

# Power IQ 8.0.0 User Guide



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# What's New in Power IQ 8.0.0

See the release notes for details on these and other enhancements.

- [Raritan Electronic Door Lock Authorization](#)
- [New Side Bar Navigation Settings Menu](#)



# The Term "PDU" in Power IQ

In the GUI and in this documentation, Power IQ uses the term PDU to encompass any device that Power IQ polls to gather power or sensor data. In some cases, PDU and Facility Item may be used interchangeably.

When you see the terms PDU and Facility Items in the product interface, remember that they include every polled object: rack PDUs, CRACs, floor PDUs, floor UPSs, power panels, standalone meters, and environmental sensor aggregators.

In this guide, the following terms are also used:

- Rack PDU
- Facility Items: CRAC, floor PDU, floor UPS, power panel, and standalone meter.



# Chapter 1: Installing the Power IQ Application

Power IQ 5.1.2 and higher support both VMware ESX/ESXi and Microsoft Hyper-V virtual machines. Power IQ 6.1.0 introduces Linux KVM support. Click below to jump to the appropriate installation instructions.

- [Installing Power IQ with VMware below](#)
- [Installing Power IQ with Hyper-V on page 47](#)
- [Installing Power IQ with KVM on page 67](#)

## Preparing to Install Power IQ

1. Download the Power IQ .ISO file from the Sunbird Support portal at <https://support.sunbirdcim.com>.

## Installing Power IQ with VMware

---

*Note: If you obtained Power IQ as a VMware application, you must install it on a VMware ESX/ESXi Server.*

---

These requirements are based on the following assumptions:

- 5 minute standard polling
- Mechanical Hard Drives (HDD)
- 54 outlets per PDU

## Outlet-Metered Rack PDUs

Minimum Configuration (Number of PDUs)*	RAM (GB)	CPU (Cores)	Datastore (GB)	OS	VMware
Up to 100	8	4	160 or more	CentOS 64-Bit	ESX/ESXi
101-1500	16	8	160 or more	CentOS 64-Bit	ESX/ESXi
1501-3000	32	16	160 or more	CentOS 64-Bit	ESX/ESXi
3001-5000	64	24	160 or more	CentOS 64-Bit	ESX/ESXi
5001-6000	128	32	160 or more	CentOS 64-Bit	ESX/ESXi

## Inlet-Metered Rack PDUs

Minimum Configuration (Number of PDUs)*	RAM (GB)	CPU (Cores)	Datastore (GB)	Linux
Up to 100	8	4	160 or more	KVM
101-1500	16	8	160 or more	KVM
1501-5000	32	16	160 or more	KVM
5001-7000	64	24	160 or more	KVM
7001-10000	128	32	160 or more	KVM

---

*Note: Power IQ performance can vary widely due to a number of factors including but not limited to, the number of concurrent users, network bandwidth and the types of PDUs (some PDUs provide MUCH more data than others)*

---

*Note: Performance can be improved significantly by using Solid State Drives (SSD) in place of the mechanical hard drives.*

---

## Create the Virtual Machine and Install the ISO (VMware)

This section walks you through creating the virtual machine and installing the ISO using VMware. See the [Virtual Machine Requirements](#) in the online help for information on the number of virtual processors and the amount of memory allocated for the virtual machine.

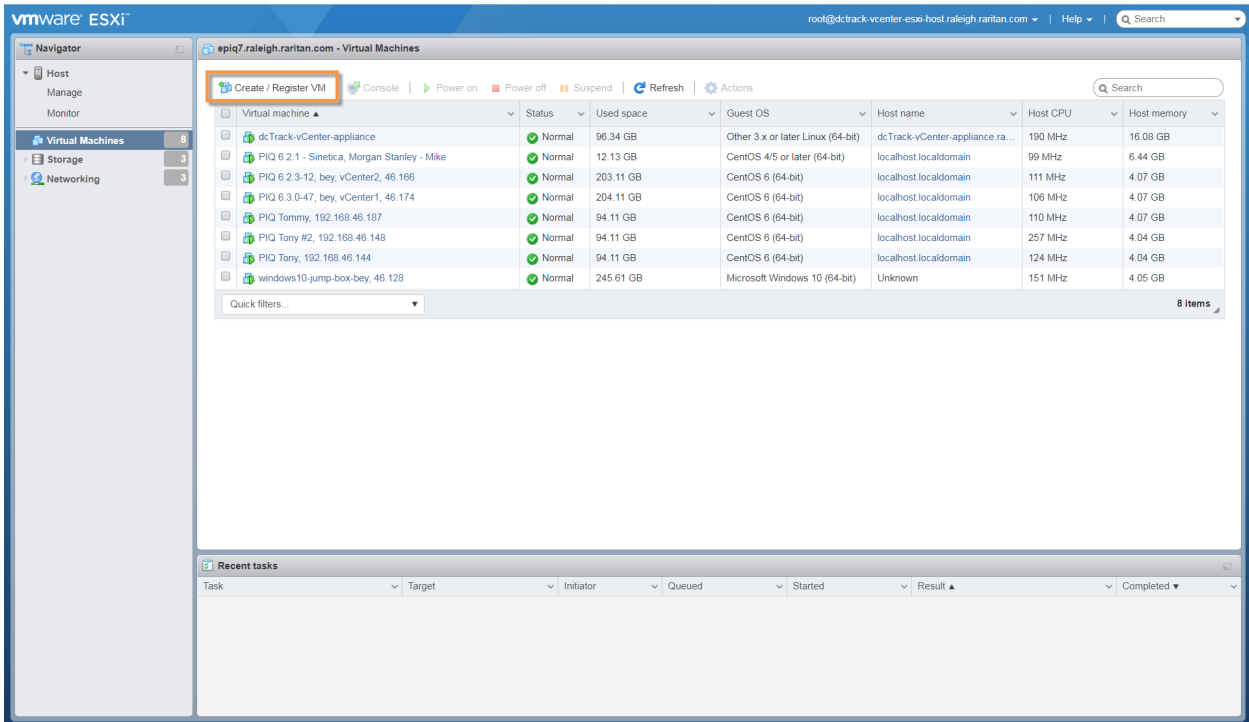
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*Note: The following steps are provided as an example of a VMware virtual machine installation. If you are using Hyper-V, see [Create the Virtual Machine and Install the ISO \(Hyper-V\)](#) in the Power IQ online help. If you are using Linux, see [Create the Virtual Machine and Install the ISO \(KVM\)](#) in the Power IQ online help.*

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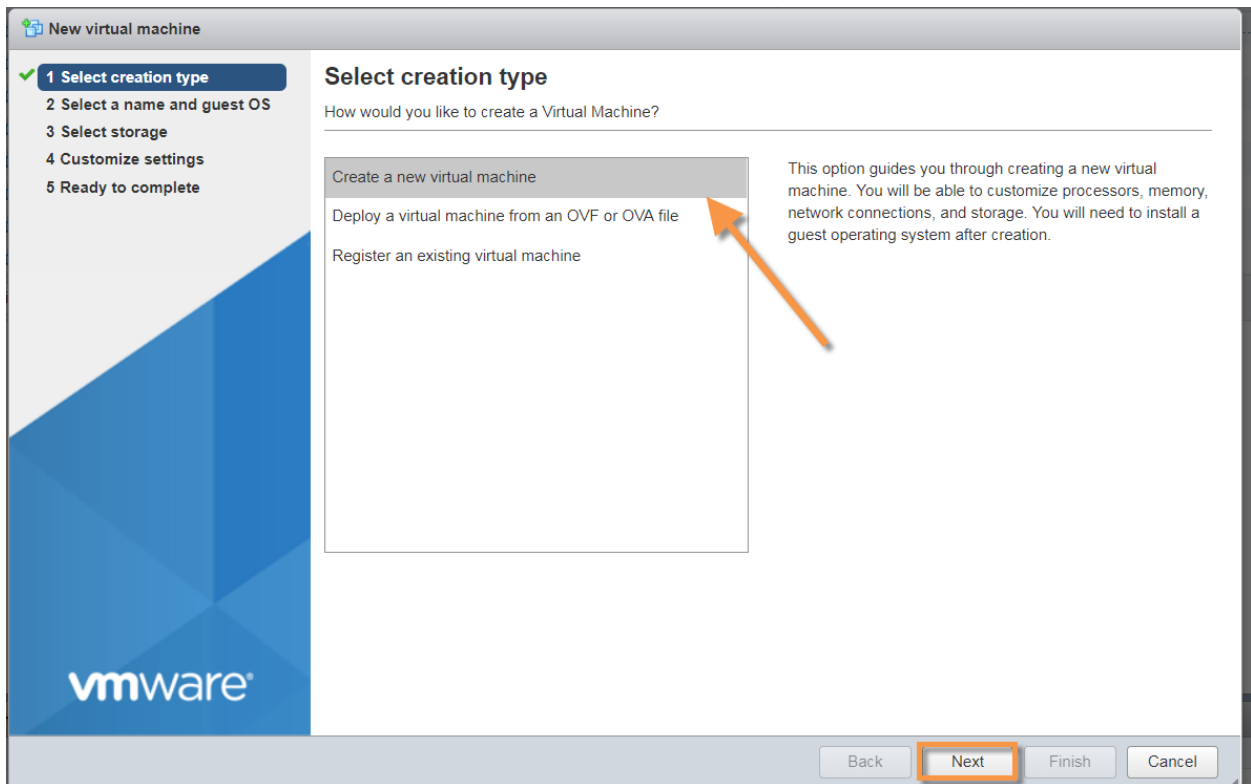
1. Connect to the VMware server using the VMware ESXi 6.5 web GUI.
2. Ensure you are logged in as a user that has permission to create, start, and stop virtual machines.
3. On the Virtual Machine page (check that Virtual Machines is selected in the left Navigator pane), click Create/Register VM.





- The New virtual machine wizard opens. In Step 1 of the New virtual machine wizard, Select the Create a new virtual machine option. Click the Next button.





5. On Step 2, type in the name of your virtual machine and select the Guest OS family and versions. For the Guest OS family, select Linux. For the Guest OS version, select CentOS 8 (64-bit) or higher. If CentOS 8 (64-bit) is not avail-

able, select Other Linux (64-bit). Click the Next button.

New virtual machine **Power IQ 8.0.0** (ESXi 6.5 virtual machine)

- 1 Select creation type
- 2 Select a name and guest OS**
- 3 Select storage
- 4 Customize settings
- 5 Ready to complete

### Select a name and guest OS

Specify a unique name and OS

Name

Virtual machine names can contain up to 80 characters and they must be unique within each ESXi instance.

Identifying the guest operating system here allows the wizard to provide the appropriate defaults for the operating system installation.


Compatibility

Guest OS family

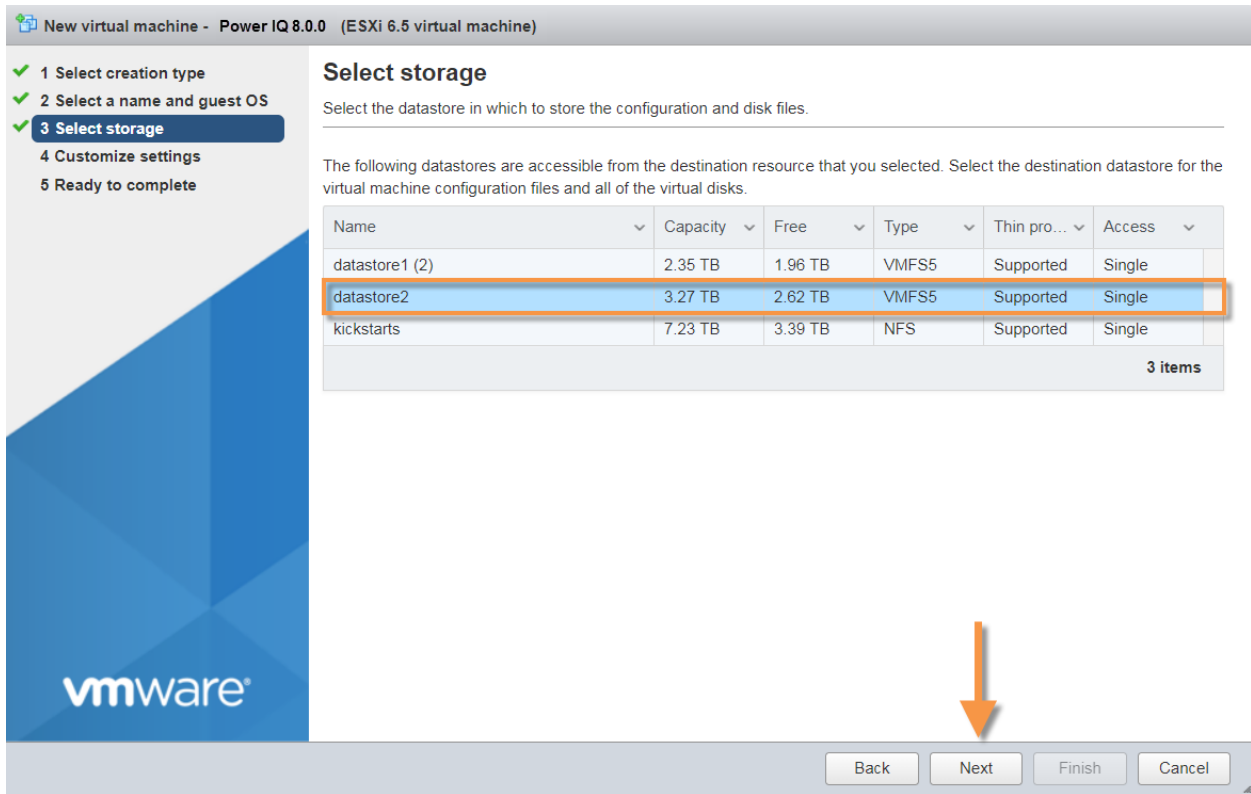
Guest OS version

vmware

Back Next Finish Cancel



6. On Step 3, select a destination storage location for the virtual machine files. Click the Next button.



New virtual machine - Power IQ 8.0.0 (ESXi 6.5 virtual machine)

- ✓ 1 Select creation type
- ✓ 2 Select a name and guest OS
- ✓ 3 Select storage
- 4 Customize settings
- 5 Ready to complete

### Select storage

Select the datastore in which to store the configuration and disk files.

The following datastores are accessible from the destination resource that you selected. Select the destination datastore for the virtual machine configuration files and all of the virtual disks.

Name	Capacity	Free	Type	Thin pro...	Access
datastore1 (2)	2.35 TB	1.96 TB	VMFS5	Supported	Single
datastore2	3.27 TB	2.62 TB	VMFS5	Supported	Single
kickstarts	7.23 TB	3.39 TB	NFS	Supported	Single

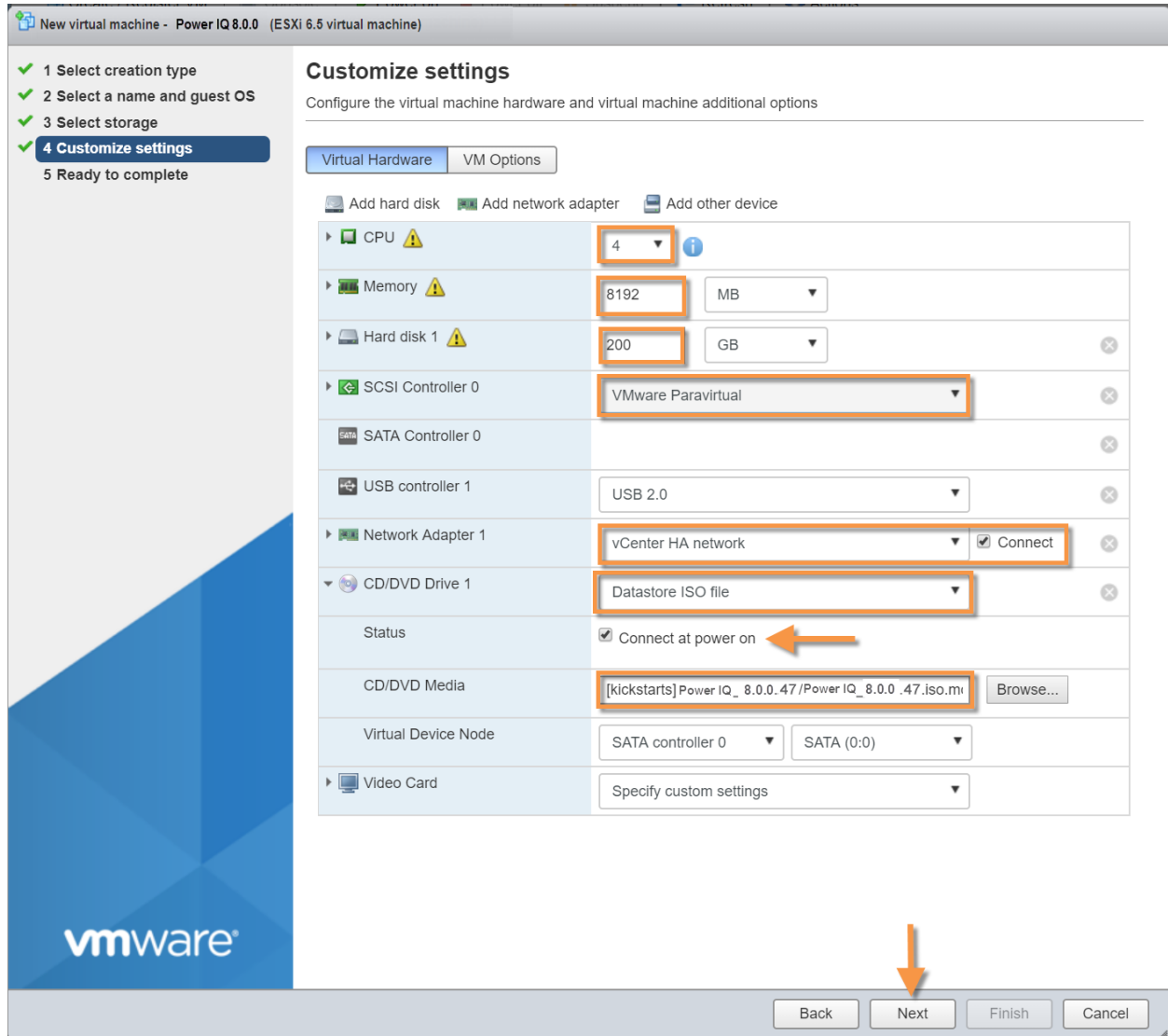
3 items

7. On Step 4, configure the VM hardware with the appropriate specifications based on the [Virtual Machine Requirements and Recommendations](#) for VMware and your network. In this example, the following specifications are used:
- a. CPU: 4 (Note: Adjust the number of CPUs allocated for the virtual machine based on your minimum configuration or number of PDUs.)
  - b. Memory: 8192 MB (Note: Adjust the amount of memory allocated for the virtual machine to at least the minimum required.)
  - c. Hard disk: 200 GB (Note: 160 GB is the recommended minimum.)
    - a. Expand the Hard Disk options by clicking the arrow to the left of the field.
    - b. Under Disk Provisioning, select one of the following depending on your needs.
      - i. Thin Provision to save storage space. For the thin disk, you provision as much datastore space as the disk would require based on the value that you enter for the disk size. However, the thin disk starts small and at first, uses only as much datastore space as the disk needs for its initial operations.
      - ii. Thick Provisioned, Lazily Zeroed. Creates a virtual disk in a default thick format. Space required for the virtual disk is allocated when the virtual disk is created. Data remaining on the physical device is not erased during creation, but is zeroed out on demand at a later time on first write from the virtual machine.
      - iii. Thick Provisioned, Eager Zeroed. A type of thick virtual disk that supports clustering features such as Fault Tolerance. Space required for the virtual disk is allocated at creation time. In contrast to the flat format, the data remaining on the physical device is zeroed out when the

virtual disk is created. It might take much longer to create disks in this format than to create other types of disks.

- d. SCSI Controller: VMware Paravirtual
- e. Network Adapter: Select an available network adapter based on your own configuration and access. Ensure that the Connect checkbox next to this field is checked.
- f. CD/DVD Drive: Datastore ISO file (Note: Ensure that the Connect at power box next to this field is checked.)
- g. CD/DVD Media: When you select Datastore ISO file in the previous field, you will be prompted to select an ISO image for the CDROM. Click the Browse button to select the dcTrack file for the CDROM.

Leave the other options at their default values.



**New virtual machine - Power IQ 8.0.0 (ESXi 6.5 virtual machine)**

1 Select creation type  
 2 Select a name and guest OS  
 3 Select storage  
**4 Customize settings**  
 5 Ready to complete

### Customize settings

Configure the virtual machine hardware and virtual machine additional options

Virtual Hardware   VM Options

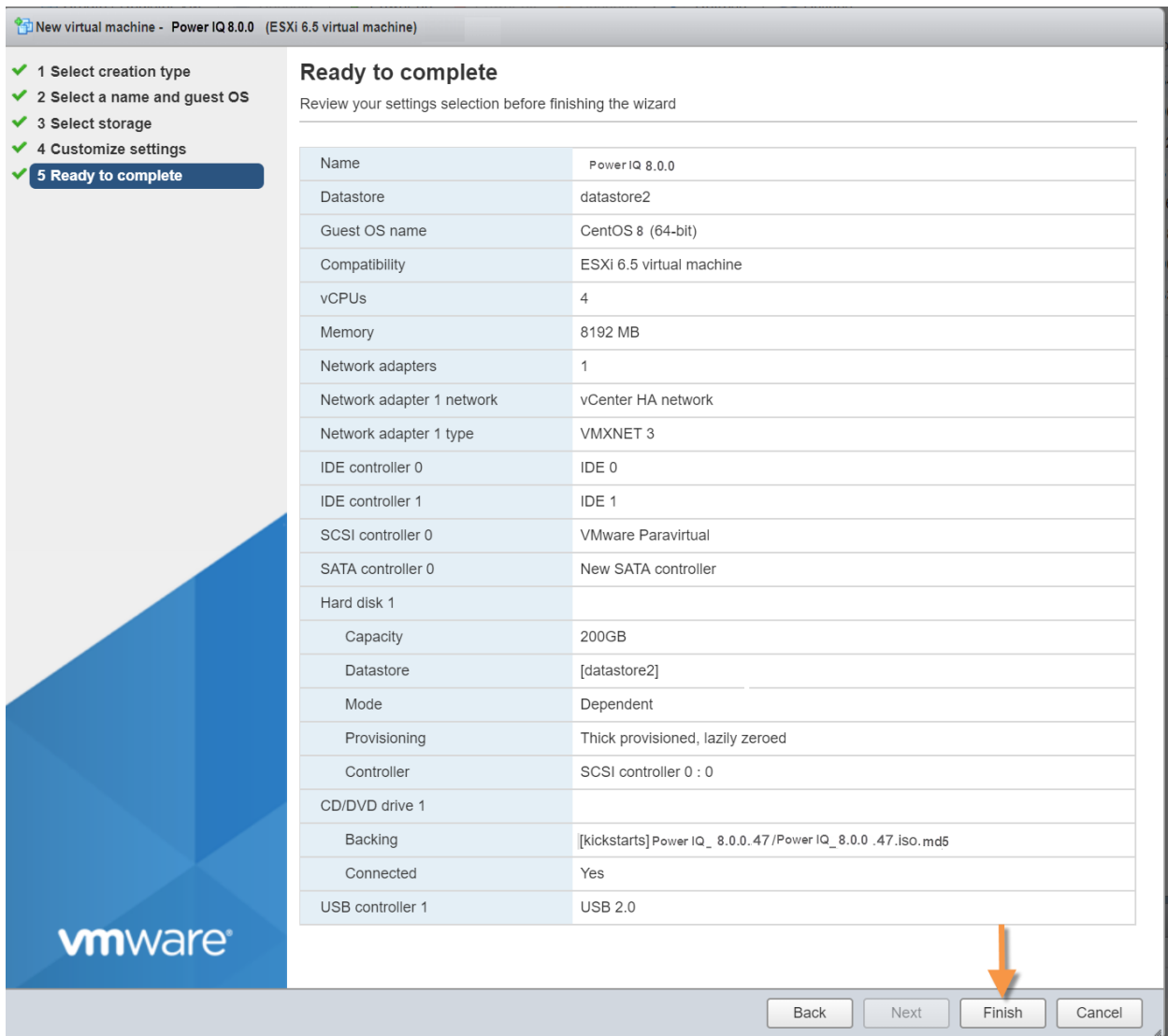
Add hard disk    Add network adapter    Add other device

CPU	4	
Memory	8192	MB
Hard disk 1	200	GB
SCSI Controller 0	VMware Paravirtual	
SATA Controller 0		
USB controller 1	USB 2.0	
Network Adapter 1	vCenter HA network	<input checked="" type="checkbox"/> Connect
CD/DVD Drive 1	Datastore ISO file	
Status	<input checked="" type="checkbox"/> Connect at power on	
CD/DVD Media	[kickstarts]Power IQ_ 8.0.0.47/Power IQ_ 8.0.0 .47.iso.mi	<input type="button" value="Browse..."/>
Virtual Device Node	SATA controller 0	SATA (0:0)
Video Card	Specify custom settings	

vmware

Back   **Next**   Finish   Cancel

8. On Step 5, review your selections. Click Finish to create the virtual machine.



New virtual machine - Power IQ 8.0.0 (ESXi 6.5 virtual machine)

- ✓ 1 Select creation type
- ✓ 2 Select a name and guest OS
- ✓ 3 Select storage
- ✓ 4 Customize settings
- ✓ 5 Ready to complete

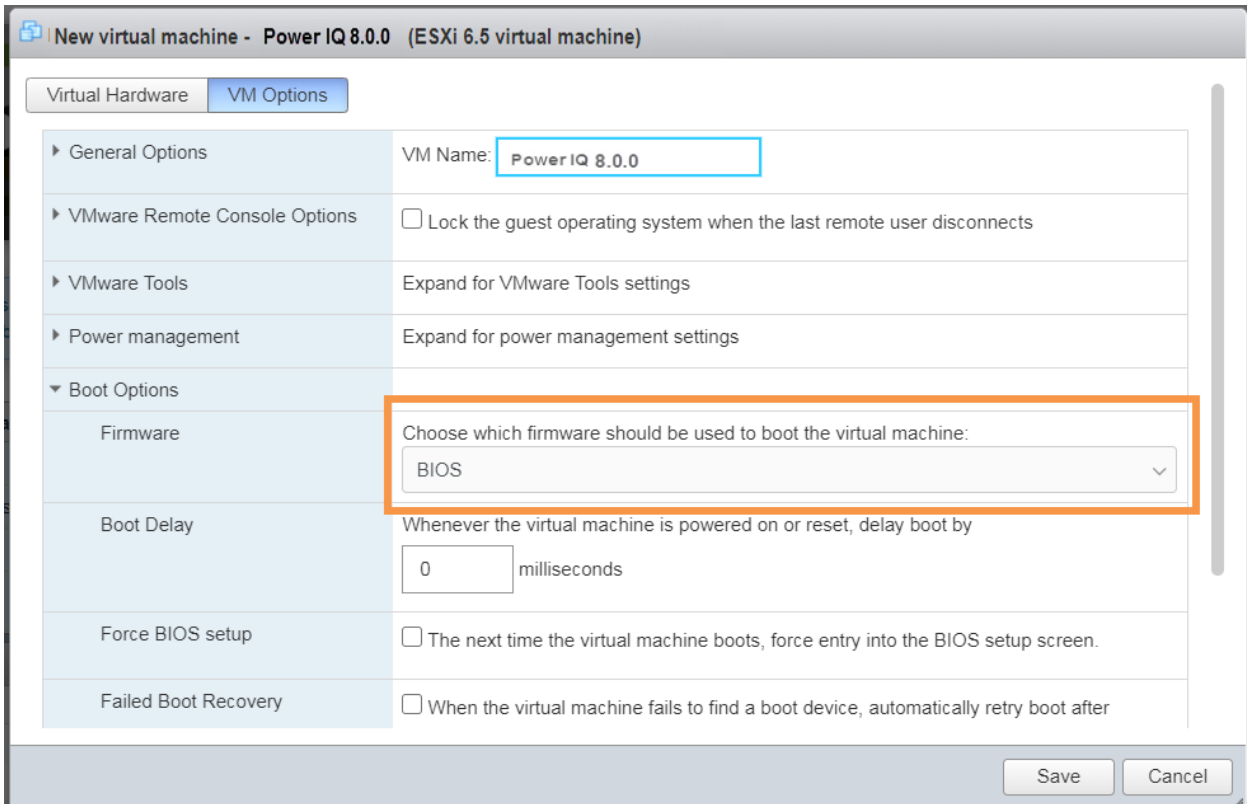
### Ready to complete

Review your settings selection before finishing the wizard

Name	Power IQ 8.0.0
Datastore	datastore2
Guest OS name	CentOS 8 (64-bit)
Compatibility	ESXi 6.5 virtual machine
vCPUs	4
Memory	8192 MB
Network adapters	1
Network adapter 1 network	vCenter HA network
Network adapter 1 type	VMXNET 3
IDE controller 0	IDE 0
IDE controller 1	IDE 1
SCSI controller 0	VMware Paravirtual
SATA controller 0	New SATA controller
Hard disk 1	
Capacity	200GB
Datastore	[datastore2]
Mode	Dependent
Provisioning	Thick provisioned, lazily zeroed
Controller	SCSI controller 0 : 0
CD/DVD drive 1	
Backing	[kickstarts]Power IQ_ 8.0.0.47/Power IQ_ 8.0.0 .47.iso.md5
Connected	Yes
USB controller 1	USB 2.0

Back Next **Finish** Cancel

9. Verify the Firmware option is set to BIOS. This may be set to EFI by default, but you must change it to BIOS to ensure the VM can be booted successfully.



10. Power on your virtual machine.

## Install the Application on the Virtual Machine (VMware)

1. Select VM and right click Edit Settings.
2. Select Options > Advanced > Boot Options and select *Force BIOS Setup*.
3. Click "Power on" to power up the virtual machine.
4. Click on the CD/DVD ROM icon at the top of the console window and select "Connect to ISO image on datastore."
5. Locate and upload the ISO file you saved locally after downloading it from the [Sunbird Support portal](#).
6. Select the datastore.
7. Select the ISO.
8. Click on the Console tab, then click inside the console window.
9. Verify in the BIOS Boot menu that the CD-ROM has priority over the hard drive.
10. Exit the BIOS by selecting Exit Saving Changes and pressing the Enter key. The Kickstart page opens.
11. Press Enter to begin the installation.
12. When the installation completes, press Enter. The virtual machine reboots and then displays a console prompt.

## Installing Power IQ with Hyper-V



## Virtual Machine Requirements (Hyper-V)

### Outlet-Metered Rack PDUs

Minimum Configuration (Number of PDUs)*	RAM (GB)	CPU (Cores)	Datastore (GB)	Microsoft
Up to 100	8	4	160 or more	Hyper-V
101-1500	16	8	160 or more	Hyper-V
1501-3000	32	16	160 or more	Hyper-V
3001-5000	64	24	160 or more	Hyper-V
5001-6000	128	32	160 or more	Hyper-V

### Inlet-Metered Rack PDUs

Minimum Configuration (Number of PDUs)*	RAM (GB)	CPU (Cores)	Datastore (GB)	Linux
Up to 100	8	4	160 or more	Hyper-V
101-1500	16	8	160 or more	Hyper-V
1501-5000	32	16	160 or more	Hyper-V
5001-7000	64	24	160 or more	Hyper-V
7001-10000	128	32	160 or more	Hyper-V

\*These requirements assume the following: 32 outlets per facility item, 10-minute data polling interval, and 10-minute health polling rate. For facility items that support data logging, a 10-minute sample rate is supported for the configurations provided in the table.

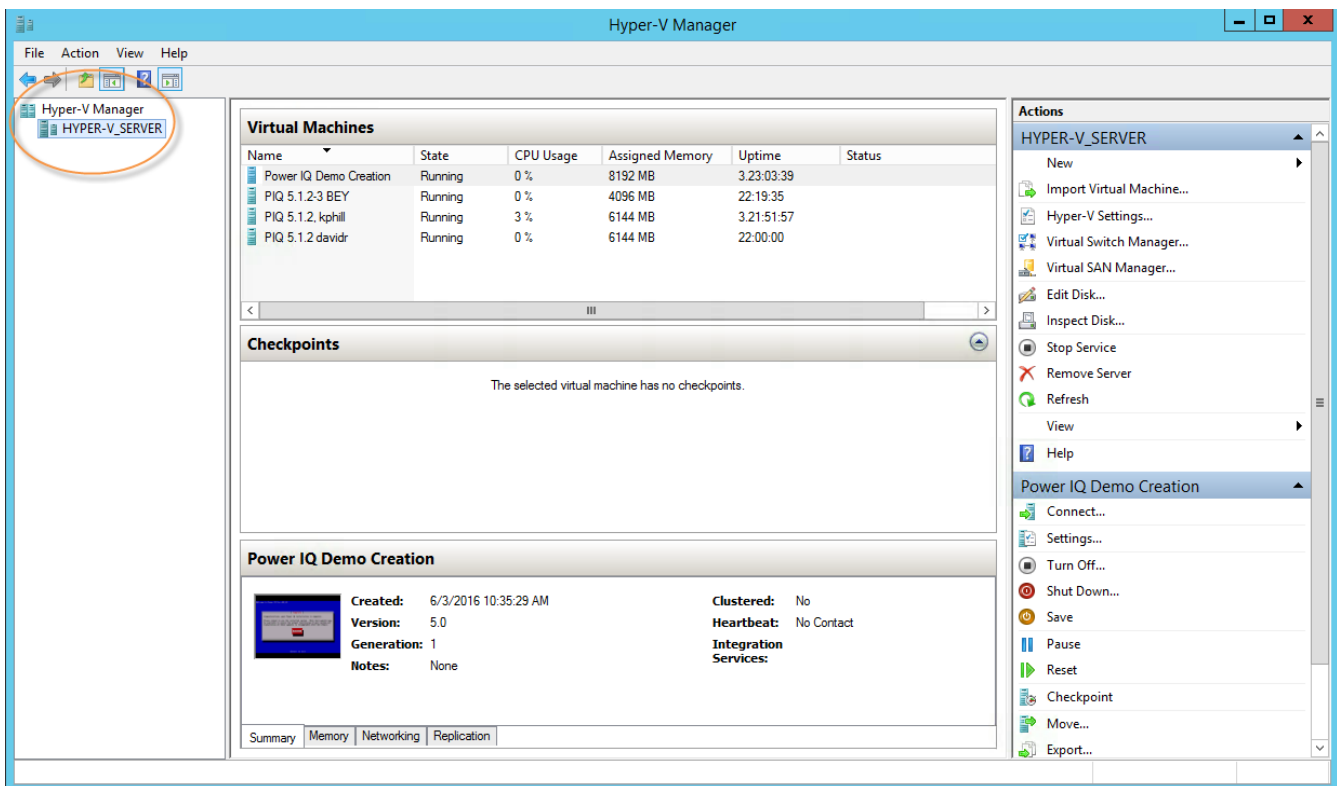


## Create the Virtual Machine and Install the ISO (Hyper-V)

This section walks you through creating the virtual machine and installing the ISO using Hyper-V. See [Virtual Machine Requirements](#) in the Power IQ online help for information on the recommended number of virtual processors and the amount of memory allocated for the virtual machine.

*Note: The following steps are provided as recommended guidelines for a virtual machine installation using Microsoft Hyper-V. If you are using VMware, see [Create the Virtual Machine and Install the ISO \(VMware\)](#) in the Power IQ online help. If you are using Linux, see [Create the Virtual Machine and Install the ISO \(KVM\)](#) in the Power IQ online help.*

1. Open Hyper-V Manager. From the left navigation pane in Hyper-V Manager, select the machine running Hyper-V.

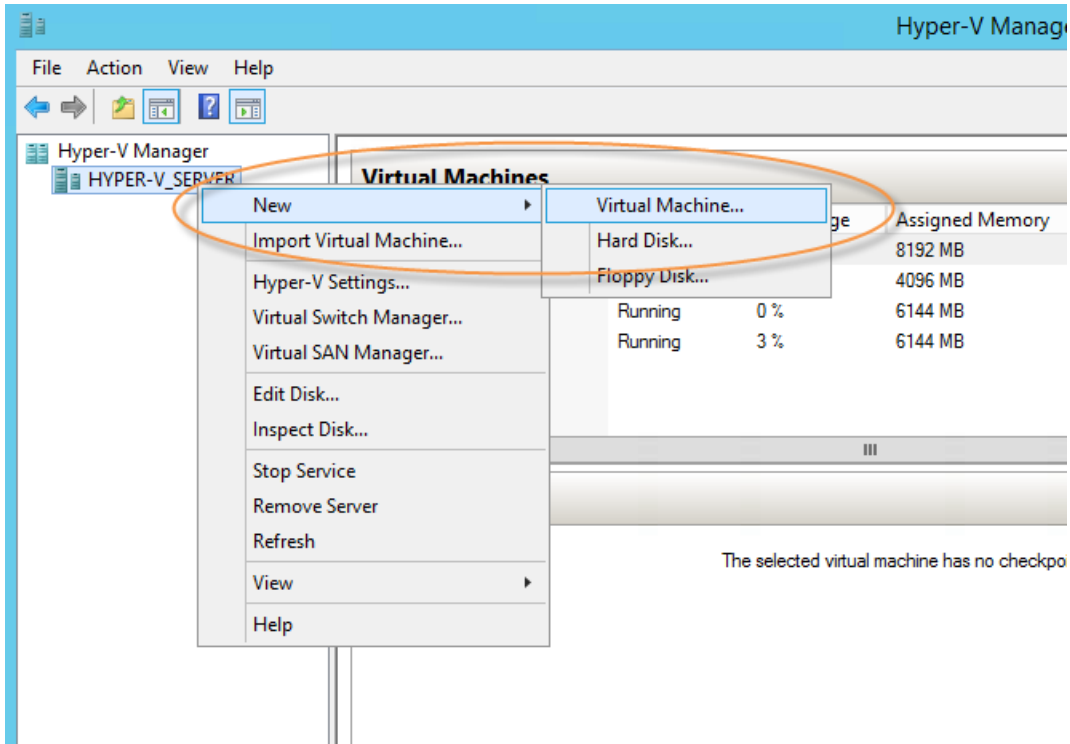


2. Right-click on the machine running Hyper-V and select New > Virtual Machine.

---

*Note: Alternatively, in the Actions pane on the right, select New > Virtual Machine.*

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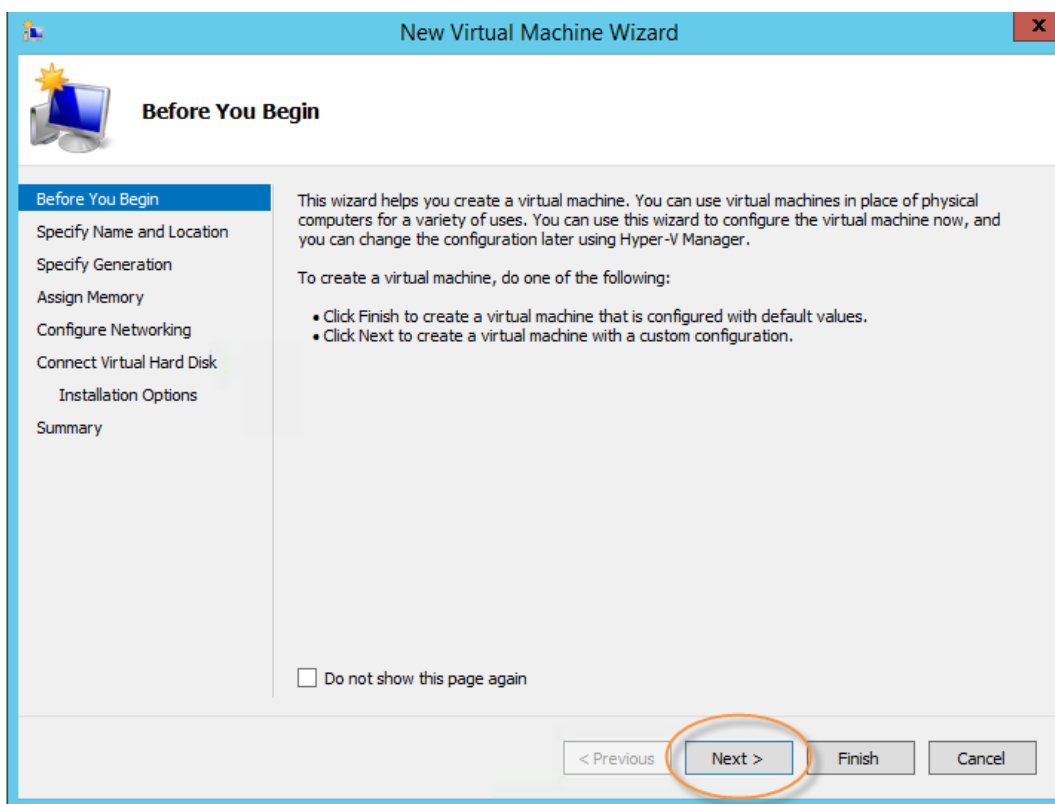
3. The New Virtual Machine wizard launches. On the Before You Begin page, click Next.

---

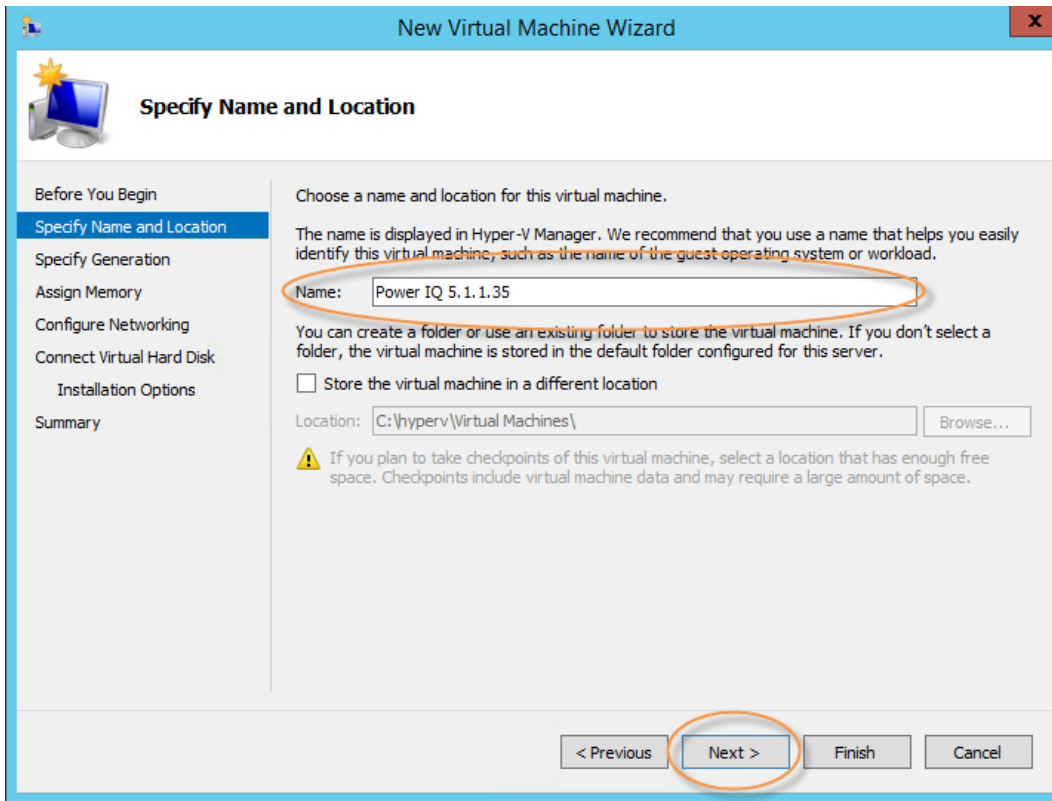
*Note: The New Virtual Machine wizard walks you through two different ways to create a virtual machine: default and customized. You must click Next to create a customized virtual machine with the values required to run PowerIQ. If you click Finish, the wizard creates a virtual machine with a default configuration.*

---


Throughout the New Virtual Machine wizard, click Next to proceed to the following page. To make changes to your previously selected options, click Previous or navigate to the appropriate page through the navigational pane on the left.



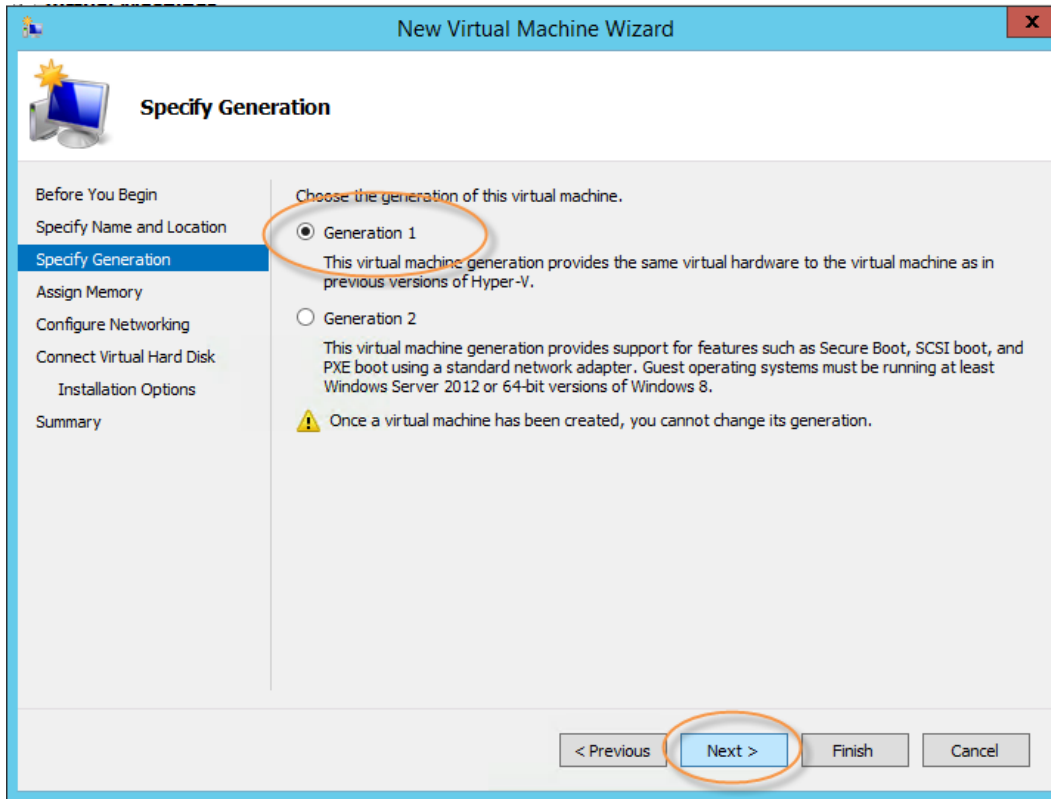
4. On the Specify Name and Location page, enter the name of the virtual machine and click Next.



The screenshot shows the 'New Virtual Machine Wizard' dialog box, specifically the 'Specify Name and Location' step. The dialog has a blue title bar and a sidebar on the left with navigation options: 'Before You Begin', 'Specify Name and Location' (selected), 'Specify Generation', 'Assign Memory', 'Configure Networking', 'Connect Virtual Hard Disk', 'Installation Options', and 'Summary'. The main area contains the following text and controls:

- Section: **Specify Name and Location**
- Instruction: Choose a name and location for this virtual machine.
- Text: The name is displayed in Hyper-V Manager. We recommend that you use a name that helps you easily identify this virtual machine, such as the name of the guest operating system or workload.
- Form: Name:  (circled in orange)
- Text: You can create a folder or use an existing folder to store the virtual machine. If you don't select a folder, the virtual machine is stored in the default folder configured for this server.
- Form:  Store the virtual machine in a different location
- Form: Location:
- Warning:  If you plan to take checkpoints of this virtual machine, select a location that has enough free space. Checkpoints include virtual machine data and may require a large amount of space.
- Buttons: < Previous,  (circled in orange), Finish, Cancel

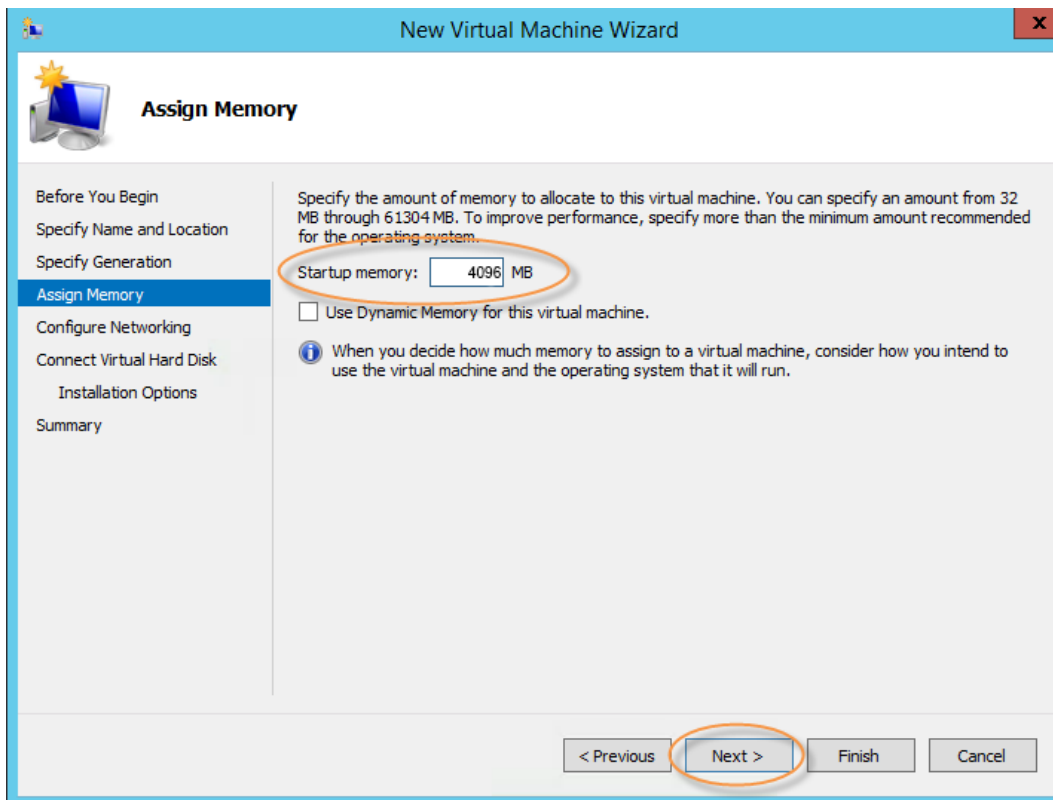
5. On the Specify Generation page, select Generation 1 and click Next.



6. On the Assign Memory page, enter 4096 MB as the amount of RAM to allocate to the virtual machine and click Next.

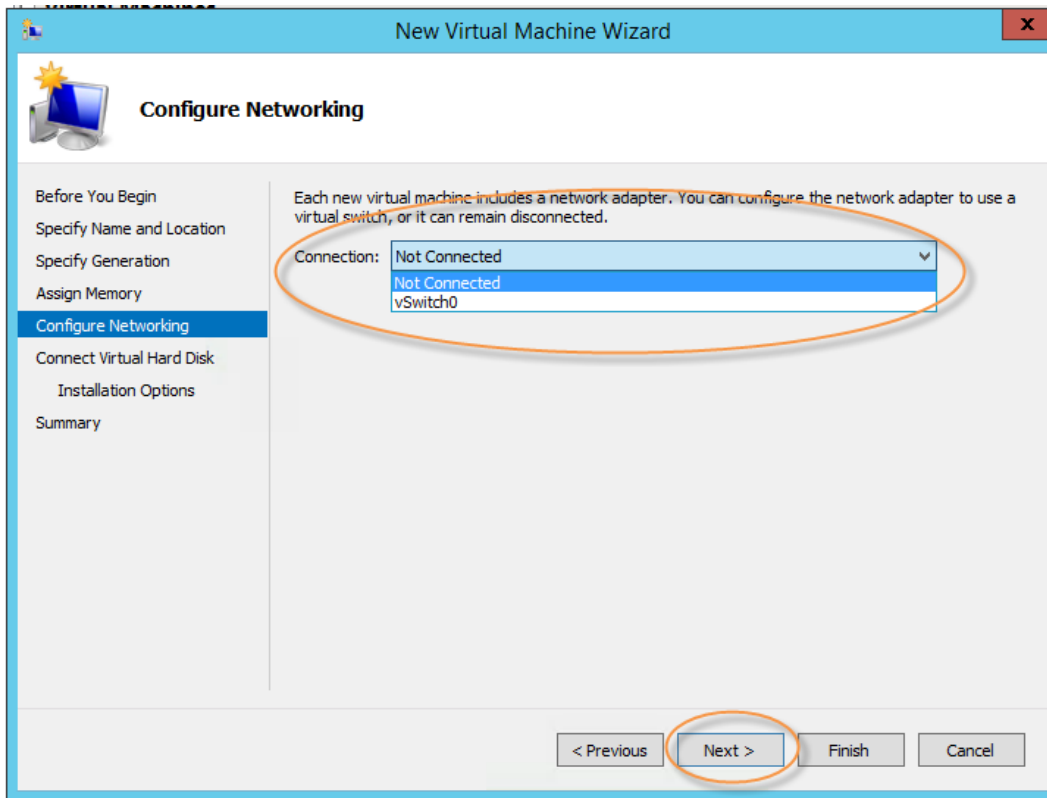
*Note: When initially installing Power IQ, you must use the minimal amount (4GB) of RAM. After completing the installation, power off the virtual machine and increase the allocation to the recommended RAM or greater.*

*Note: It is strongly recommended that you do not use Dynamic Memory for the virtual machine. If Dynamic Memory is enabled, Power IQ will balloon its memory and will not release the memory for other hypervisor guests.*

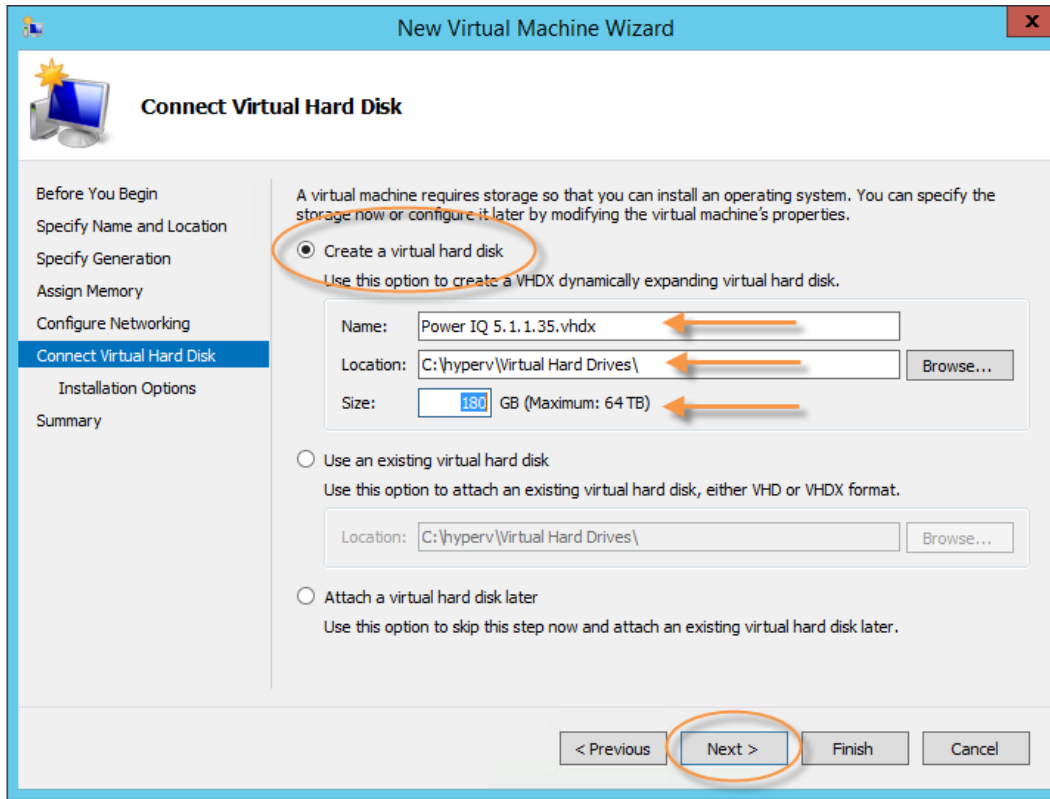


7. On the Configure Networking page, select the appropriate connection and click Next.

*Note: Running Hyper-V on Microsoft Windows Server 2012 or Windows Server 2012 R2 with Broadcom NetXtreme 1-gigabit network adapters may result in loss of network connectivity and/or unusually slow performance. For more information on troubleshooting this issue, see [this Microsoft KB article](#).*



8. On the Connect Virtual Hard Disk page, select Create a Virtual Hard Disk. Enter the Name, Location, and Size for the virtual hard disk. Click Next.




**New Virtual Machine Wizard**


### Connect Virtual Hard Disk


Before You Begin  
Specify Name and Location  
Specify Generation  
Assign Memory  
Configure Networking  
**Connect Virtual Hard Disk**  
Installation Options  
Summary

A virtual machine requires storage so that you can install an operating system. You can specify the storage now or configure it later by modifying the virtual machine's properties.

**Create a virtual hard disk**  
Use this option to create a VHDX dynamically expanding virtual hard disk.

Name:  

Location:  

Size:  GB (Maximum: 64 TB) 

Use an existing virtual hard disk  
Use this option to attach an existing virtual hard disk, either VHD or VHDX format.

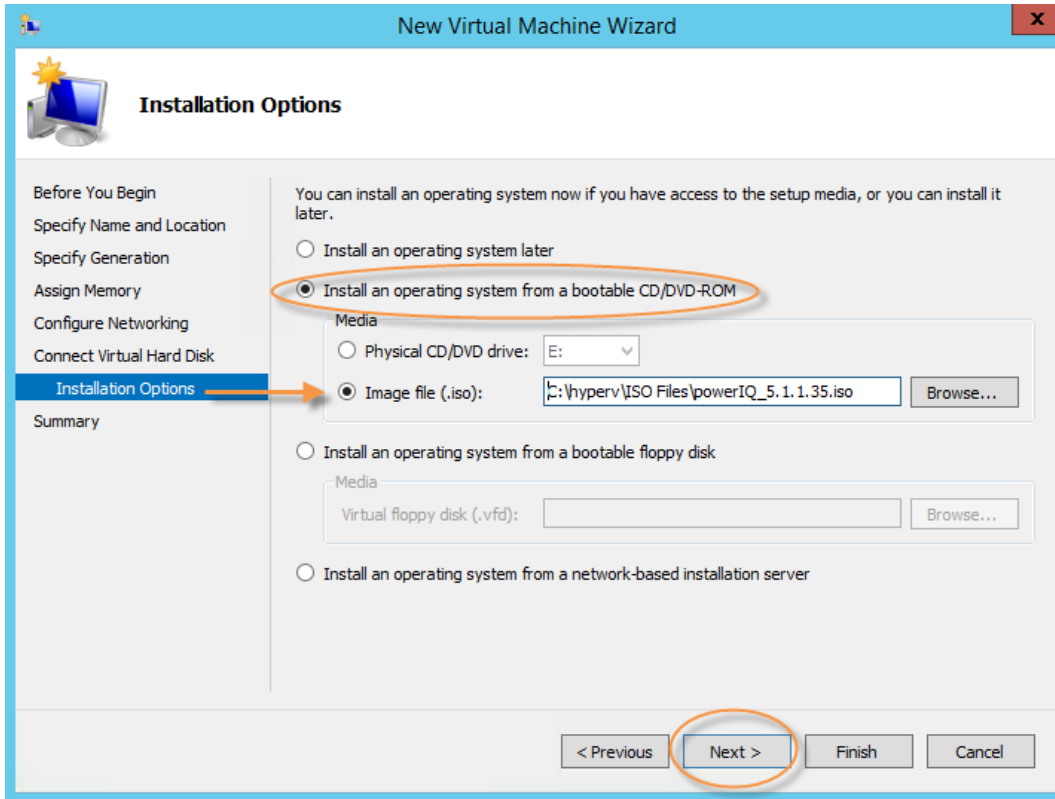
Location:

Attach a virtual hard disk later  
Use this option to skip this step now and attach an existing virtual hard disk later.

< Previous **Next >** Finish Cancel

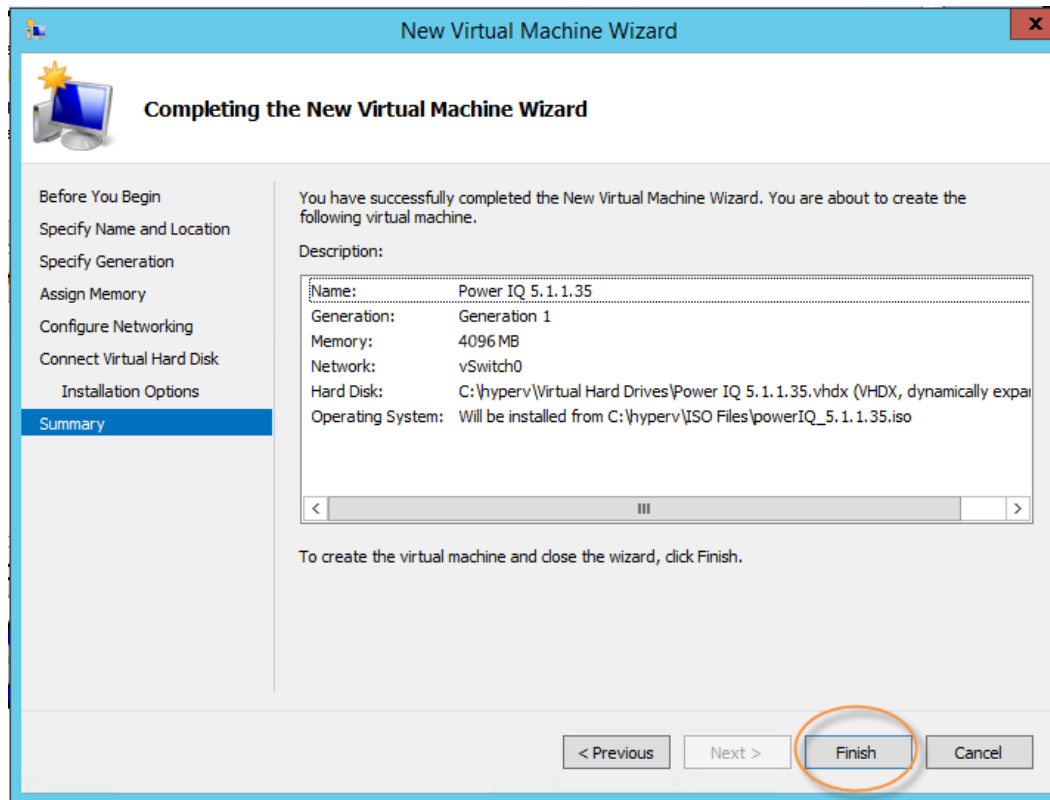


9. On the Installation Options page, select Install an operating system from a bootable CD/DVD-ROM. Select Image file (.iso) and use the Browse dialog to specify the path to the Power IQ installation file. Click Next.



10. To complete the New Virtual Machine wizard, on the Summary page, confirm your selections and click Finish.

To make changes to your previously selected options, click the Previous button or navigate to the appropriate page through the navigational pane on the left.



11. To configure the virtual machine you have just created, right-click on the virtual machine in Hyper-V Manager and click Settings.

Alternatively, in the Action pane under the virtual machine name, click Settings. When you are finished configuring your virtual machine, click Apply and OK.

---

*Note: Your settings may vary based on your installation preferences.*

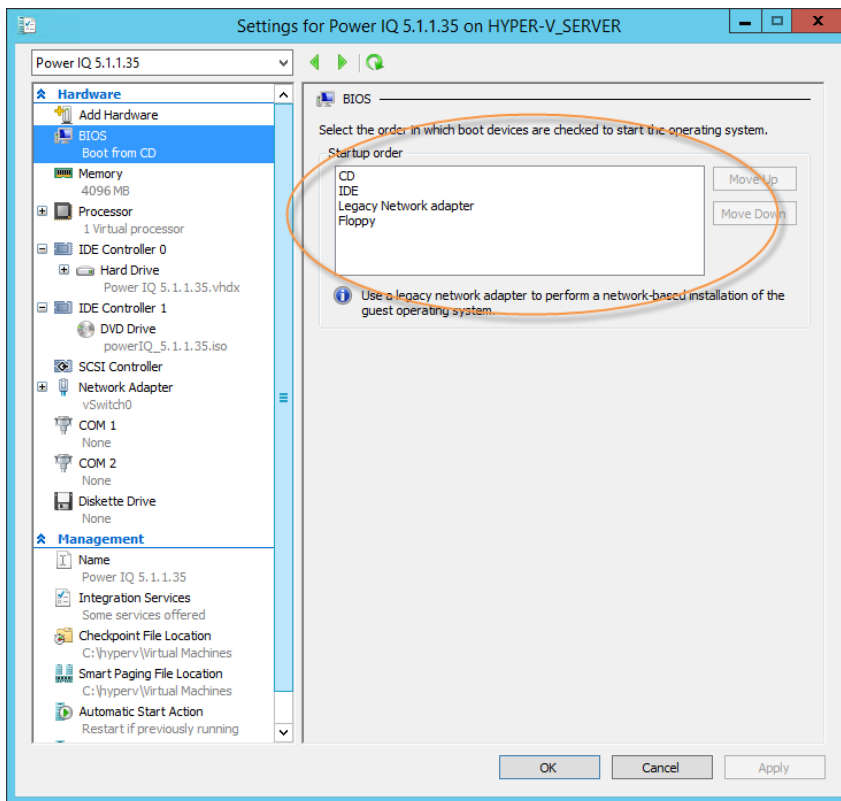
---

12. On the BIOS page, set the startup order of your boot devices. Select the device and click Move Up or Move Down to change the order.

After creating the virtual machine, you can do one of the following:

- a. Make the CD-ROM the first boot device and then disconnect the CD-ROM after installation.
- b. Make the Hard Disk the first boot device. If it is a new hard disk image, it will not have an operating system to boot and initially will boot from the CD-ROM by default.

*Note: You can change the order of your boot devices after installation.*



13. On the Memory page, you can modify the memory settings, including dynamic memory settings, for your virtual machine.

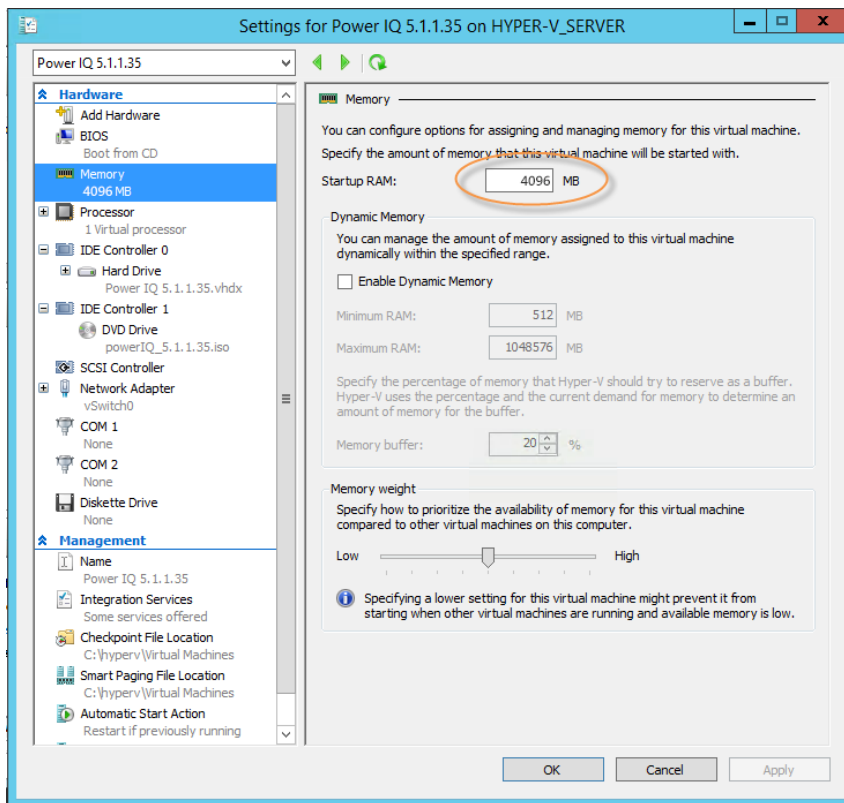
---

*Note: When initially installing Power IQ, you must use the minimal amount (4GB) of RAM. After completing the installation, power off the virtual machine and increase the allocation to the recommended RAM or greater.*

---

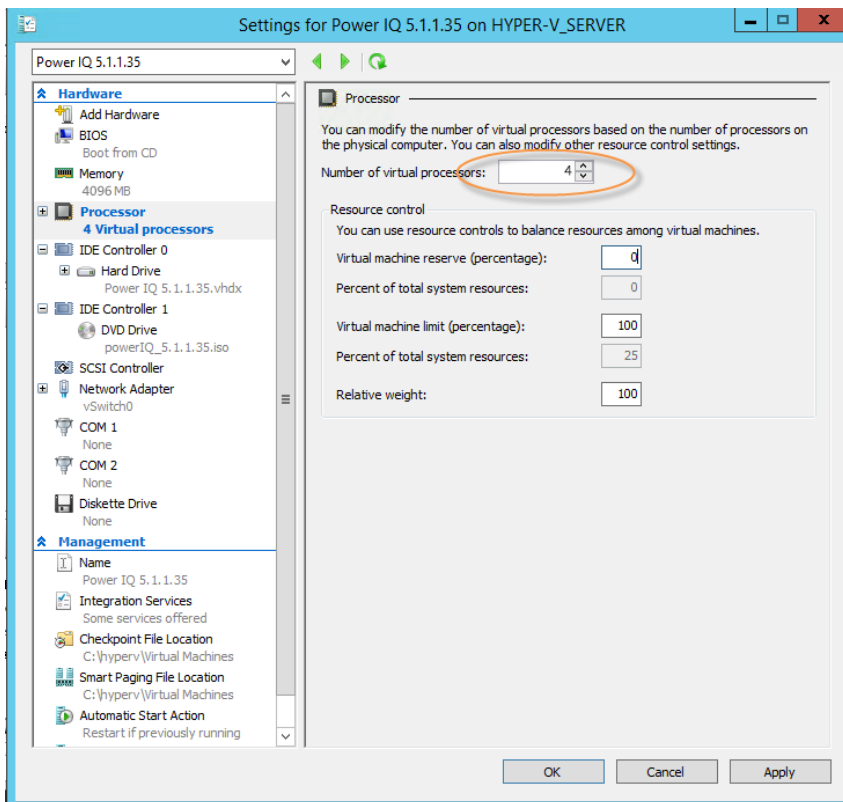
*Note: It is strongly recommended that you **do not use dynamic memory** for this virtual machine.*

---

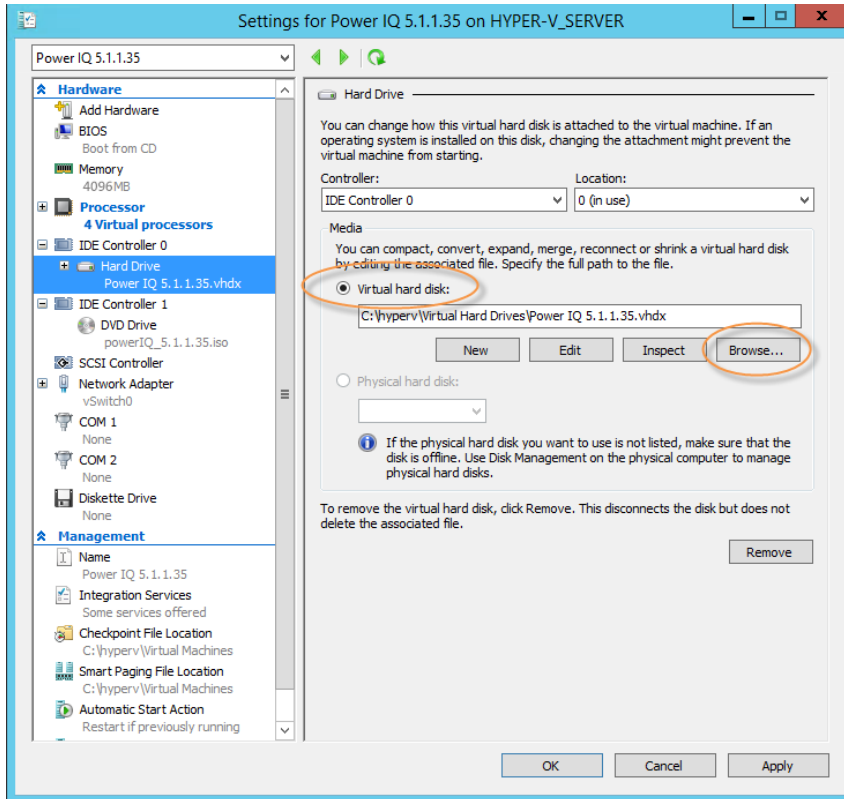


14. On the Processor page, you can specify the number of processors for your virtual machine and other resources based on the expected load. Set the number of virtual processors to four (4).

*Note: When initially installing Power IQ, you must set the number of virtual processors to four (4). After completing the installation, power off the virtual machine and increase the number of processors to the recommended allotment or greater.*

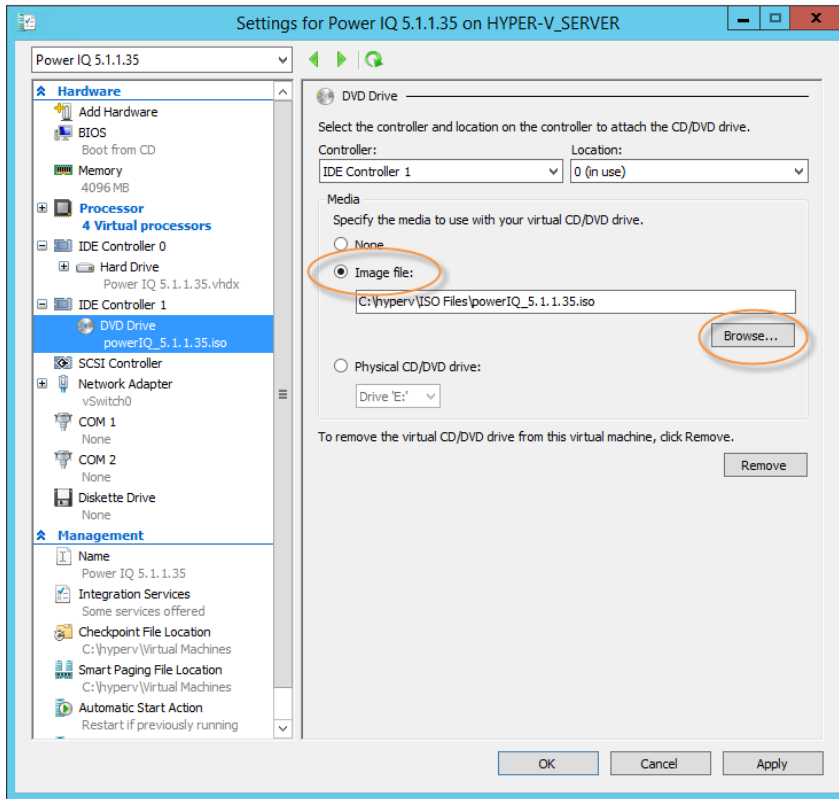


15. Under IDE Controller 0, go to the Hard Drive page. Under Media, select Virtual hard disk and use the Browse dialog to specify the path.



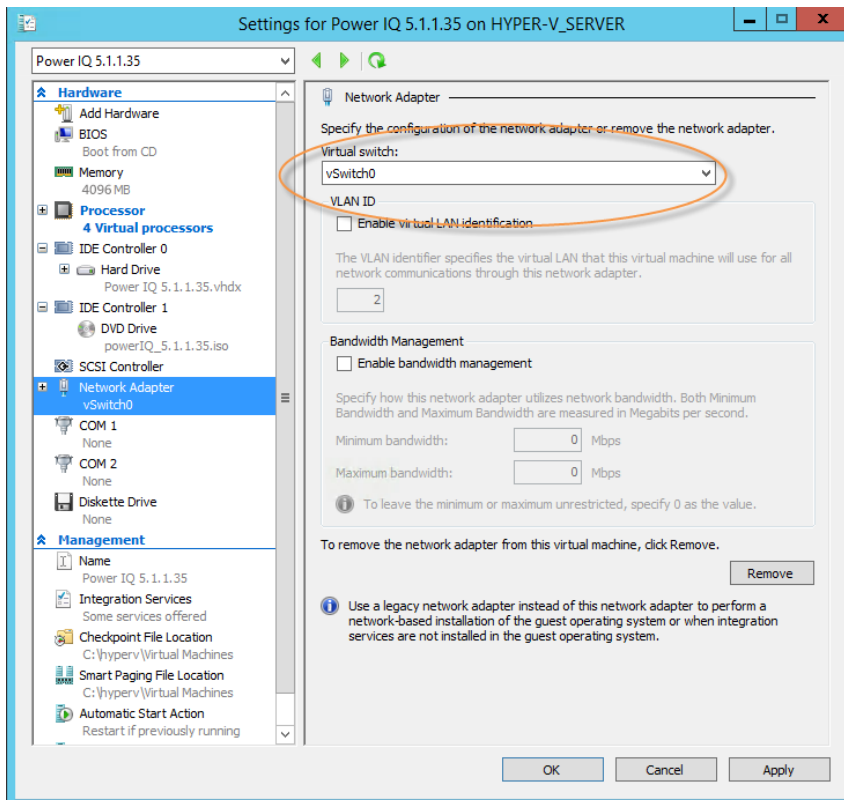
16. Under IDE Controller 1, go to the DVD Drive page. Under Media, select Image file and use the Browse dialog to specify the path to the .iso file.

*Note: Ensure that the disk image is created as an IDE device. If it is created as a SCSI device, the installation will fail.*



17. Under Network Adapter, specify the network adapter configuration.

*Note: Running Hyper-V on Microsoft Windows Server 2012 or Windows Server 2012 R2 with Broadcom NetXtreme 1-gigabit network adapters may result in loss of network connectivity and/or unusually slow performance. For more information on troubleshooting this issue, see [this Microsoft KB article](#).*

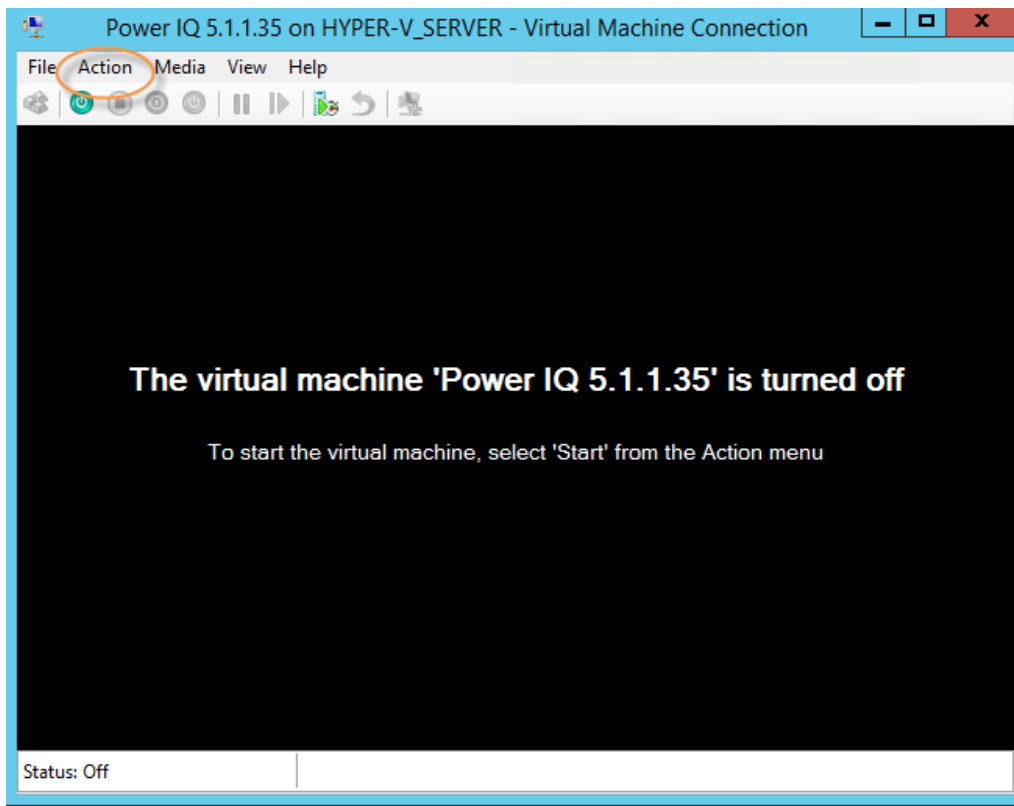


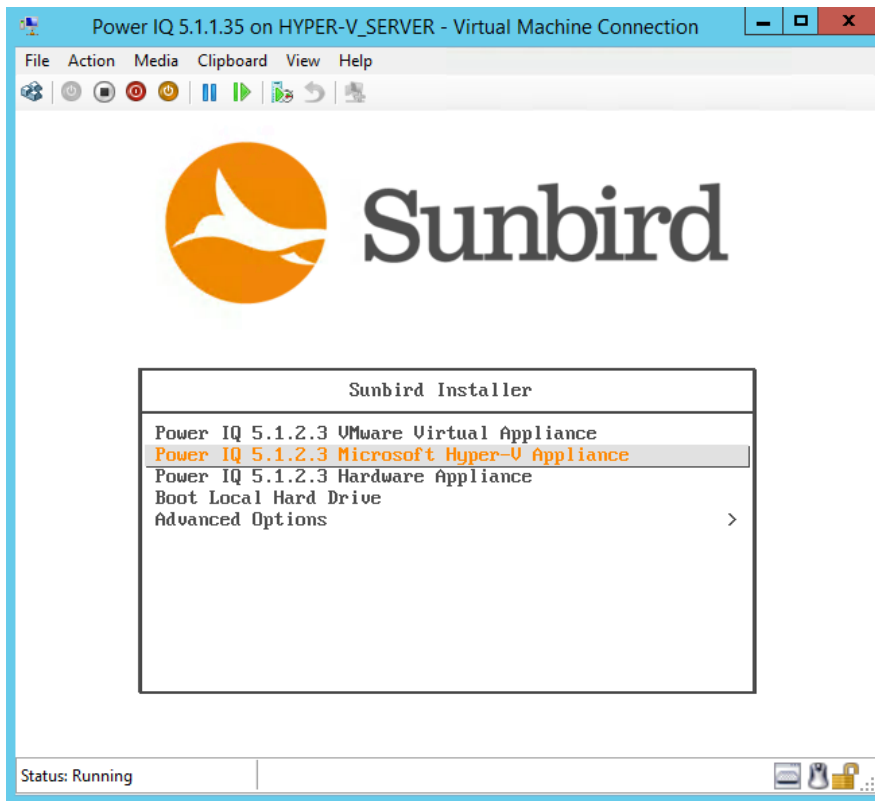


18. Click Apply and then OK.

19. In Hyper-V Manager, right-click the name of the virtual machine and click Connect. The Virtual Machine Connection tool launches.

20. From the Action menu in the Virtual Machine Connection window, click Start to power on your virtual machine and proceed with installation.





## Install the Application on the Virtual Machine (Hyper-V)

*Note: If you have not already done so, you will need to configure the virtual machine to access the installation media.*

1. Open Hyper-V Manager.
2. From the Virtual Machines pane in Hyper-V Manager, right-click the name of the virtual machine and click Connect. Alternatively, select the virtual machine, and in the Actions pane on the right, click Connect.
3. The Virtual Machine Connection tool opens.
4. From the Action menu in the Virtual Machine Connection window, click Start to power on your virtual machine.
5. The installation package loads.
6. Proceed with installation.

## Troubleshooting Power IQ Installations with Hyper-V

This section provides information for troubleshooting common issues that you may encounter when creating a virtual machine and/or installing the Power IQ application with Hyper-V. If you require further assistance, contact Sunbird Technical Support via the support portal: <https://support.sunbirdcim.com>.

## Issue: Installation fails when a large amount of memory is allocated to the virtual machine.

**Description:** When attempting to install Power IQ on a virtual machine with allocated memory greater than 4GB, the installation may fail.

**Resolution:** This issue can be resolved by installing Power IQ on a virtual machine with the minimal amount (4GB) of RAM. After completing the installation, power off the virtual machine and increase the allocation to the recommended RAM or greater. The amount of allocated RAM can be set when creating a new virtual machine (during the New Virtual Machine wizard) or on the Memory page in the Settings section after the virtual machine has been created.

## Issue: Installation fails when the virtual machine is configured for a large number of CPUs.

**Description:** When attempting to install Power IQ on a virtual machine with more than four (4) allocated virtual processors, the installation may fail.

**Resolution:** This issue can be resolved by installing Power IQ on a virtual machine with four virtual processors. After completing the installation, power off the virtual machine and increase the number of processors to the recommended allotment or greater. The number of virtual processors can be changed on the Processor page in the Settings section, after the virtual machine has been created.

## Issue: Installation fails when using a hard drive on a SCSI controller.

**Description:** When attempting to install Power IQ on a hard drive on SCSI Controller, the hard drive may fail to be detected, causing the installation to fail.

**Resolution:** Power IQ must be installed on a hard drive on an IDE controller. You can select the controller type on the Hardware page in the Settings section, after the virtual machine has been created.

## Issue: Degraded/slow performance or loss of network connectivity

**Description:** Running Hyper-V on Microsoft Windows Server 2012 or Windows Server 2012 R2 with Broadcom NetXtreme 1-gigabit network adapters may result in loss of network connectivity and/or unusually slow performance. You may see the following warning message: "Power IQ is experiencing degraded performance due to heavy load."

**Resolution:** This issue may be resolved by updating the driver version or disabling VMQ (Virtual Machine Queues) on the affected network adapters. For more information on troubleshooting this issue, see [this Microsoft KB article](#).

## Installing Power IQ with KVM



## Outlet-Metered Rack PDUs

Minimum Configuration (Number of PDUs)*	RAM (GB)	CPU (Cores)	Datastore (GB)	Linux
Up to 100	8	4	160 or more	KVM
101-1500	16	8	160 or more	KVM
1501-3000	32	16	160 or more	KVM
3001-5000	64	24	160 or more	KVM
5001-6000	128	32	160 or more	KVM

\*These requirements assume the following: 32 outlets per facility item, 10-minute data polling interval, and 10-minute health polling rate. For facility items that support data logging, a 10-minute sample rate is supported for the configurations provided in the table.

## Inlet-Metered Rack PDUs

Minimum Configuration (Number of PDUs)*	RAM (GB)	CPU (Cores)	Datastore (GB)	Linux
Up to 100	8	4	160 or more	KVM
101-1500	16	8	160 or more	KVM
1501-5000	32	16	160 or more	KVM
5001-7000	64	24	160 or more	KVM
7001-10000	128	32	160 or more	KVM

## Create the Virtual Machine and Install the ISO (KVM)

This section walks you through creating the virtual machine and installing the ISO using a Linux KVM. See the Virtual Machine Requirements in the online help for information on the number of virtual processors and the amount of memory allocated for the virtual machine.

---

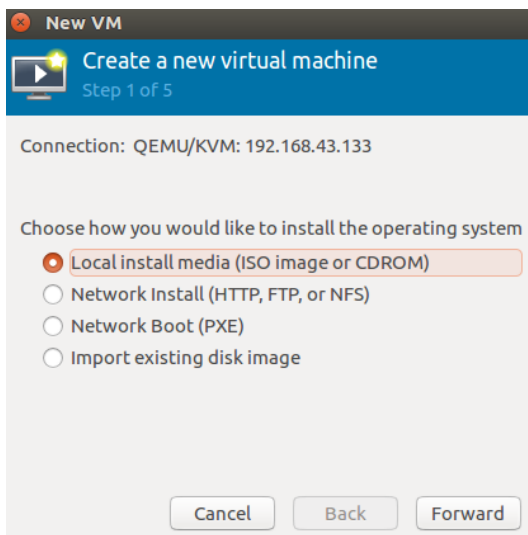
*Note: The following steps are provided as an example of a virtual machine installation using the Linux kernel-based virtual machine (KVM). If you are using Hyper-V, see [Create the Virtual Machine and Install the ISO \(Hyper-V\)](#) in the Power IQ online help. If you are using VMware, see [Create the Virtual Machine and Install the ISO \(VMware\)](#) in the Power IQ online help. Note that your instructions may differ depending on your KVM management tool.*

---

*Note: Power IQ on KVM does not support auto memory ballooning. You should set the current memory and max memory allocations for guest instances on KVM to the same value.*

---

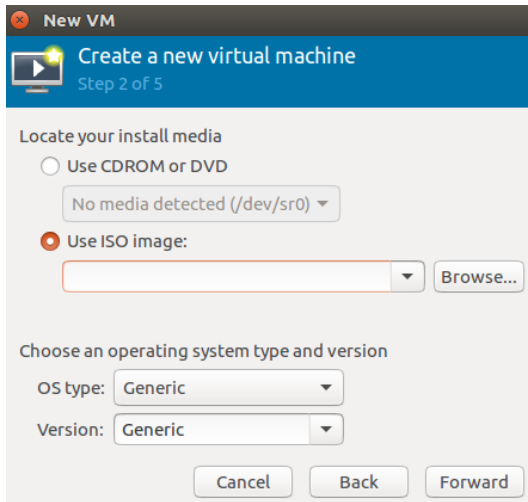
1. Open Virtual Machine Manager.
2. Click the Create a New Virtual Machine icon. Virtual Machine Manager will walk you through a wizard to create a new virtual machine.
3. In Step 1, make your selection for how you would like to install the OS based on where you have saved the Power IQ ISO file. For the purposes of this example, we've selected Local install media (ISO image or CDROM).



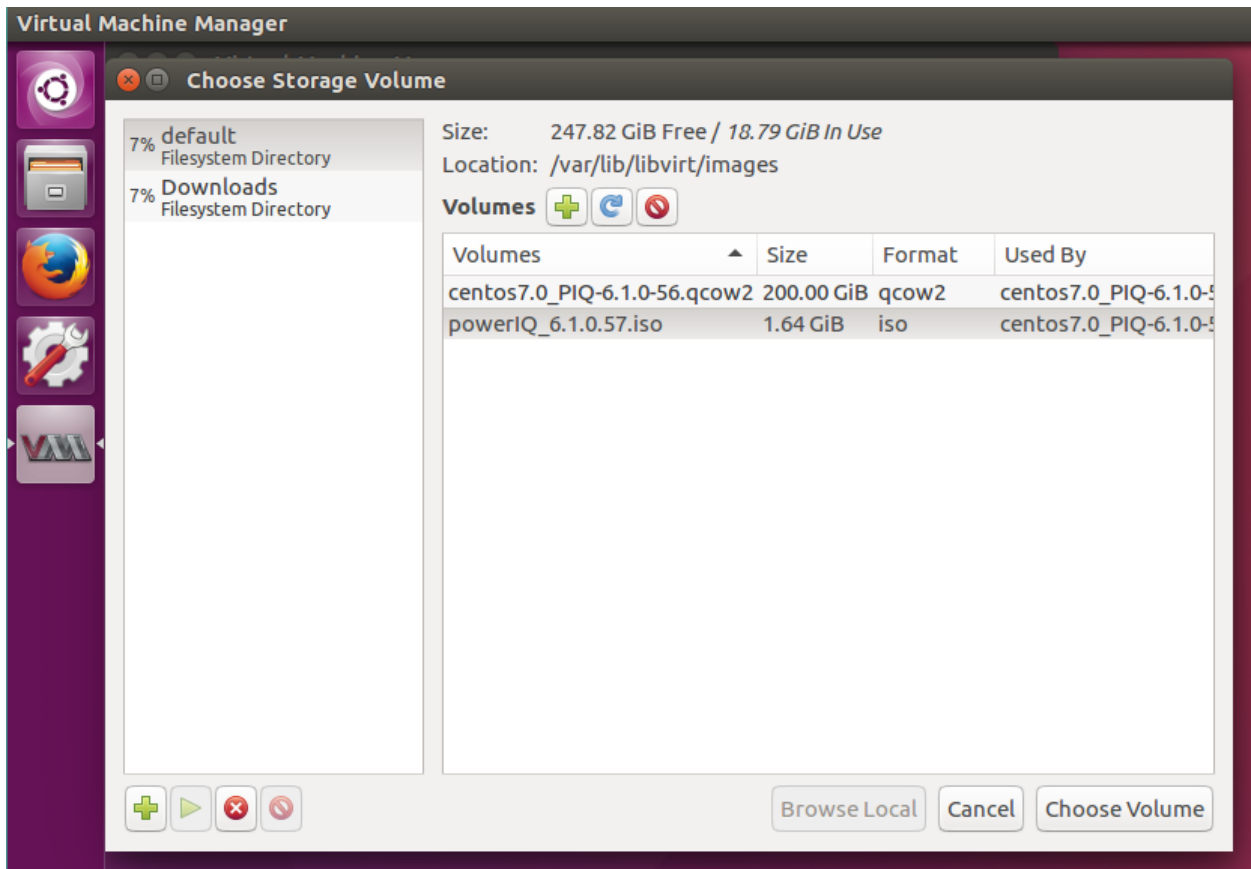
4. Click the Forward button.



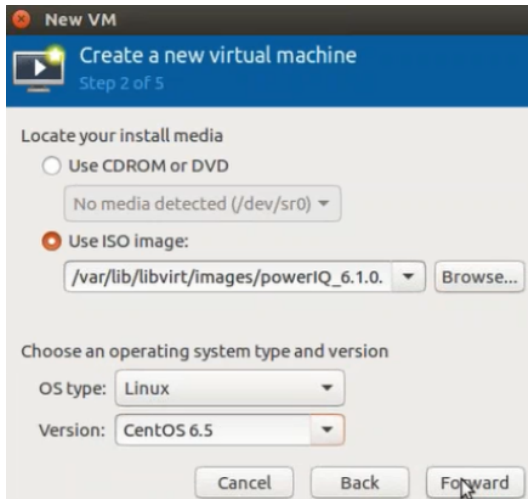
5. In Step 2, select your boot media.



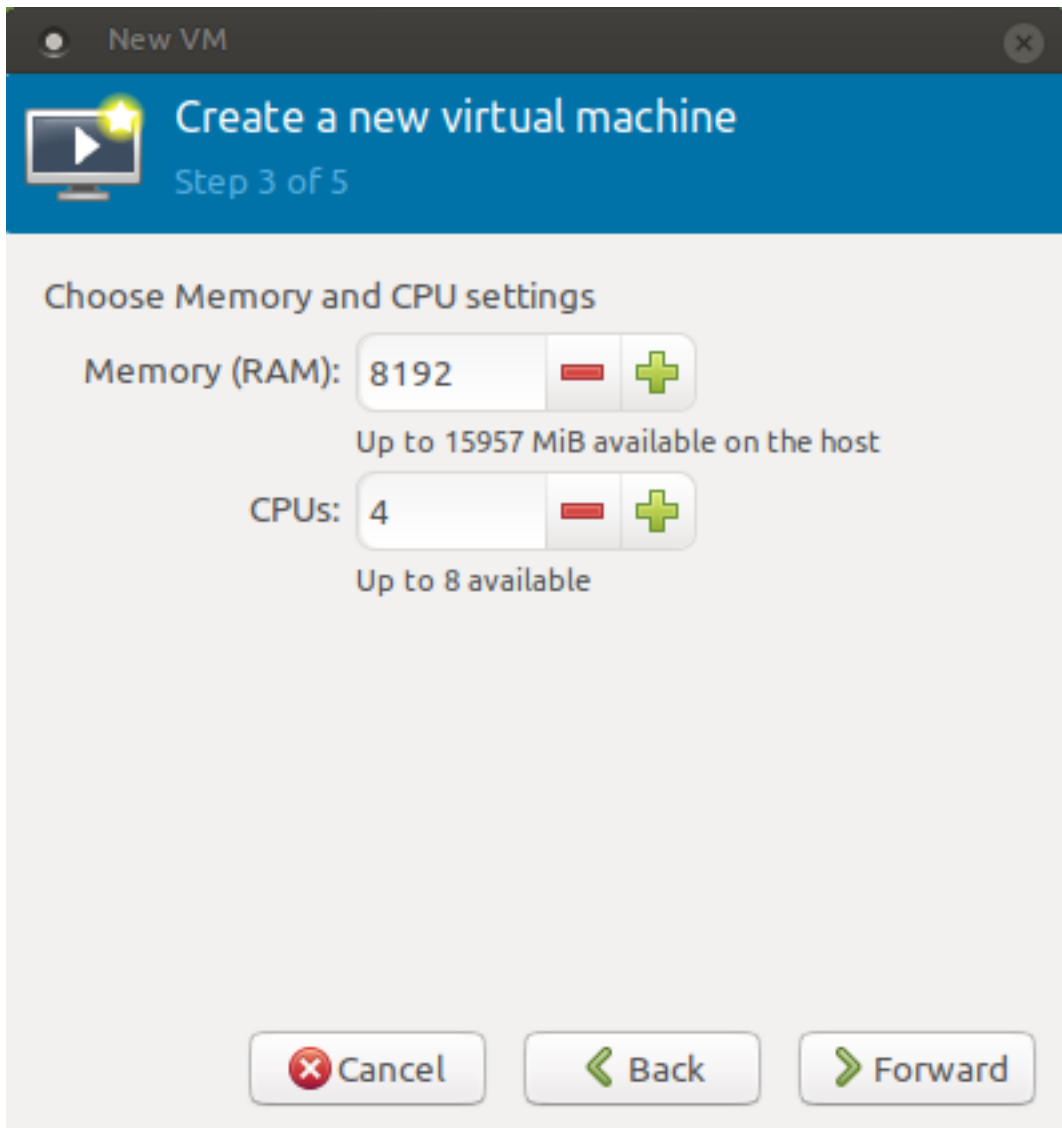
Click the Browse button. Select the Power IQ ISO file in the Choose Storage Volume dialog by either double-clicking the file or selecting the ISO file and clicking the Choose Volume button.



- Back on Step 2 of the wizard, select Linux as the OS type. The version should be the highest CentOS 6.x version supported.

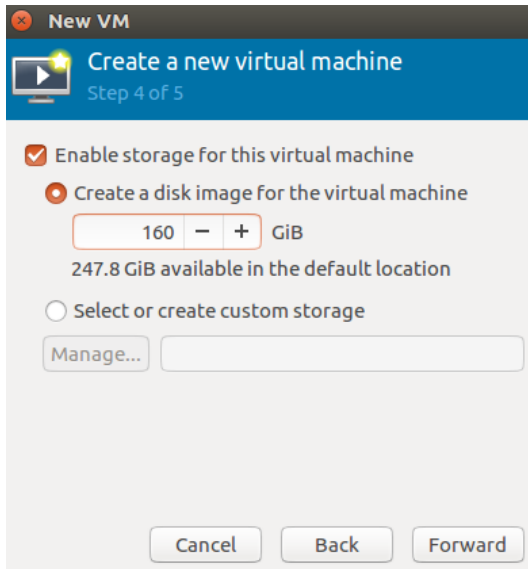


- Click the Forward button.
- In Step 3, specify your memory and CPU settings. See the Virtual Machine Requirements in the online help for information on the number of virtual processors and the amount of memory allocated for the virtual machine. For this example, the RAM is set to 8192 MB and the CPUs to 4.

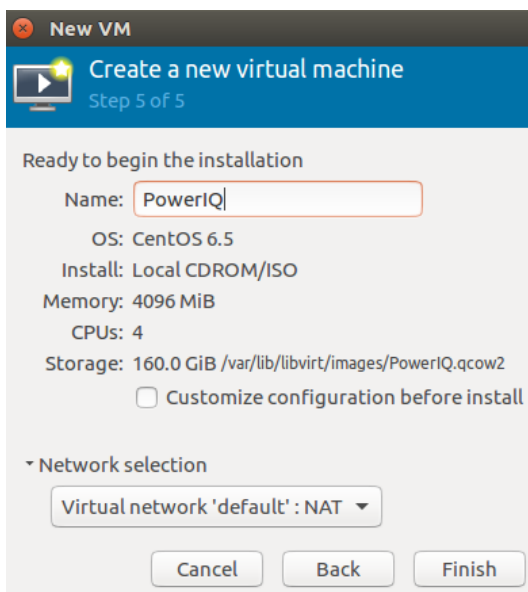


9. Click the Forward button.
10. In Step 4 of the wizard, specify the storage for your virtual machine. Sunbird recommends 160 GB or more for Power IQ. The Enable storage for this virtual machine box should be checked.





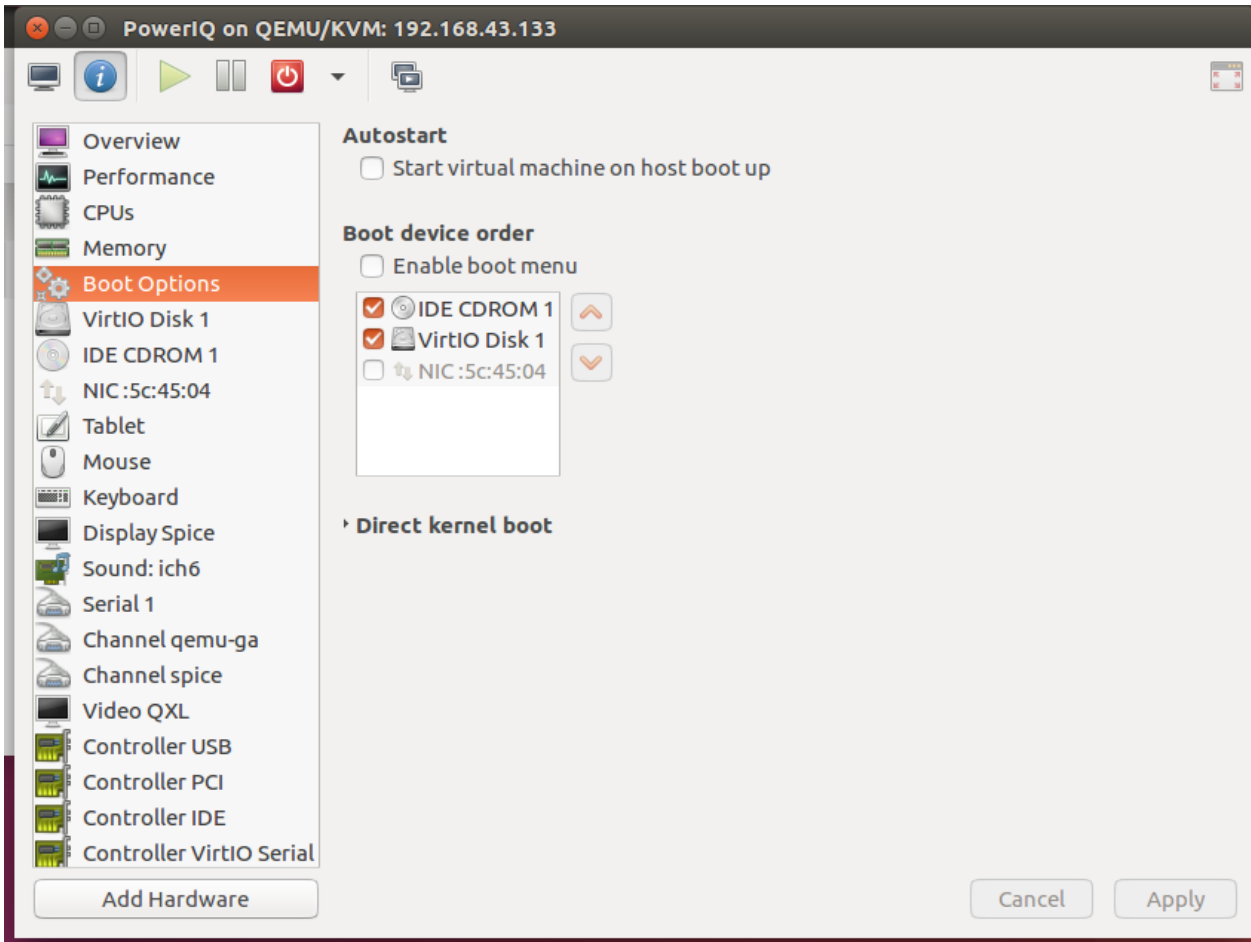
11. Click the Forward button.
12. In Step 5, name your virtual machine and select the network of your choice. This example uses the default.



13. Click the Finish button to complete the wizard and create the virtual machine.

Once created, you may need to apply the following changes to your virtual machine. Otherwise, skip to Step 17.

14. Ensure that the appropriate boot options are selected.



If booting from a CDROM, ensure that it is mounted to the correct media.

PowerIQ on QEMU/KVM: 192.168.43.133

Overview  
Performance  
CPUs  
Memory  
Boot Options  
VirtIO Disk 1  
**IDE CDROM 1**  
NIC :5c:45:04  
Tablet  
Mouse  
Keyboard  
Display Spice  
Sound: ich6  
Serial 1  
Channel qemu-ga  
Channel spice  
Video QXL  
Controller USB  
Controller PCI  
Controller IDE  
Controller VirtIO Serial

Add Hardware

### Virtual Disk

Source path: /var/lib/libvirt/images/powerIQ\_6.1.0.57.iso [Disconnect](#)

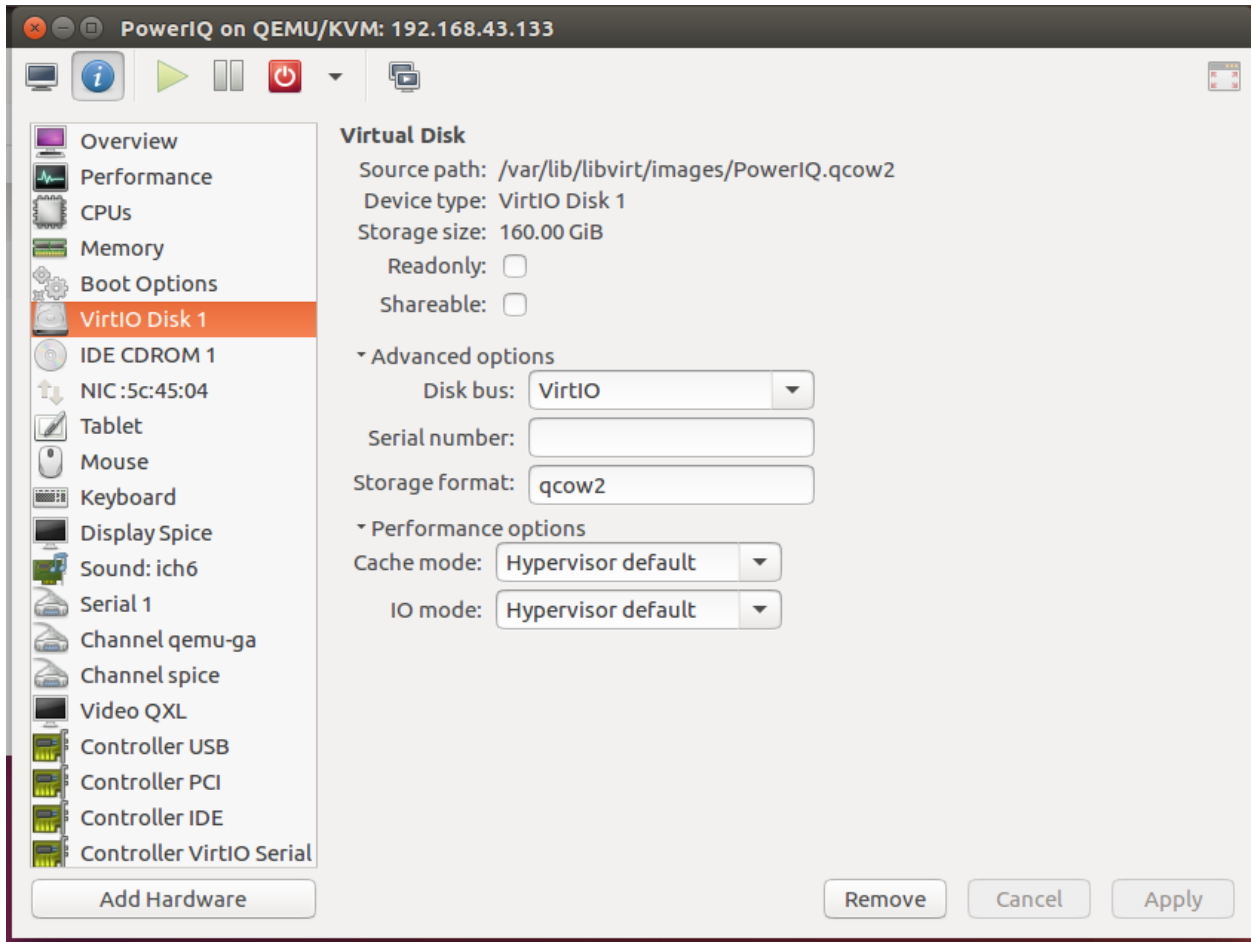
Device type: IDE CDROM 1  
Storage size: 1.64 GiB  
ReadOnly:   
Shareable:

Advanced options  
Disk bus: IDE  
Serial number:   
Storage format: raw

Performance options  
Cache mode: Hypervisor default  
IO mode: Hypervisor default

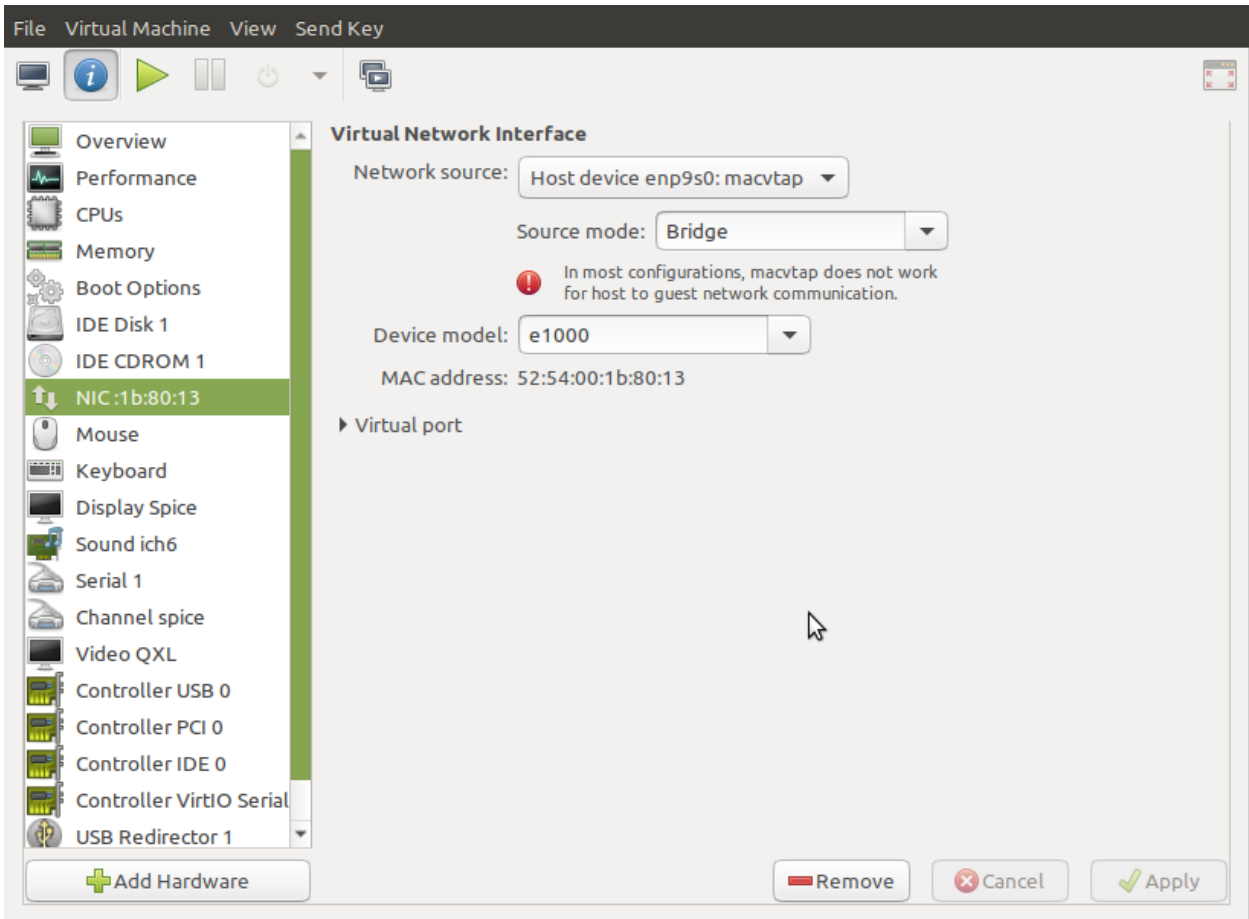
[Remove](#) [Cancel](#) [Apply](#)

- Ensure that your Disk bus type is one of the supported types: VirtIO, SCSI, or SATA. VirtIO is recommended.



- Ensure that the virtual interface is attached to a bridged physical interface. Note: It should not go through the default local to the host NAT device, because the VM needs to be accessed from outside the host.





File Virtual Machine View Send Key

Overview  
Performance  
CPUs  
Memory  
Boot Options  
IDE Disk 1  
IDE CDROM 1  
NIC :1b:80:13  
Mouse  
Keyboard  
Display Spice  
Sound ich6  
Serial 1  
Channel spice  
Video QXL  
Controller USB 0  
Controller PCI 0  
Controller IDE 0  
Controller VirtIO Serial  
USB Redirector 1

**Virtual Network Interface**

Network source: Host device enp9s0: macvtap

Source mode: Bridge

**!** In most configurations, macvtap does not work for host to guest network communication.

Device model: e1000

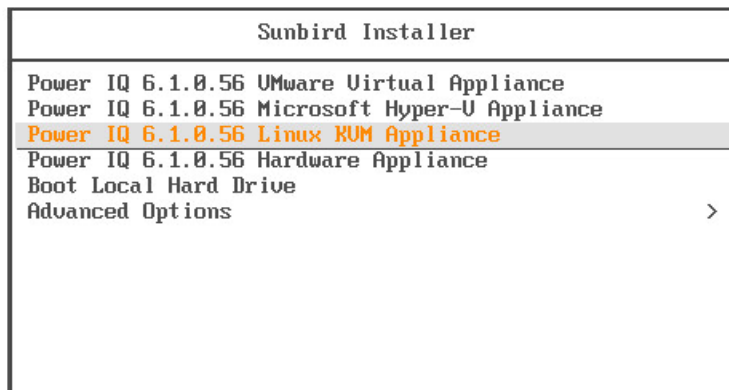
MAC address: 52:54:00:1b:80:13

Virtual port

+ Add Hardware

Remove Cancel Apply

17. Run Power IQ on the Linux KVM appliance.



## Install the Application on the Virtual Machine (KVM)

---

*Note: If you have not already done so, you will need to configure the virtual machine to access the installation media.*

---

1. Open Virtual Machine Manager or the KVM manager you are using.
2. Select the virtual machine created to run Power IQ.
3. Power on the virtual machine.
4. Select to install Power IQ on the Linux KVM appliance.
5. The installation package loads.
6. Proceed with installation.



# Chapter 2: Initial Configuration of Power IQ

After installing the application, you must configure the system for access over the network.

---

*Note: Hardware versions only: Connect a keyboard, mouse, and monitor to the Power IQ device.*

---

## Open Port Requirements

You must ensure that certain ports are open for Power IQ to work.

See [Support Connections](#) for details about open port requirements for support connections to Sunbird Technical Support.

## Ports Open Between Power IQ and PDUs

- Port 161 (UDP): Required for all PDUs.
- Port 162 (UDP): Required for all PDU traps to be sent to Power IQ.
- Port 443 (TCP): Required for Raritan PX PDU firmware upgrades performed through Power IQ.
- Port 623 (UDP): Required for PX1 firmware 1.5.20 and earlier.

## Ports Open Between Clients and Power IQ

- Port 443 (TCP): Allows the web interface.
- Port 5432 (TCP): Allows ODBC access. Optional.
- Port 22 (SSH): Allows Sunbird Technical Support to log into the shell.
- Port 80 (HTTP): Insecure connection to the web UI that immediately forwards to 443 (HTTPS)
- Port 135 (rpcbind): For graceful shutdown only.

## Configure Network Access

After installing the application, you must configure it for access over your network.

1. Attach a monitor, keyboard and mouse to the Dell R640.
2. When prompted to log in, enter the username `config` and the password `sunbird`. The configuration page opens.



```

Network Configuration: Main Menu
-----+-----+
+ -Appliance Configuration- +-----+
| Networking Setup >>      | LAN 0:   192.168.42.107
| Security Setup >>       |          MAC:   00:0C:29:12:E8:29
| Ping Network Test       |          Domain: raleigh.raritan.com
| Routing Network Test    |          Gateway: 192.168.42.1
| Restart Appliance       |          Gateway:
| Shutdown Appliance     |          DNS 1:   192.168.42.10
| Support Connection      |          DNS 2:
| Exit                    |          DNS 3:
|                          |          IPACL:   Enabled
|                          |          Tunnel:  Support Disabled
+-----+-----+

5.0.0.103. Copyright 2007-2015 Sunbird Software All Rights Reserved.

```

3. Select `Networking Setup`, then select `Setup LAN 1` to configure the primary Ethernet port.
4. Press the Space bar to select "Enable this LAN Port".
5. To manually assign the network settings to the application:
  - Type the IP address and network masks into the appropriate fields.
  - Otherwise, select the "Use DHCP" option to allow your DHCP server to automatically assign an address.
  - Select `Accept` to reset the network interface when completed.
6. To setup the gateway IP address, select `Setup IPv4 Network Routes` and type the appropriate IP address in the `Default Gateway Route` field.
7. Select `Accept` to reset the network interface.
  - If using DHCP, note the address. There must be a DHCP server available on the LAN.
8. If you are using a second network interface, configure it by selecting `Setup LAN 2` from the `Network Configuration` menu, then perform the same steps as you did for LAN 1.
9. **Optional** Select `Ping Network Test` to ensure the application is communicating over the network.
10. Select `Name Servers` under `Network Configuration` to setup the server names.

**Optional** If server names are not set up, DNS names cannot be resolved.

---

*Note: Failing to configure DNS servers causes LDAP integration issues.*

---

11. **Optional** To increase security, it is advisable to disable SSH remote access.
12. Select `/Networking Setup/Setup Access Controls`.
13. Enable `Block SSH`. By default, the config account has access to the application. SSH is re-enabled if a support connection is created.
14. Select `Exit` from the main menu. You can now access the application from any client on the network.





# Chapter 3: Connecting to Power IQ

1. Connect to Power IQ using a web browser on any machine on the network.
2. In the browser's address bar, enter the IP address or hostname assigned to Power IQ. For example:  
https://192.168.1.10
3. Answer yes to any security alerts and accept all certificates. If this is your first time connecting to Power IQ, you must upload your license and accept the End User Licensing Agreement before logging in. If this is not your first time connecting to Power IQ, skip to step 4.

Licenses are .LIC files. Repeat this step to add incremental licenses if needed.

---

*Note: You will receive an email with your license from Sunbird.*

---

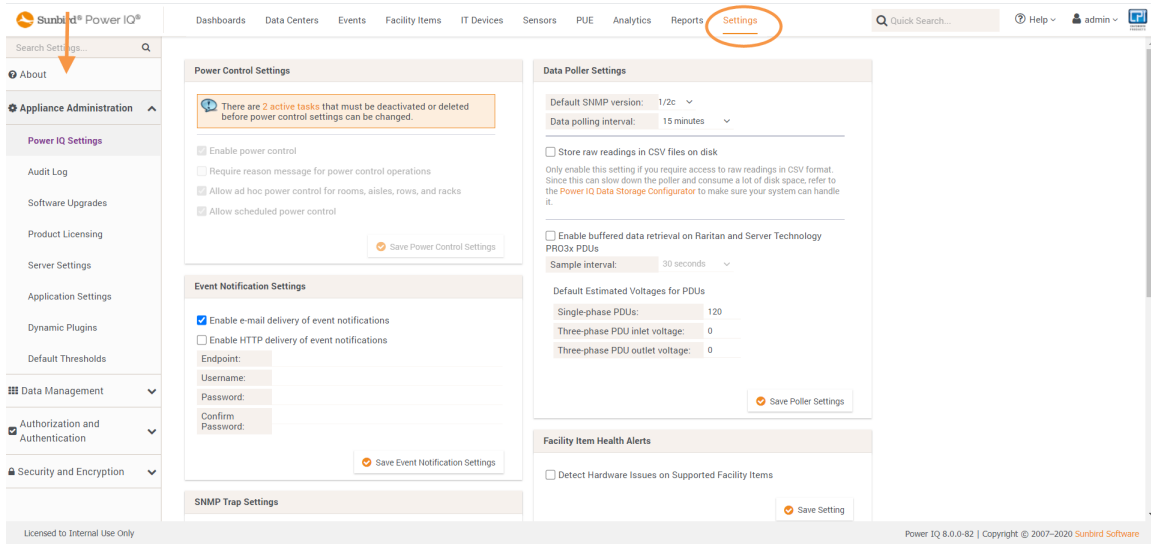
4. Log in with the default username admin and password sunbird.  
The Power IQ dashboard opens.



# Chapter 3: Settings



As of Power IQ version 8.0.0 the Settings tab is rendered with a left side navigation panel. This panel provides a logical grouping of all the Settings features allowing you to quickly navigate to the feature of your choice. Features previously displayed on a single page with multiple panels requiring you to search for the desired feature, are now rendered as logically grouped menu options.



## Menus

### About

- Appliance Information
- Appliance Services

### Appliance Administration

- Power IQ Settings
- Audit Log
- Software Upgrades
- Product Licensing
- Server Settings
- Application Settings
- Dynamic Plugins
- Default Thresholds

### Data Management

- Data Backups
- Remote Storage
- ODBC Access

- [Data Rollup Retention](#)
- [Enterprise Relationships](#)

## Authorization and Authentication

- [User Accounts](#)
- [AD and LDAP Server Settings](#)
- [User Groups](#)
- [Door Access Control](#)

## Security and Encryption

- [HTTPS Certificate](#)
- [Data Backup Encryption](#)
- [IP Based Access Control](#)
- [Single Sign On](#)
- [Password Requirements](#)
- [Other Security Settings](#)
- [Trusted Certificates](#)



# Chapter 4: Additional Configuration Tasks

This section includes information on configuring additional features of PowerIQ, including data rollup retention, enterprise power, event management, and graceful shutdown.

For more information on a specific configuration task, see the associated topic.



## Configuring Logging through Syslog

External Syslog servers can be used to record events occurring on Power IQ. Using a Syslog provides a separate external log of events.

All servers listed under Current Syslog Destinations record events on Power IQ. Recorded events include new users, configuration changes, and failed login attempts.

1. In the Settings tab, click Server Settings in the Appliance Administration section.
2. In the Syslog Destinations box, click Add, then type the IP address of a Syslog server in the "Syslog server address" field. This must be in the form of a numeric address.
3. Click OK. The server appears on the list of current Syslog Destinations.



## Configuring Health Polling

Enabling the Health Poller allows Power IQ to get information on PDU health more quickly than using the Data Poller alone. The Health Poller pings PDUs to verify that they are network-reachable. The Data Poller records whether PDUs successfully respond to data collection attempts. Power IQ uses this combined information to update the PDU Health status, and to create events when the connectivity of a PDU changes. See *PDU Connectivity Status Changes* on page 89.

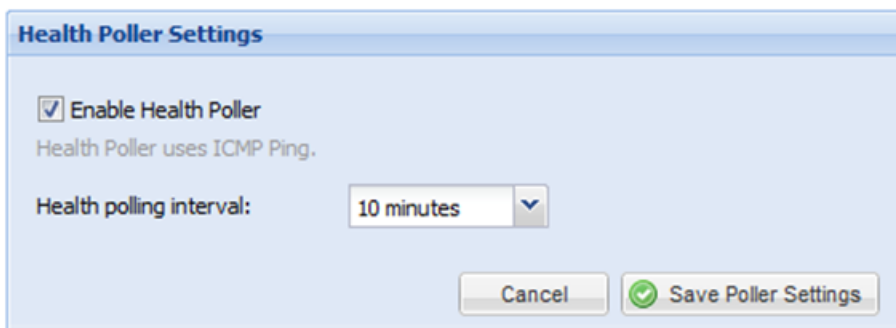
The Health Poller uses ICMP Ping. You can configure the ping intervals to poll PDUs from every 15 seconds, up to every hour. All PDUs will be pinged at the selected interval. If a PDU does not respond, the ping is retried twice by default, with a timeout as configured in the advanced settings. See *Advanced Health Polling Settings* on the next page.

---

*Note: ICMP echo and reply packets exchanges must be allowed in the firewall before enabling Health Poller.*

---

1. In the Settings tab, click Power IQ Settings in the Appliance Administration section.
2. In the Health Poller Settings section, check the Enable Health Poller checkbox to start the pings.
3. Select the ping frequency in the Health polling interval field. The interval selected must be less than, or equal to the Data Poller interval.



**Health Poller Settings**

**Enable Health Poller**  
Health Poller uses ICMP Ping.

Health polling interval: 10 minutes

Cancel Save Poller Settings

4. Click Save Poller Settings.

## Advanced Health Polling Settings

**WARNING: Advanced Data and Health Polling Settings, including Advanced SNMP Settings, Advanced ICMP Settings, and Advanced Thread Pooling Settings, should only be used with Sunbird Technical Support guidance, or by expert users. Changes to these values can negatively affect Power IQ performance, or result in loss of data.**

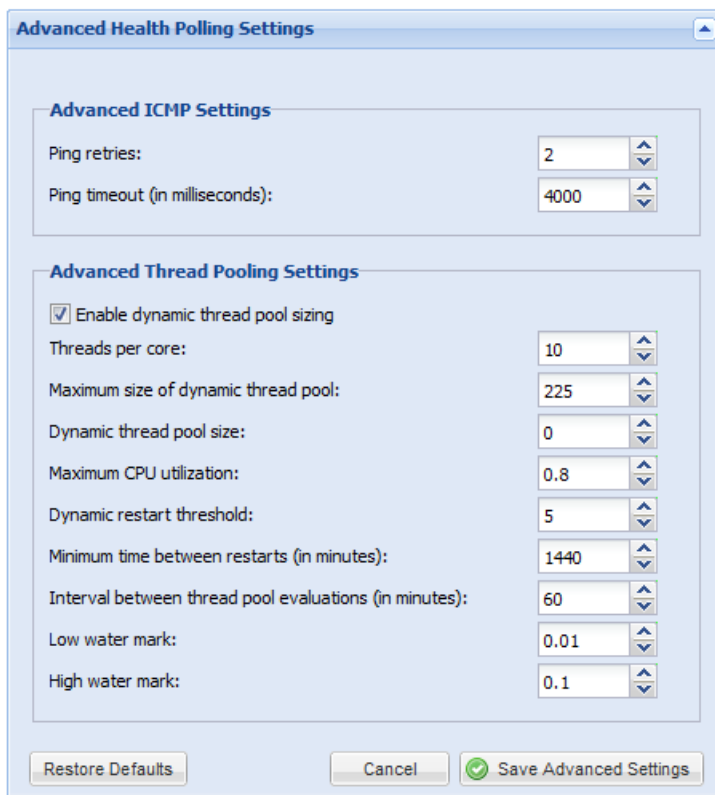
The default settings are shown.

Advanced ICMP Settings:

- Ping retries: Possible range 0-5. Default 2.
- Ping timeout (in milliseconds): Possible range 500-8000. Default is 4000.

Advanced Thread Pooling Settings:

- See [Advanced Thread Pooling Settings](#).



**Advanced Health Polling Settings**

**Advanced ICMP Settings**

Ping retries: 2

Ping timeout (in milliseconds): 4000

**Advanced Thread Pooling Settings**

Enable dynamic thread pool sizing

Threads per core: 10

Maximum size of dynamic thread pool: 225

Dynamic thread pool size: 0

Maximum CPU utilization: 0.8

Dynamic restart threshold: 5

Minimum time between restarts (in minutes): 1440

Interval between thread pool evaluations (in minutes): 60

Low water mark: 0.01

High water mark: 0.1

Restore Defaults Cancel Save Advanced Settings



## PDU Connectivity Status Changes

The PDU connectivity status will change based on the PDU response or lack of response to the Health and Data Pollers. Data Polling is enabled automatically, but you must enable the Health Poller manually.

See [PDU Connectivity Health Statuses](#) and [PDU Connectivity Lost and Restored Events](#).

## Configuring Polling Intervals

At each polling interval Power IQ collects data from PDUs under its management.

1. In the Settings tab, click Power IQ Settings in the Appliance Administration section.
2. In the Polling Settings box, select a time period from the "Polling interval" drop-down list. The time period indicates how much time passes before Power IQ starts a new polling cycle
3. Click Save Poller Settings.

---

*Note: When managing a large number of PDUs you may need to configure a longer time period for the polling interval. Setting a longer time period helps ensure that all PDUs are polled within a given cycle. A warning message appears if Power IQ is unable to poll all PDUs within the configured time period. See Recommended Polling Intervals on the facing page for details on settings that help Power IQ poll faster.*

---



## Recommended Polling Intervals

The optimal polling interval depends on your business needs, the number of PDUs you have deployed, their types and the platform you are running Power IQ on. Outlet metered PDUs are a larger system load than unit-level metered PDUs. Some PDUs have a unique feature to store readings. Storing readings gives you the added flexibility to set a poll rate and a sample rate.

Start with a longer polling and sample interval to ensure system operation. Gradually shorten the polling and sample interval as business needs require.

Your actual results may vary based upon local conditions. PDUs that provide less data tend to have a lower system load. You can therefore likely poll those PDUs at the stated sample rate for a given configuration.

To allow faster polling, disable the storage of raw sensor readings in CSV files to the Power IQ disk. Disabling this setting allows Power IQ to poll more devices at a faster polling interval, but you won't have access to raw readings in CSV format. See [Configuring Raw Sensor Readings Storage](#) for details.

See [Configuring Polling Intervals](#) for details on changing these settings.

### Polling Intervals with buffered data retrieval:

Number of PDUs	Sample Rate	Polling Interval	Memory
1,000 outlet metered PDUs	5 minutes	30 minutes	8 GB RAM
1,500 outlet metered PDUs	5 minutes	30 minutes	16 GB RAM
2,000 outlet metered PDUs	5 minutes	30 minutes	24 GB RAM
3,200 unit metered PDUs	10 minutes	30 minutes	8 GB RAM

### Polling Intervals without buffered data retrieval:

Number of PDUs	Polling Interval	Memory
2,100 outlet metered PDUs	10 minutes	8 GB RAM



## Configuring Raw Sensor Readings Storage

In Power IQ releases before 4.0.0, raw sensor readings collected by Power IQ are automatically stored in daily CSV files which are compressed into ZIP files at the end of each day. Power IQ retains a maximum of eight full days of compressed CSV files depending on available disk space.

Power IQ 4.0.0 and later can poll at faster rates than older Power IQ releases. The more sensor readings that Power IQ collects, the more likely it becomes that the disk partition where these CSV files are stored will run out of space. This could prevent the Power IQ poller from functioning properly.

In 4.0.0 and later, if you require access to the raw sensor readings in CSV format, you must enable this feature. Depending on your Power IQ polling configuration, such as number of managed PDUs, polling interval, sample rate, Power IQ may not be able to store eight full days of readings. In some configurations, it may not be possible to write sensor readings to CSV because the number of raw sensor readings in a day will consume too much disk space.

If you do not require access to raw sensor readings in CSV format, the feature should remain disabled. Disabling this feature will improve the performance of the Power IQ poller and will free system resources for other tasks.

When the feature is disabled, you can still access two hours of raw sensor data stored in the database before values are rolled up, and the raw data deleted from the database. This raw sensor data can be retrieved using ODBC access and reporting tools. See [Appendix A: ODBC Access](#).

See [Data Storage Configuration Calculator](#) for details on a tool you can use to determine if your system configuration is compatible with writing raw sensor readings to CSV.

See [Enable or Disable Storing Raw Readings in CSV Files on Disk](#) for instructions on changing the setting.

## Enable or Disable Storing Raw Readings in CSV Files on Disk

Depending on your configuration, storage of raw sensor readings in CSV files may not be supported, and could lead to performance issues with the Power IQ poller.

Use the Power IQ data storage configuration calculator tool to determine if storage of raw sensor readings is supported with your configuration.

You can download data storage configuration calculator at <http://support.sunbirdcim.com/support/solutions/articles/6000055029-tools->

## Data Storage Configuration Calculator

The Data Storage Configuration Calculator is a tool that can help you determine if storing raw readings in CSV files is supported for your configuration.

You can download the data storage configuration calculator at <http://support.sunbirdcim.com/support/solutions/articles/6000055029-tools->



## Buffered Data Retrieval

**Important: The PDU system clock must be set and configured correctly in order to ensure proper data reporting to Power IQ.**

Raritan PX PDUs version 1.2.5 and higher have the ability to temporarily buffer power measurements. This allows Power IQ to receive more data with less frequent polling. Enabling buffered data retrieval instructs Power IQ to retrieve these buffered measurements instead of collecting a single point of data at the time of polling. This results in increased efficiency when gathering data from Raritan PX PDUs.

See [Enabling Buffered Data Retrieval from Raritan PX 1.2.5 or Higher](#) for instruction on enabling the feature.

You must set a Sample Interval when using buffered data retrieval. The polling interval controls how often Power IQ requests buffered data from Raritan PX PDUs, the sample interval controls how granular the buffered data is.

### Example:

With a polling interval of 1 hour, and a sample interval of 1 minute, Raritan PX PDUs under Power IQ management collect measurements each minute and store the data in the Raritan PX's data buffer. Every hour, Power IQ then retrieves the data buffer with the last hour's measurements from each Raritan PX.

Shorter sample intervals cause Raritan PX PDUs to fill their buffers more quickly. As a result, Power IQ may limit the polling interval to prevent data loss due to filled buffers.

When buffered data retrieval is in use, Power IQ polls other PDUs that do not support this feature at the Sample Interval. This helps maintain a consistent granularity of measurements across all readings.

The Buffered Data Retrieval feature may consume the space available for data storage rapidly since it allows Power IQ to retrieve a great deal of data at once.

---

*Note: To configure Raritan PX sampling rates, Power IQ must have SNMP write access to those PDUs. First make sure the Raritan PX SNMP agents are enabled. Then ensure that they have been added to Power IQ management using an SNMP community string that has write access.*

---

## Set Polling Intervals and Sample Rates at Even Multiples

Set your sample rate at even multiple of your polling interval, when data buffering is enabled. This enables Power IQ to collect an even number of data points.



## Enabling Buffered Data Retrieval from Raritan PX 1.2.5 or Higher

---

*Note: All Power IQs using buffered data retrieval that are polling the same PDU must use the same Sample Interval setting to prevent each instance of Power IQ from attempting to change the sample interval to its own setting.*

---

See [Buffered Data Retrieval](#) for more details.

To retrieve buffered data from Raritan PX 1.2.5 or higher:

Make sure that Raritan PX PDUs have been added to Power IQ with a Write Community String, or buffered data retrieval will not work. See [Editing PDUs under Power IQ Management](#) for details on editing PDU credentials.

1. In the Settings tab, click Power IQ Settings.
2. In the Polling Settings section, select the "Enable buffered data retrieval on Raritan PDUs" checkbox.
3. Select a sample period from the Sample Interval drop-down list. This configures the sample interval that Raritan PX PDUs use to buffer power measurements.

### Example

If 1 minute is selected, every minute a Raritan PX PDU takes a power measurement and stores it in its internal buffer for retrieval.

---

*Note: The polling interval and sample interval should not be set to the same time period. Set the polling interval to a longer time period than the sample interval. For example: 30 minute polling interval with a 10 minute sample interval. See [Configuring Polling Intervals](#).*

---

4. Click Save Poller Settings.



## External Sensor Data from Raritan PX

Raritan PX model PDUs version 1.6 and higher support buffered data for external sensors.

For Raritan PX model PDU versions earlier than 1.6, external sensor data is not recorded at the sample interval when Buffered Data Retrieval is enabled. The external sensor data is recorded at the polling interval.





## Use NTP Servers with Buffered Data Retrieval

If you enable Buffered Data Retrieval, Raritan strongly suggests enabling NTP and configuring Power IQ and your Raritan PX PDUs to use the same NTP servers. This ensures that all recorded data is in sync, whether generated by Power IQ or Raritan PX.

Difference in time between Power IQ and PDUs can cause incorrect values on the capacity gauges on the dashboard.



## Advanced Data Polling Settings

**WARNING: Advanced Data and Health Polling Settings, including Advanced SNMP Settings, Advanced ICMP Settings, and Advanced Thread Pooling Settings, should only be used with Sunbird Technical Support guidance, or by expert users. Changes to these values can negatively affect Power IQ performance, or result in loss of data.**

If you have PDUs in the "Connectivity: Data Collection Failed" state, changing the default SNMP settings may help. Do not proceed without Sunbird Technical Support guidance. See [Troubleshooting Connectivity: Data Collection Failed Status in PDUs](#) for details on possible causes. See [Advanced SNMP Settings](#) for details on the settings.

## Advanced SNMP Settings

Changing the SNMP settings may help if you have too many PDUs in "Connectivity: Data Collection Failed" state.

See [Troubleshooting "Connectivity: Data Collection Failed" Status in PDUs](#) for details on possible causes and other solutions.

**Warning: You should only change these settings if you are an expert SNMP user, or with Technical Support's help. Changes to these values can negatively affect Power IQ performance, or result in loss of data.**

Recommended changes:

- Increase how many times Power IQ will attempt an individual SNMP request and how long Power IQ will wait for an individual SNMP request. A poll of a PDU can potentially involve hundreds of individual SNMP requests. It is recommended to gradually increase the "Read timeout" and Retries settings and allow several poll intervals to pass to gauge the impact of the change before making additional changes.
- If you see a large number of unexplained outages for Raritan PX1 or PX2 PDUs, it may also be necessary to decrease the "Maximum rows per request (PX)" setting. In a small number of cases the default value of 10 may result in SNMP response packets that are too large for customer networks to handle correctly due to packet fragmentation. This is related to PDUs being managed remotely over a WAN. Decreasing this value results in some loss of efficiency because Power IQ has to send more SNMP requests to the target PDU, given that a smaller set of data is sent back in each SNMP response.

By default, Power IQ uses the following default SNMP settings:

- Read timeout: 5000 milliseconds
- Write timeout: 5000 milliseconds
- SNMPv3 timeout: 20000 milliseconds
- Retries: 2
- Total number of attempts= retries + 1. The default number of attempts is 3.
- Maximum rows per request (default): 1. This value is used for non-Raritan PDUs
- Maximum columns per request (default): 5. This value is used for non-Raritan PDUs
- Maximum rows per request (PX): 10. This value is used for Raritan PDUs
- Maximum columns per request (PX): 15. This value is used for Raritan PDUs

## Advanced Thread Pooling Settings

Warning! The configured thread pool settings determine how many Power IQ resources are allocated to polling PDUs. The default settings are designed to work for most use cases and should not need to be changed. If you are experiencing performance issues related to polling, Sunbird Technical Support can work with you to determine if changing the thread pool settings will be beneficial.

**Warning! Do not change these settings without the guidance of Sunbird Technical Support.**

- Threads per core: If dynamic sizing is disabled, this value will be used to calculate thread pool size. (default value: 10) This parameter affects poller operation when dynamic thread pool sizing is enabled or disabled.
- Maximum size of dynamic thread pool: Defines the maximum possible size of the dynamic poller thread pool. (default: 225 threads)
- Dynamic thread pool size: Dynamically calculated ideal thread pool size (default: 0)
- Maximum CPU utilization: Target CPU utilization for polling PDUs. (default: .80)
- Dynamic restart threshold: Defines how large the delta between the configured max pool size and the calculated ideal pool size must be before a Poller JVM restart is justified. (default: 5)
- Minimum time between restarts (in minutes): Defines minimum time between Poller restarts due to thread pool resizing (default: 1440, that is, only allow Poller to restart once every 24 hours to adjust thread pool size)
- Interval between thread pool evaluations (in minutes): Defines how frequently the Poller service will evaluate the thread pool size to determine if resizing is needed. (default: 60)
- Low water mark: Thread pool scheduler low water mark. Low water mark controls how aggressively threads are removed from the thread pool. This water mark represents the ratio of threads to items in the queue. The higher the value the more likely a thread will be removed from the pool. (default: .01)
- High water mark: Thread pool scheduler high water mark. High water mark controls how aggressively threads are added to the thread pool. This water mark represents the ratio of threads to items in the queue. The smaller the value the more likely a thread will be added to the pool. (default: .10)
- **Data Poller only.** Maximum number of active database connections: Upper limit on number of database connections that may be used by the poller thread pool. (default: 350) This parameter affects poller operation when dynamic thread pool sizing is enabled or disabled.

## Troubleshooting "Connectivity: Data Collection Failed" Status in PDUs

A PDU in "Connectivity: Data Collection Failed" state usually has one of these problems.

1. The user has configured Power IQ with the wrong community string for the PDU.
2. There is a network connectivity issue between Power IQ and the PDU.
3. The PDU is powered off or not connected to the network.



If you have checked and corrected these problems, and the status does not change, there may be an SNMP setting that is causing the problem. These problems are much less common. These problems may be solved by changing the SNMP settings, but you should only change these settings if you are an expert SNMP user, or with Technical Support's help. See [Advanced SNMP Settings](#).

1. The configured SNMP timeout and retry value are insufficient for your use case.

**Example**

You need to manage remote PDUs over a WAN. Network latency or bandwidth do not work well with the default SNMP settings, resulting in a large number of SNMP timeouts that show up as "Connectivity: Data Collection Failed" state PDUs.

2. The SNMP agent on the PDU is not responding to requests. The PDU's processor may be busy handling other tasks and is temporarily unable to respond to SNMP requests.



## Setting the Default SNMP Version for PDUs

1. In the Settings tab, click Power IQ Settings in the Appliance Administration section.
2. In the Polling Settings box, select 1/2c or 3 as the default SNMP version for new PDUs added to Power IQ.
3. Click Save Poller Settings.
4. You can change the default value when you add the PDU.

## SNMPv3 May Require Longer Polling Interval

Enabling SNMPv3 represents about twice the load on Power IQ as SNMPv1/2.

You may need to increase the polling interval to enable Power IQ to poll all pdus when SNMPv3 is enabled.

See [Setting the Default SNMP Version for PDUs](#).

See [Configuring Polling Intervals](#).



## Setting Default Estimated Voltages

Power IQ can estimate active power for PDUs that do not directly provide Active Power measurements.

If a PDU does not provide one of the following values, the default estimated voltage will be applied.

- Inlet Voltage
- Outlet Voltage
- Active Power

This default value can be changed per PDU, in the Edit PDU page. These voltage values are only editable when they are NOT coming from the PDU. See [Configuring Estimated Voltages](#).

1. In the Settings tab, click Power IQ Settings.
2. In the Polling Settings box, enter a default estimated voltage for single phase PDUs and a default estimated inlet and outlet voltage for three phase PDUs. Optional.
3. Click Save Poller Settings.



## Note on Geist and Rittal PDUs

Geist and Rittal PDUs are marked as single or three phase at the second polling interval after discovery.

If a PDU is not marked after two polls, mark the phase manually.

## Configuring Polling Path Redundancy (Backup IP Address Support) for PDUs

Power IQ 5.2 and above support Polling Path Redundancy, configuration of a backup (secondary or redundant) IP address that can be used for polling and data collection in case the primary IP address that the user adds a PDU with is unavailable to Power IQ. Whenever a PDU is not reachable through its primary IP address, Power IQ will try to reach the PDU using its backup IP address.

Backup IP addresses can be added to PDUs through the following methods:

- Redundant IP addresses can be added to existing PDUs by editing the PDU smart page. For more information, see *Adding, Editing, or Deleting a Backup IP Address for an Existing PDU* on the next page.
- Redundant IP addresses can also be added to new PDUs at the time they are created. For more information, see *Adding a New PDU and Specifying a Backup IP Address* below.
- Redundant IP addresses can be added through CSV import. For more information, see *Bulk Adding, Editing, or Deleting Backup IP Addresses Using CSV Import* on page 105.

Both IPv4 and IPv6 IP addresses are supported. Users can manually add no more than one backup IP address to each PDU.

## Viewing a Backup IP Address

A PDU's backup (secondary or redundant) IP address is listed on the PDU's smart page.

1. In the Facility Items tab, click the PDU with the backup IP address you want to view. Doing so will take you to the PDU's smart page.
2. On the PDU smart page, scroll down to the Details section (at the bottom of the PDU smart page).
3. The backup IP address is displayed if available.

---

*Note: The backup IP address will be displayed only if it is manually entered by the user **and** the Show Facility Item IP Address option is selected for Facility Item Labels under Display Settings (click the Settings tab > Application Settings > Display Settings > Show Facility Item IP Address). Otherwise, the Backup IP Address field in the Details section of the smart page will remain blank.*

---

## Adding a New PDU and Specifying a Backup IP Address

A backup (secondary or redundant) IP address can be added when you add a new PDU to Power IQ.

1. In the Facility Items tab, click the Add button and icon under the Facility Items List. The Add a New PDU Page will appear.



2. Enter the relevant details in each field.
3. In the Backup IP section, enter the desired backup IP address. Note: Both IPv4 and IPv6 addresses are supported.

**Add a New PDU**

IP Address:

Proxy Index: Integer:  Hex:

External Key:

Custom Field 1:

Custom Field 2:

SNMP Version:

---

**PDU Administrative Credentials**

Username:

Password:

Password Confirm:

---

**SNMP v1/2c Credentials**

Community String:

Community String Confirm:

---

**Backup IP Address**

Backup IP Address:

Validate and wait for discovery to complete before proceeding

4. Click the Add button to add the PDU. A dialog indicating that the PDU is being added will appear.
5. Click OK in the Adding PDU dialog once the task has been completed successfully to return to the Facility Items List page.

*Note: You can specify only one backup IP address manually.*

## Adding, Editing, or Deleting a Backup IP Address for an Existing PDU

A backup (secondary or redundant) IP address can be added, edited, or deleted for an existing PDU manually by the user through Power IQ.

1. In the Facility Items tab, click on the PDU you want to add or edit the backup IP address for. The PDU's smart page will appear.





2. On the smart page, click Actions > Edit. The Change Credentials for PDU (Edit) page will appear.
3. In the Backup IP section, make the appropriate change.
  - a. Add a new backup IP address by typing it in the Backup IP Address field.
  - b. Edit the existing backup IP address by making your changes in the Backup IP Address field.
  - c. Delete the backup IP address by checking the Delete Backup IP Address box.



- d. Click the Save button to save your changes and return to the smart page.

---

*Note: You can specify only one backup IP address manually.*

---

*Note: You also can add backup IP addresses in bulk via CSV import. For more information, see [Bulk Adding, Editing, or Deleting Backup IP Addresses Using CSV Import](#) below.*

---

## Bulk Adding, Editing, or Deleting Backup IP Addresses Using CSV Import

Backup (secondary or redundant) IP addresses can be added in bulk via CSV Import.

1. On the Import PDUs page, download the Import file template.
2. Open the file.
3. In the Step 1: Add PDUs worksheet in the CSV file, add backup IP addresses to the desired PDUs. The backup IP addresses are entered in the Backup IP Address column.
4. Back on the Import PDUs page, use the Browse dialog to select your CSV file.
5. Click Import PDUs.

You also can configure backup IP addresses for individual PDUs on the PDU's smart page. For more information, see [Adding, Editing, or Deleting a Backup IP Address for an Existing PDU](#) on the previous page.

---

*Note: In the Step 1: Add PDUs worksheet, the Backup IP Address column is located between the Proxy Index and PX User Name column.*

---

*Note on Bulk Editing and Deleting: If you import through CSV a PDU that already exists and has a backup IP address specified in Power IQ, the existing backup IP address will be overwritten with the backup IP address specified in the CSV. If a backup IP address is not specified in the CSV file for a PDU that already exists and has a backup IP address specified in Power IQ, then the backup IP address will be deleted for that PDU.*

---

## Trap Support for Backup IP Addresses

If a trap is received from a backup (secondary or redundant) IP address, Power IQ will associate the trap with the IP address of the primary PDU so the trap will display as if it is coming from the primary PDU.

When Power IQ loses connectivity with the primary and begins polling the backup IP address, Power IQ will create a timestamped, Warning-severity event called "Failover IP address in use" with the summary description, "Data collection is being performed using a failover IP address." The target will be the primary IP address and/or the PDU name.

**Event Details**

<b>Event</b>	Failover IP address in use		
<b>Status</b>	Active	<b>Severity</b>	Warning
<b>Occurred at</b>	10/26/16 07:00:56 PM UTC	<b>Target</b>	<a href="#">192.168.46.197 - 20896</a>
<b>Summary</b>	Data collection is being performed using a failover IP address		
<b>Cleared events</b>	None		

*Note: To clear the Failover event, Power IQ must lose connectivity with the backup IP address and connectivity to the primary IP address must be restored.*

## Polling Path Redundancy for CPI PDUs (Secure Array Support)

This section highlights support considerations for Power IQ's Polling Path Redundancy specific to Chatsworth Products, Inc. (CPI) PDUs and Secure Array IP Consolidation, which enables users to link up to 32 PDUs under a single IP address using standard Ethernet cables.

When you add a supported CPI PDU, Power IQ will find the backup (secondary or redundant) IP address configured for the unit automatically.

For CPI PDUs, you can have up to two backup IP addresses: one automatically discovered and one manually entered. The manually entered backup IP address will be displayed on the PDU's smart page.

If there are multiple backup IP addresses associated with a PDU, there is no specific polling order. If the primary is unavailable, the backup will be the IP address that is found first. When the primary becomes available, Power IQ will switch to the primary.

Due to hardware limitations for the PDUs, there could be a delay of 2-7 minutes before the primary and backup PDUs recognize that they have lost connectivity with each other, so multiple polls may occur before Power IQ switches to the backup IP address. In the interim after the primary becomes unavailable and before Power IQ switches to the backup IP address, the PDU will display a unit health state.

If both the primary and alternate units are unavailable to Power IQ, after approximately one hour (depending on your poller configuration settings), a Data Connectivity: Lost communication event will be created.

For more information on Polling Path Redundancy, see *Configuring Polling Path Redundancy (Backup IP Address Support) for PDUs* on page 103.

For more information on CPI PDU support in Power IQ, see *Native Support for Chatsworth eConnect PDUs* on page 477.



## Support for IPv6

- You can assign Power IQ an IPv6 address.
- Power IQ supports IPv6 communication for the following functions.
- Add PDUs with IPv6 addresses
- Add PDUs with IPv6 addresses using CSV import
- Add IT devices with IPv6 addresses
- Enable access controls using IPv6 address
- Use SNMP diagnostics over IPv6 network.
- Allow IPv6 hosts to connect to the ODBC database
- Configuring NTP servers with IPv6 addresses
- Do network diagnostics using ping, traceroute over IPv6 network. Serial console only.
- Enable static routes using IPv6 addresses. Serial console only.

## Valid IPv6 Address Formats

Power IQ accepts IPv6 addresses written in any of the valid formats.

IPv6 addresses need to be enclosed in square brackets when used in the browser.

These examples show several valid versions of the same IPv6 address, and one invalid example.

### Chapter 4 Valid IPv6 address formats:

- FE00:0000:0000:0001:0000:0000:0000:0056
- FE00::1:0:0:0:56
- FE00:0:0:1::56
- In a browser: `https://[FE07:2fa:6cff:2113::101]/login`

### Chapter 4 Invalid IPv6 address formats:

---

*Note: The :: abbreviation, meaning one or more quartets of all 0s, cannot be used twice.*

---

- The abbreviation FE00::1::56 is not valid.

## PDU Autodiscovery

Autodiscover PDUs on your network to quickly add them to Power IQ.

To use this feature:

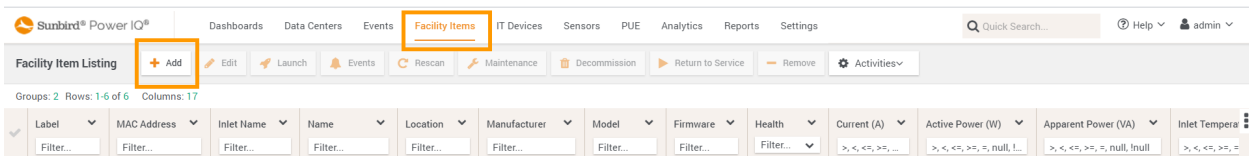
- PDUs must be set on the network with an IP address.
- PDUs must be configured with SNMP v1, v2 or v3
- PDUs can be on multiple subnets.
- The SNMP configuration may differ among the PDUs (for example community strings).



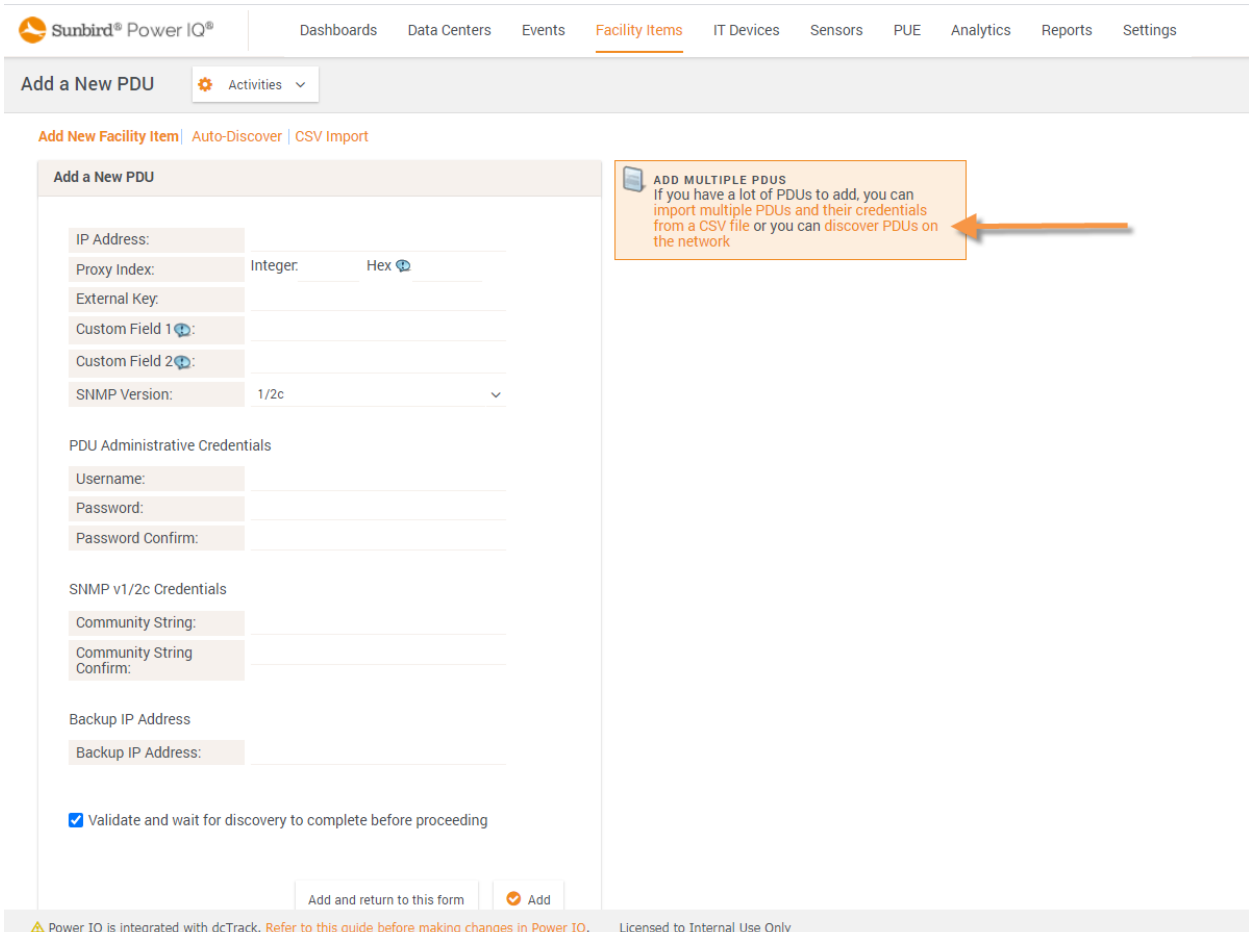
*Note: When a Server Technology primary PDU is autodiscovered within an IP address range, the daisy-chained PDUs attached to the primary will also be discovered.*

*Note: If you do not have enough licenses, you receive an error message indicating you've exceeded the license. You cannot add PDUs without purchasing additional licenses.*

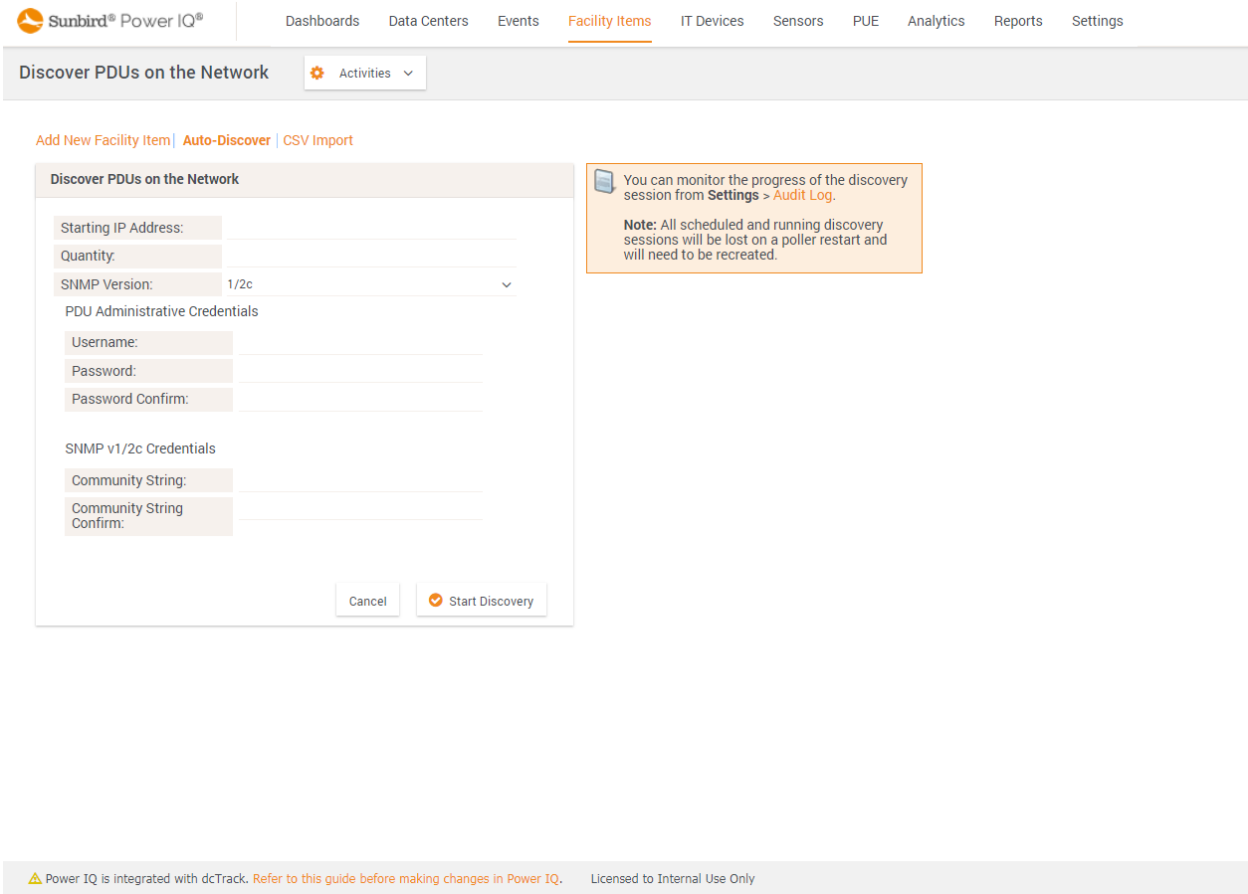
1. Click the Facility Items tab in Power IQ to open the Facility Items List.
2. Click the Add link under Facility Items List.



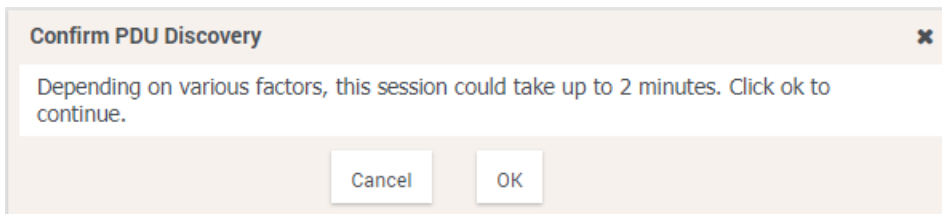
3. On the Add PDUs page, click the "discover PDUs on the network" link to open the PDU Autodiscovery page.



4. The Discover PDUs on the Network page displays. Enter the required information.



5. Enter the Starting IP Address.
6. Enter the Quantity. This is the number of PDUs on the specific string that you want to discover.
7. Select the SNMP version.
8. Enter PDU access credentials.
9. Enter the community string of the PDUs, if applicable.
10. Click Start Discovery.
11. When prompted, confirm you want to begin.




---

*Note: To stop autodiscovery once it has begun, you must restart the poller.*

---



---

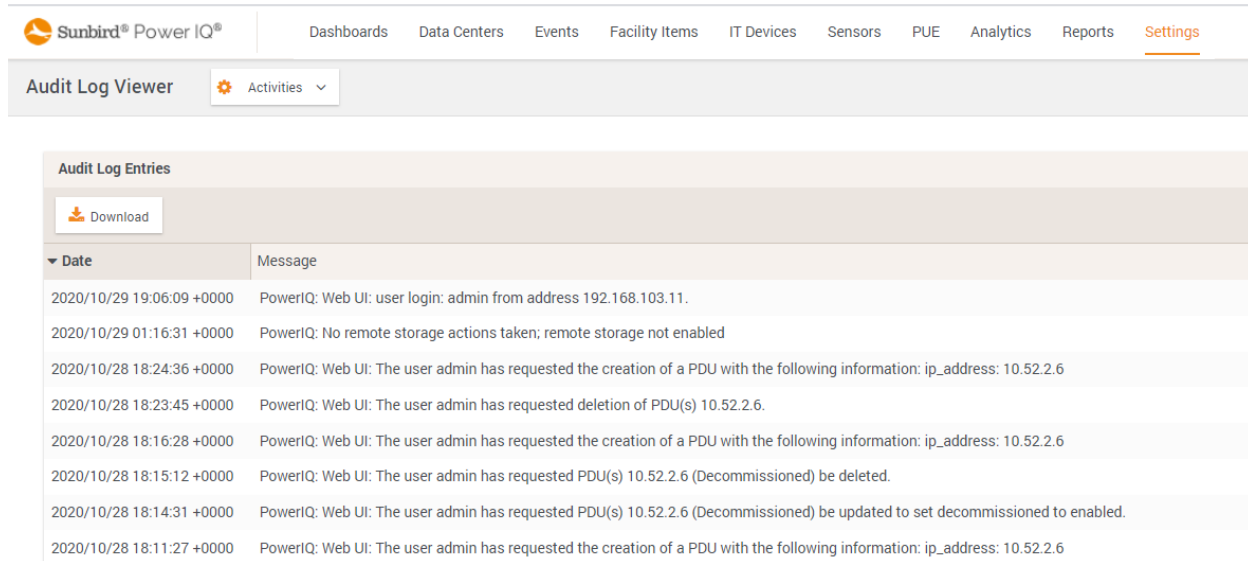
*Note: If the autodiscovery process is interrupted, the event is recorded in the audit log.*

---



Autodiscovery runs in the background and you can work in other screens while it runs.

PDUs located by autodiscovery are listed on the PDUs page.



The screenshot shows the Sunbird Power IQ interface. At the top, there is a navigation bar with the Sunbird logo and the text "Power IQ". Below this, a secondary navigation bar contains several menu items: Dashboards, Data Centers, Events, Facility Items, IT Devices, Sensors, PUE, Analytics, Reports, and Settings (which is highlighted with an orange underline). Below the navigation bar, there is a section titled "Audit Log Viewer" with a gear icon and a dropdown menu labeled "Activities".

Below the "Audit Log Viewer" section, there is a table titled "Audit Log Entries". The table has two columns: "Date" and "Message". A "Download" button is located above the table. The table contains the following entries:

Date	Message
2020/10/29 19:06:09 +0000	PowerIQ: Web UI: user login: admin from address 192.168.103.11.
2020/10/29 01:16:31 +0000	PowerIQ: No remote storage actions taken; remote storage not enabled
2020/10/28 18:24:36 +0000	PowerIQ: Web UI: The user admin has requested the creation of a PDU with the following information: ip_address: 10.52.2.6
2020/10/28 18:23:45 +0000	PowerIQ: Web UI: The user admin has requested deletion of PDU(s) 10.52.2.6.
2020/10/28 18:16:28 +0000	PowerIQ: Web UI: The user admin has requested the creation of a PDU with the following information: ip_address: 10.52.2.6
2020/10/28 18:15:12 +0000	PowerIQ: Web UI: The user admin has requested PDU(s) 10.52.2.6 (Decommissioned) be deleted.
2020/10/28 18:14:31 +0000	PowerIQ: Web UI: The user admin has requested PDU(s) 10.52.2.6 (Decommissioned) be updated to set decommissioned to enabled.
2020/10/28 18:11:27 +0000	PowerIQ: Web UI: The user admin has requested the creation of a PDU with the following information: ip_address: 10.52.2.6

# How to Add PDUs to Power IQ

## Adding PDUs to Power IQ Manually

Once Power IQ is configured, add PDUs. Power IQ can then gather data from these PDUs. If you're adding a PDU that uses a custom dynamic plugin, see *Adding PDUs with Custom Dynamic Plugins* in the online help or user guide.

You can also add PDUs to Power IQ by uploading a CSV file containing the information. See *Adding PDUs in Bulk with CSV Files*.

1. In the Facility Items tab, click the Add link.
2. Enter the IP address of the PDU.
3. Optional: If the PDU is in a daisy-chained configuration or console server configuration, enter the PDU's position number in the chain or serial port number in the Proxy Index fields.  
For PDUs that use the MAC address as a proxy index, enter the last six digits of the address separated by a colon (for example: 01:89:ab).

You can also specify branch circuit monitors using the Proxy Index field.

Leave this value blank if the PDU does not support or is not using this configuration.

---

*Note: As a best practice when renaming outlets and other objects in the EDM in Power IQ, Sunbird recommends exporting the current data to a CSV file that you can edit and then import. This will ensure that the Proxy Index value corresponds to the correct integer representation for the MAC.*

---

4. Enter an asset tag number or other asset management code in the External Key field. Optional.
5. Enter data in Custom Field 1 and Custom Field 2. Optional. The labels may have been changed in Power IQ to identify these fields.
6. If the PDU is a Raritan PX-series or Server Technology PDU, enter a valid Username and Password for the PDU in the PDU Administrative Credentials section. Re-enter the password in the Password Confirm field. Optional.
7. Select the SNMP Version.
  - For SNMP version 1/2c PDUs, enter an SNMP Community String that has at least READ permissions to this PDU. This enables polling the PDU for data. Enter an SNMP community string that has both READ and WRITE permissions to the PDU to enable power control, outlet naming, sensor naming, and buffered data retrieval.
  - For SNMP version 3 PDUs, enter the Username and select an Authorization Level. The authorization levels are:
    - noAuthNoPriv - No Authentication Passkey, No Encoding Passkey
    - authNoPriv - Authentication Passkey, No Encoding Passkey
    - authPriv - Authentication Passkey, Encoding Passkey
- a. Depending on the Authorization Level selected, you must enter additional credentials for Authorization and Privacy.
- b. Authorization Protocol: Select MD5 or SHA.
- c. Enter the PDU's Authorization Passkey, then re-enter the passkey in the Authorization Passkey Confirm field.
- d. Privacy Protocol: Select DES or AES.
- e. Enter the PDU's Privacy Passkey, then re-enter the passkey in the Privacy Passkey Confirm field.

---

*Note: You must enable the SNMP agent on all PDUs added to Power IQ.*

---



8. Select "Validate and wait for discovery to complete before proceeding" to check credentials and view the discovery process status as you add this PDU. Optional.

---

*Note: When Power IQ discovers a primary Server Technology PDU, its daisy-chained PDUs will also be discovered and added to the Facility Items list. If the daisy-chained PDUs are already in Power IQ, those PDUs will not be rediscovered and will retain their PDU IDs.*

---

9. Click Add.

---

*Note: PDU discovery is complete once the PDU model type is determined. SNMP fields such as contact or location values are not determined until this device is polled for the first time.*

---

Once added, the PDU appears in the Facility Items List. Power IQ begins polling the PDU for sensor data. You can configure how often Power IQ polls PDU.

---

*Note: If you change the administrator password used by Power IQ for a Server Technology PDU through the PDU UI, you must restart the PDU to ensure that the Server Technology SNAP API will correctly authenticate requests from Power IQ. However, if you change the administrator password through the Power IQ UI, Power IQ will restart the PDU without any additional action by the user.*

---



## Discovery Progress Status

Viewing the discovery process displays a status result for each PDU. See [PDU Connectivity Health Statuses](#).

## Validating PDU Credentials

When adding PDUs to Power IQ individually, you can specify whether the admin credentials are validated.

Check the "Validate and wait for discovery to complete before proceeding" checkbox on the Add a New PDU page. See [Adding PDUs to Power IQ](#) for details on adding PDUs.

When you specify validation, the PDU will not be added if the credentials are incorrect. If you opt not to validate, all PDUs will be added, and those added with incorrect credentials will trigger an event called PDUcredentialsInvalid.

When adding PDUs to Power IQ with a CSV file, the admin credentials are not validated before the PDU is added. When credentials are found to be incorrect, an event is logged.

Power IQ can poll PDUs without the correct credentials. You cannot upgrade PDUs or use bulk configuration without the correct credentials.



## Editing PDUs under Power IQ Management

Editing a PDU allows you to reconfigure the SNMP community string for a PDU, or change the username and password used to access that PDU.

If you need to maintain the PDU or physically remove it without deleting its data from Power IQ, you have to edit the PDU to change its connectivity state. See *Managing Removed or Out of Service Items* on page 776.

1. In the Facility Items tab, click a PDU to open the PDU's smart page.
2. Choose Actions > Edit.
3. Enter an asset tag number or other asset management code in the External Key field. Optional.
4. To set the PDU to the maintenance mode, select the Maintenance Mode checkbox. To decommission the PDU, select the Decommissioned checkbox. If both checkboxes are selected, the PDU is considered decommissioned.
5. Enter data in Custom Field 1 and Custom Field 2. Optional. The labels may have been changed in Power IQ to identify these fields.
6. Select the SNMP Version. Then, use the fields that display to enter the credentials. To delete previous credentials for either SNMP version, select the "Delete SNMP v2 community credentials" checkbox.
  - For SNMP version 1/2c PDUs, enter an SNMP Community String that has at least READ permissions to this PDU. Use an SNMP community string that has both READ and WRITE permissions to the PDU to enable power control, outlet renaming, and buffered data retrieval. Re-enter the string in the Community String Confirm field.
  - For SNMP version 3 PDUs, enter the Username and select an Authorization Level. The authorization levels are:
    - noAuthNoPriv: No Authentication Passkey, No Encoding Passkey
    - authNoPriv: Authentication Passkey, No Encoding Passkey
    - authPriv: Authentication Passkey, Encoding Passkey
  - a. Depending on the Authorization Level selected, you must enter additional credentials for Authorization and Privacy.
  - b. Authorization Protocol: Select MD5 or SHA.
  - c. Enter the PDU's Authorization Passkey, then re-enter the passkey in the Authorization Passkey Confirm field.
  - d. Privacy Protocol: Select DES or AES.
  - e. Enter the PDU's Privacy Passkey, then re-enter the passkey in the Privacy Passkey Confirm field.
7. PDU Phase:
  - When Power IQ can detect the phase, the Automatic option is selected, and the phase displays. For example, "Automatic (determined to be single phase)."
  - When a PDU does not report phase, the Ignored option is selected. You can keep this setting to ignore phase, or set the phase manually.
  - To set the phase manually, either if it cannot be determined automatically, or is incorrect, select the "Manually set to single phase" or "Manually set to three phase" option.
8. If the PDU is a Raritan PX/PX2/PX3/EMX or a Server Technology PDU, enter a valid Username and Password for the PDU in the PDU Administrative Credentials section. Re-enter the password in the Password Confirm field. Leave the fields blank to keep using the password already configured. If you want to use a blank password, select the "Delete PX credentials" checkbox. Optional.
9. Enter the backup IP address. Optional. Leave the field blank if not using a backup IP address. To delete an existing backup IP address, check the "Delete Backup IP Address" checkbox.
10. Click Save.



---

*Note: If you change the administrator password used by Power IQ for a Server Technology PDU through the PDU UI, you must restart the PDU to ensure that the Server Technology SNAP API will correctly authenticate requests from Power IQ. However, if you change the administrator password through the Power IQ UI, Power IQ will restart the PDU without any additional action by the user.*

---



## Configuring Estimated Voltages

Power IQ can estimate Active Power for PDUs that do not directly provide Active Power measurements.

If a PDU does not provide one of the following values, the default estimated voltage will be applied. See *Setting Default Estimated Voltages* on page 102.

- Inlet Voltage
- Outlet Voltage
- Active Power

These voltage values are only editable when they are NOT coming from the PDU.

1. In the Facility Items tab, select a PDU then click the Edit this PDU icon in the Actions column.
2. For three-phase PDUs, enter the voltages in the Manually Configured Inlet Voltage and Manually Configured Outlet Voltage fields.
3. For single-phase PDUs, enter the inlet voltage in the Manually Configured Voltage field.

If no value is entered, the default value is used.

4. Click Save.



## Adding PDUs in Bulk with CSV

### Structure of the Add PDUs CSV File

The structure of the CSV file is as follows:

- One line per PDU to import.
- No header row.
- Each line has only the following value columns, in the following order:
  1. IP address
  2. Proxy index: If the PDU is in a daisy-chained configuration or console server configuration, enter the PDU's position number in the chain or serial port number. See [Proxy Index Details](#). For PDUs that use the MAC address as a proxy index, enter the last six digits of the address separated by a colon (for example: 01:89:ab).

**Leave blank if not configuring a backup IP address.**

3. Backup IP Address

**Leave blank if the PDU is not in this type of configuration.**

4. Raritan PX username
5. Raritan PX password

**Leave the Raritan PX username and Raritan PX password fields blank for other PDUs.**

6. SNMP Community String

**Leave the SNMP Community String blank if it does not apply for a PDU.**

7. SNMPv3 enabled: true or false.

**Leave columns 8-13 blank if SNMPv3 is set to false.**

8. SNMPv3 username
9. SNMPv3 authorization level: noAuthNoPriv, authNoPriv or authPriv.
10. Authorization protocol: MD5 or SHA.
11. Authorization passkey: no commas allowed
12. Privacy protocol: DES or AES
13. Privacy passkey: no commas allowed
14. External key
15. Custom field 1
16. Custom field 2

For example:

#### Example

```
192.168.43.184,,,admin,raritan,private
```

```
192.168.44.101,,,,,PDUread
```

The first line in this example represents a Raritan PX PDU. The second line represents a PDU from another vendor. Uploading this CSV file would instruct Power IQ to add two PDUs to management. The first PDU is located at 192.168.43.184, and uses the login/password combination admin/raritan for authentication. Its SNMP Community String is set to private. The second PDU is located at 192.168.44.101 and does not use a user name and password for authentication. Its SNMP Community String is set to PDUread.

---

*Note: When a Server Technology primary PDU is imported into Power IQ via CSV import, its daisy-chained PDUs will also be imported. However, a CSV import file with only daisy-chained PDUs will not result in the import of the primary PDU.*

---

## Proxy Index Details

For stand-alone PDUs, the proxy index field should be left blank.

For PDUs acting in a daisy-chain, or for PDUs that are being proxied through another PDU, the proxy index field should contain the number of the PDU's position.

For daisy chained systems, the proxy index field should be set to the PDU's position within the chain. The head-end or primary system should have a proxy index value of 1. The second system in the chain would have a proxy address of 2 and so on.

For PDUs that use the MAC address as a proxy index, enter the last six digits of the address separated by a colon (for example: 01:89:ab).

For element managed systems, such as PDUs behind a serial proxy, the proxy index field should contain the serial port number to which the PDU is attached on the management console.





## Adding Raritan Power Meter and Power Meter Branch Circuit Monitor (BCM)

You can add a Raritan Power Meter and Power Meter Branch Circuit Monitor (PMM and PMB) to Power IQ the same way you add a PDU.


1. Add the meter using the IP address of the Power Meter Controller (PMC) module.
2. If your PMC manages more than one PMM/PMB, enter the dip-switch setting as the Proxy Index to identify the correct module. Power IQ checks which modules are connected to your PMC to determine how to add the unit.
  - If Power IQ discovers the PMM alone, it is added as a Standalone Power Meter.
  - If Power IQ discovers the PMM with the PMB connected, it is added as a Power Panel.
  - Power IQ discovers new circuits automatically, but does not recognize other changes made in the PMC interface. Decommission and add the unit again to get the updated configuration.




- Asset management strips and environmental sensors connected to Raritan Power Meters are not supported


### Add a New PDU


IP Address:

Proxy Index: Integer:  Hex :

External Key:

Custom Field 1 :

Custom Field 2 :

SNMP Version:  

#### PDU Administrative Credentials

Username:

Password:

Password Confirm:

#### SNMP v1/2c Credentials

Community String:

Community String Confirm:

#### Backup IP Address

Backup IP Address:

Validate and wait for discovery to complete before proceeding

in Power IQ 5.0.

## Adding Raritan EMX

You can add a Raritan EMX to Power IQ the same way you add a PDU. All information in this help that refers to PDUs can be applied to EMX, with a few exceptions.

Power IQ collects and displays sensor and asset strip data from a EMX in the same way as other PDUs with attached sensors or asset strips. EMX does not have any outlets.

You cannot upgrade or use bulk configuration for EMX through Power IQ.



## Adding MRV PDUs

For MRV PDUs, make sure you have configured the get and set clients with the same community string, and use that community string when adding the PDU to Power IQ.



## Adding Rack Transfer Switches

You can add a supported Rack Transfer Switch to Power IQ the same way you add a PDU.

You can upgrade or use bulk configuration for Raritan PX3TS transfer switches through Power IQ.



## Adding Veris Branch Circuit Monitors with Acquisuite

Use the Add a PDU function to add a Veris branch circuit monitor (BCM) connected to a Veris or Obvius Acquisuite modbus to Power IQ.

For more information, see *How to Add PDUs to Power IQ* on page 112.

Specify the following information when adding the Veris BCM to ensure Power IQ connects to the correct panel.

Field name in Add a PDU page	Modbus/BCM information
IP Address	IP address of the Acquisuite modbus.
Proxy Index <b>REQUIRED</b>	Device number of the BCM panel. Example: The device number of the panel as configured in the Acquisuite. This information can be found in the Acquisuite web client.

Each panel displays as a PDU with up to 42 outlets. Each branch displays as an outlet.

Each single-phase branch is monitored independently as a single-phase circuit.

Groupings into multi-phase circuits is not supported.



## Adding PDUs Managed by Dominion SX

You can add PDUs that are managed by a Dominion SX serial console to Power IQ.

Specify the following information when adding the PDU to ensure Power IQ connects to the correct SX-managed PDU.

See *How to Add PDUs to Power IQ* on page 112

Field name in Add a PDU page	Modbus/BCM information
IP Address	IP address of the Dominion SX
Proxy Index	Dominion SX port number that the PDU is connected to
PDU Administrative Credentials Username, Password, Password Confirm	Dominion SX username and password
SNMP fields	Leave blank.

## Adding PDUs with Custom Dynamic Plugins

When adding a PDU that uses a custom dynamic plugin, use the same Add a PDU feature as any other addition. See *How to Add PDUs to Power IQ* on page 112.

When Power IQ detects that there is at least one custom dynamic plugin configured, a Plugin drop-down field displays.





### Add a New PDU

IP Address:


Plugin:


Automatic ▼

Proxy Index:

Automatic  
bb\_pm710\_custom\_sam\_proxy1

External Key:

Custom Field 1 :

Custom Field 2 :

SNMP Version:

1/2c ▼

#### PDU Administrative Credentials

Username:

Password:

Password Confirm:

#### SNMP v1/2c Credentials

Community String:

Community String Confirm:

#### Backup IP Address

Backup IP Address:

Validate and wait for discovery to complete before proceeding

Add and return to this form

 Add

Automatic: Use Automatic to allow Power IQ to determine the correct plugin for the PDU you are adding. Automatic attempts to find an exact match between the PDU and the plugin for SysObjectID, PDU Model name, and Proxy ID.

If there is no exact match, but several dynamic plugins are eligible to manage the PDU, based on sysObjectID, then Power IQ selects from among the eligible plugins. If automatic mode does not select the desired dynamic plugin, delete the PDU and add it again, selecting the specific custom dynamic plugin from the list.

Alternatively, select the specific custom dynamic plugin from the list.

For more information, see *How Power IQ Associates Facility Items with a Structured or Custom Plugin* on page 734.



## Adding Raritan PDUs in Port Forwarding Configuration

Raritan PDUs can be cascaded via USB cables to share an Ethernet connection. The first PDU in the chain is the primary device, and all PDUs connected to it are extension devices.

Power IQ USB-cascading chains have been tested with a total of eight PDUs, however there is no upper limit to the number of devices in the chain.

---

*Note: Power IQ only recognizes Raritan "PX2" and "PX3" PDU models in a USB-cascading chain. For details, see the [USBCascading Solution Guide on the PX2 web page \(http://www.raritan.com/support/product/px2/\)](http://www.raritan.com/support/product/px2/) of the Raritan web-site.*

---

Chains can be built using USB, network or a mixture of both. It is transparent to Power IQ, i.e. Power IQ can not see how the chain is built, still it supports any of those chains.

Add primary and extension PDUs in Port Forwarding mode the same way you add a standalone Raritan PDU. See *How to Add PDUs to Power IQ* on page 112.

Power IQ includes built-in validations and protections, and displays notification messages when the port forwarding configuration order is changed.

Specify the following information when adding primary and extension PDUs in Port Forwarding mode.

Field name in Add a PDU page	Primary PDU	Extension PDU
IP Address	IP address of the primary PDU	Same IP address as the primary PDU
Proxy Index <b>REQUIRED</b>	1	8
External Key	Any unique entry different from the IP address	Any unique entry different from the IP address
PDU Administrative Credentials Username, Password, Password Confirm	The primary PDU's credentials	The extension PDU's credentials
SNMP fields	The primary PDU's SNMP strings	The extension PDU's SNMP strings

## Adding Server Technology PDUs

Many Server Technology PDUs follow a configuration with a primary PDU and daisy-chained PDUs. This configuration is handled in Power IQ as follows:

When adding PDUs through the Power IQ GUI, when Power IQ discovers a primary Server Technology PDU, its daisy-chained PDUs will also be discovered and added to the Facility Items list. If the daisy-chained PDUs are already in Power IQ, those PDUs will not be rediscovered and will retain their PDU IDs.

### Autodiscovery of Server Technology PDUs

When a Server Technology primary PDU is autodiscovered within an IP address range using Power IQ's autodiscovery feature, the daisy-chained PDUs attached to the primary will also be discovered as separate units, starting at Proxy Index 2. The feature also applies when a Server Technology primary PDU is added either manually or through CSV import.

### Adding Server Technology PDUs via CSV Import

When a Server Technology primary PDU is imported into Power IQ via CSV import, its daisy-chained PDUs will also be imported. However, a CSV import file with only daisy-chained PDUs will not result in the import of the primary PDU.

## Server Technology PDU Names in Power IQ

In naming PDUs, Power IQ typically uses a PDU's sysName value as is commonly seen on the SNMP MIB to display the PDU name in the GUI. However, to improve identification of daisy-chained Server Technology PDUs, Power IQ now uses the sysName value for primary PDUs and the PDU's Tower Name for the daisy-chained Server Technology PDUs.

For the primary PDU:

- Power IQ will show the sysName value
- When the user changes the PDU Name in Power IQ, Power IQ will update both the sysName value and the Tower Name for that PDU

For the daisy-chained PDUs:

- Power IQ will show the Tower name value for each PDU
- When the user changes the PDU Name in Power IQ, Power IQ will only update the Tower Name for that PDU

## Server Technology PDU Firmware Version and X.509 Certificate Issues

This section covers potential issues related to Server Technology PDU firmware versions and X.509 security certifications. It provides recommendations to avoid or address these issues on Server Technology PDUs.

Power IQ supports discovery and data collection for Server Technology PDUs running pre-v7.0m firmware. However, some new features, including administrator credential validation, bulk configuration, and firmware upgrades are supported for PDUs running only v7.0m or higher firmware.



On Server Technology PDU's running v7 firmware, Power IQ will generate an "Admin Credentials Invalid" event and display the PDU in a Warning state for the following reasons:

- Credentials don't match those of an "Administrator" user on the PDU
- PDU is running pre-v7.0m firmware
- PDU has an older X.509 certificate that was generated with an older encryption protocol that is no longer considered secure. As a result, Power IQ is not able to authenticate their administrator credentials. Refer to the recommendations section for instructions on how to generate a new certificate on the PDU.

## Recommendations for Server Technology PDUs in Power IQ 6.2

Sunbird makes the following recommendations to customers to address these issues:

### 1. Prior to upgrading to Power IQ 6.2, upgrade all Server Technology PDUs to the latest available firmware (at a minimum v7.0m).

After upgrading the Server Technology PDU firmware, you should generate a new X.509 certificate for any Server Technology PDU which was purchased prior to 2016 and has never had a new certificate generated.

To do so, log in to the Server Technology PDU web GUI. Then navigate to Tools > Restart and initiate a system restart the PDU with the "Restart and generate a new X.509 certificate" option. Please refer to your ServerTech PDU documentation for further instructions.

### 2. After upgrading to Power IQ 6.2, update your Server Technology PDU administrator credentials.

After upgrading to Power IQ 6.2, you should update the configuration of all your Server Technology PDUs that are managed in Power IQ to include administrator credentials. This is required to be able to take advantage of all the new Server Technology related functionality in Power IQ 6.2.

---

*Note: If you change the administrator password used by Power IQ on a Server Technology PDU through the PDU UI, you must restart the PDU to ensure that the Server Technology SNAP API will correctly authenticate requests from Power IQ. However, if you change the administrator password through the Power IQ UI, Power IQ will restart the PDU without any additional action by the user.*

---

## Bulk Configuration of PDUs

Bulk configuration capabilities in Power IQ are supported for Raritan and Server Technology PDUs.



## Requirements for Bulk Configuration

Bulk configuration is supported for Raritan and Server Technology PDUs only.

---

*NOTE: For Raritan PX2s, the Bulk Configuration feature can be used to copy configuration files to other PX devices of the same model and firmware version. On Raritan PX2s running firmware 2.5.30 or higher, the model is considered the same when the only differences are the length of the line cord (option A or L), the color of the line cord (Option B), or the PDU Color (option K).*

---

- Each PDU must be configured with an IP address and be under Power IQ management.
- A configuration backup file from a configured Raritan or Server Technology PDU.



## Planning a New Rollout

1. In the Facility Items tab, choose Activities > Bulk Configuration Activities.
2. On the Bulk Configuration Activities page, select Clone and Restore Configuration Files.
3. On the Bulk PDU Configuration page, click Plan a new rollout or, if an existing unexecuted plan exists in the system, click the Activities menu > Plan a new rollout. The Bulk PDU Configuration rollout planning wizard starts.
4. Enter a name for the plan and click Continue.

A summary of plan options appears at the top of the page. Continue adding details of your plan at the bottom of the page, or click the links in the summary list to add details.

5. In the Choose a PDU Configuration File section, you can add a new PX backup file or select a previously uploaded file. Configuration backup files are .XML files for PX2 configurations, and do not show a file extension for PX1 configurations.
6. To add a new file, click the Upload a New File tab, then click Browse to select the file. Enter comments. Click Upload. The file is automatically selected for the plan.
7. To select a previously uploaded file, click the Available Files tab, then select a file from the list, and click Continue.
8. All PDUs available for the rollout appear in a list. Select the checkboxes for the PDUs you want to configure, then click Selected PDUs to add them to the "PDUs selected for this plan" list at the bottom of the page. Or, click All PDUs to add all available PX PDUs to the list.
9. To remove PDUs from the plan, click Selected PDUs or All PDUs in the bottom list. Only PDUs in the bottom list will be configured.
10. Click Continue. Click the Plan Options link in the summary at top.
11. On the Plan Options page, edit the plan name, if needed, and set other preferences.
12. Select the "Abort on failure" checkbox if you want Power IQ to cancel all remaining configurations in the plan if a configuration failure occurs. This could help prevent a configuration problem from affecting other Raritan PX PDUs in the plan.
13. Select the "Allow simultaneous rollouts" checkbox if you want Power IQ to configure multiple Raritan PX PDUs at once. This makes batch configurations faster by allowing up to 25 configurations to run at the same time.
14. Click Continue. Review the summary of the plan. Click Add Comment if you want add notes to the plan. Click Add or Remove PDUs if you want to edit the list of PDUs to configure.
15. Click Save. The completed plan summary page opens.
16. Click Start Rollout to execute the plan immediately. The rollout starts, and the status page displays. You can also execute the saved plan later.

See [Viewing a Status of Rollout Plans in Progress](#) for details on checking rollouts in progress.

See [Viewing Completed Rollout Plans](#) for details on checking completed rollouts.





## Viewing Saved/Current Rollout Plans

View saved rollout plans to verify and edit their details before executing a plan.

1. In the Facility Items tab, select [Activities > Bulk Configuration Activities](#).
2. On the Bulk Configuration Activities page, select [Clone and Restore Configuration Files](#).
3. On the Bulk PDU Configuration page, saved rollout plans are available in the [Saved Plans](#) section.
4. Click the plan name link to view the details and edit if needed.

---

*Note: You can also view saved rollout plans on the [Saved PDU Configuration Rollout Plans](#) page under [Activities > View status of current rollouts](#).*

---



## Editing a Saved Rollout Plan

Saved rollout plans can be edited to change details, add or remove PDUs, or change the configuration file.

You can only edit rollout plans that you created.

1. In the Facility Items tab, select Activities > Bulk Configuration Activities.
2. On the Bulk Configuration Activities page, select Clone and Restore Configuration Files.
3. On the Bulk PDU Configuration page, saved rollout plans are available in the Saved Plans section.
4. Click the Plan name link to view the plan summary page.
5. Click the Edit link on the Plan Summary page to edit the plan.
6. Click the blue links on the Edit page to edit the plan name, choose a configuration plan, select PDUs for the plan, edit plan options, and add comments.
7. Click the Save link to save your changes.

See [Plan a New Rollout](#) for details of plan settings.

Note: Plans with edits in progress are displayed in the Plan Edits in Progress section on the Bulk PDU Configuration home page. Click the plan name link to access the Edit page.



## Executing a Saved Rollout Plan

1. In the Facility Items tab, select Activities > Bulk Configuration Activities.
2. On the Bulk Configuration Activities page, select Clone and Restore Configuration Files.
3. On the Bulk PDU Configuration page, saved rollout plans are available in the Saved Plans section.
4. Select the saved plan you want to execute to view its plan summary page.
5. On the plan summary page, click Start Rollout to execute the plan.

See [Viewing Status of Rollout Plans in Progress](#) for details on checking rollouts in progress.

See [Viewing Completed Rollout Plans](#) for details on checking completed rollouts.

## Rollout Timing

Each PDU configuration takes approximately 30 seconds.

If you select "Allow simultaneous rollouts" in the plan options, 25 configurations will begin simultaneously, and each batch of 25 will take approximately 30 seconds.



## Viewing Status of Rollout Plans

Rollout plans have three possible statuses when in progress.

- Init: Initializing to prepare the PDU for configuration
- Login: Logging in to the PDU
- Verify: Verifying the PDU is responsive after configuration is complete

test 1 (Aborted)						
PDU	Started At	Init	Login	Verify	Status	
192.168.42.201	07/20/17 07:36:08 AM EDT	✓			Failed	

Page 1 of 1      Displaying PDUs 1–1 of 1

The status page for plans in progress displays when you execute the plan. You can return to the status page at any time, even after the plan has finished.

1. In the Facility Items tab, select Activities > Bulk Configuration Activities.
2. On the Bulk Configuration Activities page, select Clone and Restore Configuration Files.
3. On the Bulk PDU Configuration page, select Activities > View previously completed rollouts.
4. Click the link for the plan you executed to view the plan summary page. At the top of the page, a status message will be displayed. The message will vary based on the status of the plan.


**ROLLOUT COMPLETE**  
 The plan completed successfully. [View detailed rollout status messages.](#)

5. Click the View detailed rollout status messages to view the detailed status messages for each PDU selected for the plan.

Update PDU Config (Completed)						
PDU	Started At	Init	Login	Verify	Status	
192.168.43.105	03/27/17 02:36:34 PM EDT	✓	✓	✓	Success	

Page 1 of 1      Displaying PDUs 1–1 of 1



## Viewing Completed Rollout Plans

When a plan has been executed, you can view details of the plan status and results of each PDU included in the plan.

1. In the Facility Items tab, select Activities > Bulk Configuration Activities.
2. On the Bulk Configuration Activities page, select Clone and Restore Configuration Files.
3. On the Bulk PDU Configuration page, select Activities > View previously completed rollouts.
4. On the Completed PDU Configuration Roll Outs page, click the link for the plan you executed to view the plan summary page. At the top of the page, a status message will be displayed. The message will vary based on the status of the plan.

**ROLLOUT COMPLETE**

The plan completed successfully. [View detailed rollout status messages.](#)

- If the plan completed successfully, a success message displays at the top of the plan details.
  - The list of PDUs included in the plan includes a Success or Failure message.
5. Click the "View detailed upgrade status messages" link for more information about each PDU.
  6. Click Delete Plan to delete it.

## Managing Uploaded Configuration Files

You can upload different configuration files for use in rollout plans, and view previously uploaded configurations.

Configuration files are .DAT files. Configuration files are created by backing up a Raritan or Server Technology facility item.

1. In the Facility Items tab, select Activities > Bulk Configuration Activities.
2. On the Bulk Configuration Activities page, select Clone and Restore Configuration Files.
3. On the Bulk PDU Configuration page, click Activities > Manage Uploaded Configuration Files. The PDU Configuration Files page opens.
4. To delete a file, select the checkbox for the configuration file you want to delete, then click Delete.
5. To upload a new file, scroll down to the Upload New Configuration File section.
  - a. Enter the model name that the file is for in the Model Name field.
  - b. Click Browse to select the .DAT file.
  - c. Click Upload. The file is added to the list and will be available to select when creating a new rollout plan. See [Plan a New Rollout](#).

### PDU Configuration Files

Results: 1 - 1 of 1

PDU Model	Uploaded	By	Size
<input type="checkbox"/> <a href="#">PX2-5146R</a>	03/27/17 02:34:54 PM EDT	System Administrator	7.61 KB

[Delete](#)

### Upload New Configuration File

Model name

PDU configuration file  No file chosen

[Upload](#)

---

*Note: You can also upload, delete, and edit firmware in the Firmware Update panel under Manage Bulk Configuration Templates > Templates Firmware Update.*

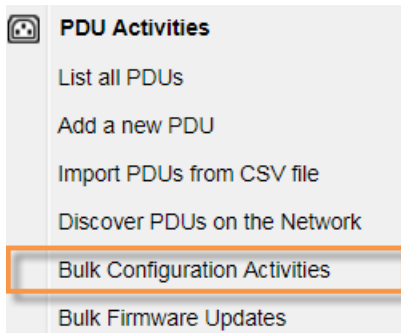
---

## Viewing the Run History and Report for a Bulk Configuration Template

You can view the run history for a specific bulk configuration template or plan within Power IQ. You can also view the reports for specific dates and times from the Run History page. Reports are created automatically when a template has been run. If a template has not been run, you will not be able to view its run history.

To view the run history for a specific template:

1. In the Facility Items tab, select **Activities > Bulk Configuration Activities**.



2. On the Bulk Configuration Activities page, select **Manage Bulk Configuration Templates**.
3. On the Templates page, select the existing template you would like to view the run history for.

Start / Templates

Templates					
Add	Copy	Edit	Delete	Run	Run History
Name	Summary	Creator	Runs	Latest Run State	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
config pdus		admin	0	Template has no actions...	
con pdu		admin	0	Template has no actions...	
update pdus		admin	0	Template has no Faciliti...	
alex		admin	1	Completed with errors	
box pdu update	demo for ben	admin	0	No runs have been mad...	
01/13/2018 05:39:11.16...	Bulk Template created b...	admin	0	No runs have been mad...	

4. Click the **Run History** link to view the run history page.

On the Run History page, you can select the template report you would like to view by clicking the Report link in the far right column of the report you would like to view. Reports can be filtered by the following:

- State
- Summary



- Start Date and Time
- Completion Date and Time

## Template/Plan Reports

The following screenshot shows an example template report for updating a password.

### Report for Update password on Owen's PX2

Summary: yeah  
Created By: admin

#### Actions

Title	Description
Update Password	Bulk update password for the facility items selected on the plan

#### Summary

Started At	Completed At	Run By	Facility Items		
			Count	Updated	Failed
07/13/2017 01:45:12.792 PM	07/13/2017 01:45:18.715 PM	admin	1	1	0

#### Details

Facility Item	Message Time	Message
192.168.43.105		
	07/13/2017 01:45:12.839 PM	Waiting to run
	07/13/2017 01:45:12.868 PM	Started tasks
	07/13/2017 01:45:18.691 PM	Password change completed

Each report includes the following sections:

#### Actions

The Actions section provides titles and descriptions for the actions performed (e.g., Update Password).

#### Summary

The Summary section provides the dates and times the actions were completed. It also indicates who executed the plan and the number of facility items that were included and updated in the plan.

#### Details

The Details section provides date- and time-stamped messages for each facility item that indicate the state of each facility item as the plan is executed (e.g., Waiting to run, Started tasks).

Reports also can be exported to PDF.



## CSV Summary Report

A downloadable CSV summary report is also available by clicking the Summary Report link on the Run History page. This report can be used for sorting and filtering the data in Excel and for emailing to others on your team.

The CSV file captures PDU information and whether the desired actions were completed successfully. It includes the following columns:

- Label: The IP address or host name of the PDU
- Name: The name of the PDU
- Location: The location of the PDU
- Manufacturer: The manufacturer or make of the PDU
- Model: The model of the PDU
- Password Update: Indicates the status of the action: Success, Fail, or Warning (completed but with errors or warnings)
- Firmware Update: Indicates the status of the action: Success, Fail, or Warning (completed but with errors or warnings)
- Trap Destinations: Indicates the status of the action: Success, Fail, or Warning (completed but with errors or warnings)
- SNMP Configuration: Indicates the status of the action: Success, Fail, or Warning (completed but with errors or warnings)

The order of the actions may vary by which action were included in the template. For example, if only the Password Update action was included, only the Password Update column would be included in the report.



## Managing Bulk Configuration Templates

Bulk configuration templates or plans are used to make configuration changes to one or more facility items in Power IQ. These templates are useful for making changes on facility items in bulk, without logging in to each device individually. Template also save time when you need to repeat the same action every so often (for example, changing the passwords on your facility items every six months.)

You can change the administrator password, trap destinations, and SNMP settings using bulk configuration templates. Click the links below for detailed instructions for completing each action.

- [Updating Firmware for Facility Items in Bulk on page 151](#)
- [Changing the Administrator Password for Facility Items in Bulk on page 155](#)
- [Setting Power IQ as the SNMP Trap Destination for Facility Items in Bulk on page 158](#)
- [Configuring SNMP Settings for Facility Items in Bulk on page 162](#)

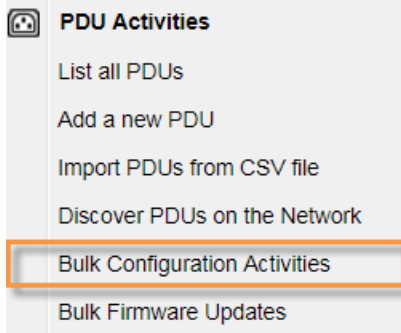
To use bulk configuration template to make changes across a range of facility items:

1. Create a new template or edit an existing template
2. Make your desired updates in the appropriate sections for one or more of the above actions.
3. Select the facility items that you would like to update.
4. Run the template.

Bulk configuration template can be created, edited, copied and deleted through Power IQ. You can also run an existing template and view its run history. For more information, see *Bulk Configuration Template Activities* on the facing page

To manage bulk configuration templates:

1. In the Facility Items tab, select Activities > Bulk Configuration Activities.



2. On the Bulk Configuration Activities page, select Manage Bulk Configuration Templates.
3. Click the Next button. The Templates page displays.

- On the Templates page, select the existing plan you would like to run or click the Add button to create a new plan. Plans can be filtered based on the following: Name, Summary, Creator, Number of Runs, and Latest Run State.

[Start](#) / [Templates](#)

**Templates**

[Add](#)   [Copy](#)   [Edit](#)   [Delete](#)   [Run](#)   [Run History](#)

Name	Summary	Creator	Runs	Latest Run State
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
New Plan - 20171204 15:50:40	New Bulk Plan created by Admin User	admin	1	Completed with errors
Auto Bulk Template	Auto Bulk Template	admin	1	Completed with errors
12/18/2017 02:26:52.602 PM - Bulk ...	Bulk Template created by user: admin	admin	22	Completed with errors
12/19/2017 11:28:45.053 AM - Bulk ...	Bulk Template created by user: one...	one_pdu	2	Completed with errors
01/10/2018 03:14:19.551 PM - Bulk ...	Bulk Template created by user: admin	admin	0	No runs have been made yet
01/10/2018 03:44:57.076 PM - Bulk ...	Bulk Template created by user: admin	admin	0	Template has no actions to implement

[Next](#)

## Bulk Configuration Template Activities

The following actions are available on the Templates page for managing bulk configuration templates or plans. Click each link for detailed instructions.

- [Adding a Bulk Configuration Template](#) on the next page
- [Editing a Bulk Configuration Template](#) on the next page
- [Copying a Bulk Configuration Template](#) on page 149
- [Deleting a Bulk Configuration Template](#) on page 149
- [Running a Bulk Configuration Template](#) on page 150
- [Viewing Run History](#) on page 150

To initiate each action, click on their respective links in the top bar on the Templates page in the Power IQ GUI.



[Start](#) / [Templates](#)

Templates					
<a href="#">Add</a> <a href="#">Copy</a> <a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Run</a> <a href="#">Run History</a>					
Name	Summary	Creator	Runs	Latest Run State	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
New Plan - 20171204 1...	New Bulk Plan created ...	admin	1	Completed with errors	
Auto Bulk Template	Auto Bulk Template	admin	1	Completed with errors	
12/18/2017 02:26:52.6...	Bulk Template created ...	admin	22	Completed with errors	
12/19/2017 11:28:45.0...	Bulk Template created ...	one_pdu	2	Completed with errors	
01/10/2018 03:14:19.5...	Bulk Template created ...	admin	0	No runs have been ma...	
01/10/2018 03:44:57.0...	Bulk Template created ...	admin	0	Template has no action...	

[Next](#)

## Adding a Bulk Configuration Template

To add a bulk configuration template, click the [Add](#) link on the Bulk Configuration Templates page. A new template will automatically be created, and you will be direction to the Actions page.

*Note: To edit the plan's name or summary, return to the Templates page, select the plan, and click the [Edit](#) link.*

## Editing a Bulk Configuration Template

Two types of edits are available for bulk configuration templates:

1. Edit the template name and summary: To edit the template's name or summary, select the template and click the [Edit](#) link. Make your desired changes in the Name and Summary fields in the popup.



Edit Template ✕

**Name**

**Summary**

2. Edit the template actions: To edit the actions performed when the template is executed, click the Next button.
  - a. On the Actions page, click the Reset button under any action to remove that action from the template. Click the Save button in the appropriate action panel to save your changes.
  - b. On the Add PDUs page, add or remove desired PDUs.
  - c. Click the Run button to run the template.

## Copying a Bulk Configuration Template

Copying a bulk configuration template can save time when you are creating multiple templates or plans with the same actions.

To copy a bulk configuration template:

1. Select the template you want to copy.
2. Click the Copy link on the Templates page. The Edit popup will display prepopulated with the original template's name, time- and date-stamped and appended with "copy." The Summary will be the same as the original template.

Edit Template ✕

**Name**

**Summary**

3. Change the name and summary as desired.

The new template will appear in the Templates list.

## Deleting a Bulk Configuration Template

Clean up your templates list by deleting old or unused bulk configuration templates/plans.

To delete a bulk configuration template:



1. On the Templates page, select the template you want to Delete.
2. Click the Delete link.
3. When prompted, click the Yes button to confirm the deletion.

The template will be removed from the Templates list.

## Running a Bulk Configuration Template

1. Running a bulk configuration template or plan enables you to re-run the template as-is, without making changes to it.
2. To run a bulk configuration template:
3. Select the template you want to run.
4. Click the Run link on the Template page.
5. A popup will display asking you to confirm that you want to apply the settings to selected facility items on the template. Click the Yes button to proceed. Click the No button to cancel.
6. If you select Yes, you will be redirected to the live status page. A success message will display once the run has completed.



[Start](#) / [Templates](#) / [Actions](#) / [Facility Items](#) / [Status](#)

Template Actions	
<b>Update Password</b>	Bulk update password for the facility items selected on the template

PDUs				
	Status ▲ ▼	Label ▲ ▼	Message Time ▲ ▼	Message ▼
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<b>Completed (3)</b>				
<input type="checkbox"/>		<b>192.168.43.177 (3)</b>		
	Completed	192.168.43.177	01/18/2018 08:24:01.184 PM	Waiting to run
	Completed	192.168.43.177	01/18/2018 08:24:01.401 PM	Started tasks
	Completed	192.168.43.177	01/18/2018 08:24:01.421 PM	Password change completed

## Viewing Run History

You can view the run history for a specific bulk configuration template or plan within Power IQ. You can also view the reports for specific dates and times from the Run History page. Reports are created automatically when a template has been run. If a template has not been run, you will not be able to view its run history.

For detailed instructions, see *Viewing the Run History and Report for a Bulk Configuration Template* on page 143



## Updating Firmware for Facility Items in Bulk

Site Administrators can update firmware for Raritan and Server Technology facility items in bulk.

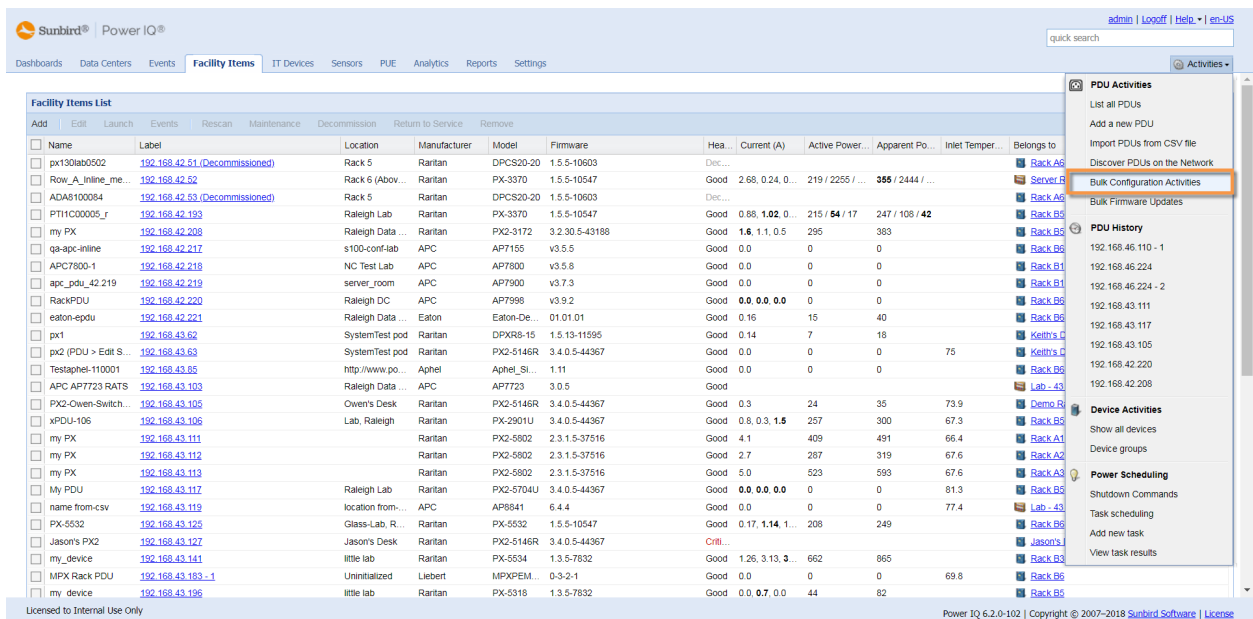
Updating firmware for one or more Raritan and Server Technology facility items requires creating a new bulk configuration template/plan or editing an existing template for uploading or selecting the firmware, selecting the desired facility items, and then running the plan to update the facility items with the new firmware.

For the change to take place, the facility item must have the administrator credentials set in Power IQ.

*Note: Before performing bulk configuration actions on PDUs, Sunbird recommends putting them into Maintenance Mode. This will prevent events related to lost connectivity and admin credential checks from being generated while the actions are running. After the bulk configuration plan has completed, be sure take the PDUs out of Maintenance Mode by using the Return to Service option.*

To update firmware:

1. In the Facility Items tab, select Activities > Bulk Configuration Activities.



The screenshot shows the Sunbird Power IQ interface. At the top, there are navigation tabs: Dashboards, Data Centers, Events, **Facility Items**, IT Devices, Sensors, PUE, Analytics, Reports, and Settings. Below these is a search bar and a user profile (admin | Logout | Help | en-US). The main content area is titled "Facility Items List" and contains a table with columns: Add, Edit, Launch, Events, Rescan, Maintenance, Decommission, Return to Service, Remove, Name, Label, Location, Manufacturer, Model, Firmware, Health, Current (A), Active Power, Apparent Power, Inlet Temperature, and Belongs to. The table lists various facility items, including PDUs and servers, with their respective details. On the right side, there is a sidebar menu with "Activities" expanded, showing options like "List all PDUs", "Add a new PDU", "Import PDUs from CSV file", "Discover PDUs on the Network", "Bulk Configuration Activities" (highlighted), and "Bulk Firmware Updates".

2. On the Bulk Configuration Activities page, select Manage Bulk Configuration Templates.
3. On the Templates page, select the existing template you would like to run or click the Add link to create a new template. Templates can be filtered based on the following: Name, Summary, Creator, Number of Runs, and Latest Run State.

*Note: If you click the Add link, a new template will automatically be created, and you will be directed to the Actions page, without clicking the Next button. Proceed to Step 5. To edit the template's name or summary, return to the Templates page, select the template, and click the Edit link.*

[Start](#) / [Templates](#)

Templates					
Add	Copy	Edit	Delete	Run	Run History
Name	Summary	Creator	Runs	Latest Run State	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
New Plan - 20171204 15:50:40	New Bulk Plan created by Admin User	admin	1	Completed with errors	
Auto Bulk Template	Auto Bulk Template	admin	1	Completed with errors	
12/18/2017 02:26:52.602 PM - Bulk ...	Bulk Template created by user: admin	admin	22	Completed with errors	
12/19/2017 11:28:45.053 AM - Bulk ...	Bulk Template created by user: one...	one_pdu	2	Completed with errors	
01/10/2018 03:14:19.551 PM - Bulk ...	Bulk Template created by user: admin	admin	0	No runs have been made yet	
01/10/2018 03:44:57.076 PM - Bulk ...	Bulk Template created by user: admin	admin	0	Template has no actions to implement	

[Next](#)

4. Click the Next button. The Actions page will display.





- In the Firmware Update section, select a firmware version from the table. You can only select one firmware version at a time.

### Firmware Update

To upgrade the firmware, select a version from the table below. Hit Save when done to add the action to the plan.

Upload	Delete	Edit				
	Version	Platform	Uploaded By	Uploaded At	Comment	
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
✓	1.5.5.0-10530	Raritan PX1	System Adminis...	01/25/2012 04:16:13.024 PM		
✓	1.5.5.0-10534	Raritan PX1	System Adminis...	01/26/2012 02:32:34.153 PM		
✓	1.5.5.0-10547	Raritan PX1	System Adminis...	02/01/2012 02:26:34.193 PM		
✓	1.5.5.0-10550	Raritan PX1	System Adminis...	02/07/2012 03:46:51.921 PM		
✓	1.5.5.0-19999	Raritan PX1	System Adminis...	02/07/2012 04:27:52.512 PM		
✓	1.5.5.0-10569	Raritan PX1	System Adminis...	02/10/2012 12:09:06.826 PM		
✓	1.3.12.0-9123	Raritan PX1	System Adminis...	08/14/2012 11:15:10.450 AM		
✓	1.5.2.0-10441	Raritan PX1	System Adminis...	08/14/2012 11:24:25.396 AM		
✓	1.5.5.0-10603	Raritan PX1	System Adminis...	08/14/2012 11:33:00.338 AM		
✓	2.4.0.5-39563	Raritan Xerus	System Adminis...	04/23/2013 01:50:59.677 PM		
✓	7.0v	Server Technolo...	System Adminis...	06/12/2018 06:51:04.949 PM		
✓	7.0h	Server Technolo...	System Adminis...	06/12/2018 06:51:31.962 PM		

- Click the Save button in the Firmware section to save your changes. If successful, a success message will display.

---

*Note: On the Actions page, you can also update passwords, set Power IQ as a trap destination, and configure SNMP community credentials without the need to create a new plan. For more information, see [Changing the Administrator Password for Facility Items in Bulk](#) on page 155, [Setting Power IQ as the SNMP Trap Destination for Facility Items in Bulk](#) on page 158 and [Configuring SNMP Settings for Facility Items in Bulk](#) on page 162 respectively.*

---

7. Click the Next link in the upper right corner.
8. Select your desired PDUs from the list of available PDUs and click the Add PDUs link to add your desired PDUs to the selected PDUs. If you have selected an ineligible PDU based on your current configuration, you will need to either change the configuration or remove the ineligible PDUs.

---

*Note: Since Power IQ only communicates with the primary PDU in the chain, Power IQ will only display the primary Server Technology PDUs in the list of available PDUs. When you successfully change the password on a primary Server Technology PDU, Power IQ will internally update the username and password for the PDU Administrative Account on the daisy-chained PDUs to the same credentials. Updates to both the primary and daisy-chained PDUs are captured in the Power IQ audit log.*

---

*Note: You can also review the template actions in the Template Actions section at the top of the page. The Template Actions section will also note the supported facility items for each action.*

---

[Run](#)

---

**Template Actions**

**Update Firmware**      Bulk update firmware on the facility items selected on the template      Supported Facility Items: Raritan PX1

---

**Available PDUs**

Add PDUs

<input checked="" type="checkbox"/>	Name	IP Address	Location	Type	Manufacturer	Model	Data Center	Floor	Room	Aisle	Row	Rack
<input checked="" type="checkbox"/>	192.168.43.141	192.168.43.141	little lab	Rack PDU	Raritan	PX-5534						
<input checked="" type="checkbox"/>	192.168.43.58	192.168.43.58	Jason's Desk	Rack PDU	Raritan	DPCR8-15	London				Row1	Rack1
<input checked="" type="checkbox"/>	192.168.43.62	192.168.43.62	SystemTest pod	Rack PDU	Raritan	DPXR8-15	London				Row1	Rack1
<input checked="" type="checkbox"/>	192.168.45.117	192.168.45.117	system_test	Rack PDU	Raritan	PX-4397						
<input checked="" type="checkbox"/>	192.168.45.156	192.168.45.156	Big Lab	Rack PDU	Raritan	PX-3220						
<input checked="" type="checkbox"/>	192.168.45.236	192.168.45.236	nc testlab	Rack PDU	Raritan	DPCR8-15						
<input checked="" type="checkbox"/>	192.168.45.242	192.168.45.242	raleigh	Rack PDU	Raritan	DPCR8-15						
<input checked="" type="checkbox"/>	192.168.46.228	192.168.46.228	suite130	Rack PDU	Raritan	DPXS12A-16						

---

**Selected PDUs**

Remove PDUs

<input checked="" type="checkbox"/>	Name	IP Address	Location	Type	Manufacturer	Model	Data Center	Floor	Room	Aisle	Row	Rack
<input checked="" type="checkbox"/>	192.168.42.193	192.168.42.193	Raleigh Lab	Rack PDU	Raritan	PX-3370						
<input checked="" type="checkbox"/>	192.168.42.52	192.168.42.52	Rack 6 (Above ...	Rack PDU	Raritan	PX-3370						

9. Click the Run button.

Upon completion, the firmware will be updated.

---

*Note: This feature is supported only for Raritan PX2, PX3, and EMX and Server Technology facility items.*

---



## Changing the Administrator Password for Facility Items in Bulk

Site Administrators can change the administrator password (used by Power IQ to poll facility items) on Raritan and Server Technology facility items, provided they have the current password.

Changing the administrator password for one or more multiple Raritan and Server Technology facility items requires creating a new bulk configuration template/plan or editing an existing template for updating the password, verifying the old and new passwords, selecting the desired facility items, and then running the plan to update the facility items with the new password.

For the change to take place, the facility item must have the administrator credentials set in Power IQ. A successful password change will set the new password in both Power IQ and the facility item. The change will not take effect if the credentials for the user who is initiating the change are incorrect or outdated.

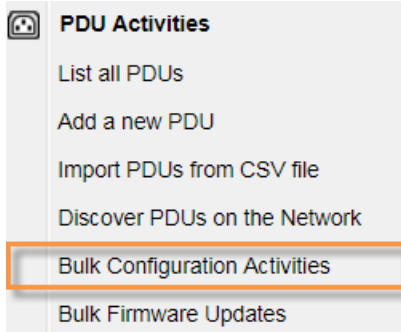
---

*Note: Before performing bulk configuration actions on PDUs, Sunbird recommends putting them into Maintenance Mode. This will prevent events related to lost connectivity and admin credential checks from being generated while the actions are running. After the bulk configuration plan has completed, be sure take the PDUs out of Maintenance Mode by using the Return to Service option.*

---

To change the administrator password:

1. In the Facility Items tab, select Activities > Bulk Configuration Activities.



2. On the Bulk Configuration Activities page, select Manage Bulk Configuration Templates.
3. On the Templates page, select the existing template you would like to run or click the Add link to create a new template. Templates can be filtered based on the following: Name, Summary, Creator, Number of Runs, and Latest Run State.

---

*Note: If you click the Add link, a new template will automatically be created, and you will be directed to the Actions page, without clicking the Next button. Proceed to Step 6. To edit the template's name or summary, return to the Templates page, select the template, and click the Edit link.*

---



[Start](#) / [Templates](#)

**Templates**

Add   Copy   Edit   Delete   Run   Run History

Name	Summary	Creator	Runs	Latest Run State
New Plan - 20171204 15:50:40	New Bulk Plan created by Admin User	admin	1	Completed with errors
Auto Bulk Template	Auto Bulk Template	admin	1	Completed with errors
12/18/2017 02:26:52.602 PM - Bulk ...	Bulk Template created by user: admin	admin	22	Completed with errors
12/19/2017 11:28:45.053 AM - Bulk ...	Bulk Template created by user: one...	one_pdu	2	Completed with errors
01/10/2018 03:14:19.551 PM - Bulk ...	Bulk Template created by user: admin	admin	0	No runs have been made yet
01/10/2018 03:44:57.076 PM - Bulk ...	Bulk Template created by user: admin	admin	0	Template has no actions to implement

[Next](#)

4. Click the Next button. The Actions page will display.
5. In the Password Update section, provide the old password and desired new password in the appropriate fields.

**Password Update**

Old Password: \*

New Password: \*

New Password Confirmation: \*

[Reset](#)   [Save](#)

6. Click the Save button in the Password Update section to save your changes. If successful, a success message will display.

---

*Note: On the Actions page, you can also update firmware, set Power IQ as a trap destination, and configure SNMP community credentials without the need to create a new plan. For more information, see [Updating Firmware for Facility Items in Bulk on page 151](#), [Setting Power IQ as the SNMP Trap Destination for Facility Items in Bulk on page 158](#) and [Configuring SNMP Settings for Facility Items in Bulk on page 162](#) respectively.*

---

7. Click the Next link in the upper right corner.
8. Select your desired PDUs from the list of available PDUs and click the Add PDUs link to add your desired PDUs to the selected PDUs.

---

*Note: Since Power IQ only communicates with the primary PDU in the chain, Power IQ will only display the primary Server Technology PDUs in the list of available PDUs. When you successfully change the password on a*

---

primary Server Technology PDU, Power IQ will internally update the username and password for the PDU Administrative Account on the daisy-chained PDUs to the same credentials. Updates to both the primary and daisy-chained PDUs are captured in the Power IQ audit log.

Note: You can also review the template actions in the Template Actions section at the top of the page.

**Template Actions**

**Update Password**      Bulk update password for the facility items selected on the template

**Available PDUs**

Add PDUs

	Name	IP Address	Location	Type	Manufacturer	Model	Data Center	Floor	Room	Aisle	Row	Rack
<input checked="" type="checkbox"/>	10.128.1.205	10.128.1.205		Rack PDU	Raritan	PX2-5720U-A1	HONEYPOT LAND		ROOM FOR 10 S...	Aisle for 10.128 ...	Inlet/Outlet Row 2	Rack for 10.128...
<input checked="" type="checkbox"/>	10.128.1.208	10.128.1.208	RaleighDataCenter	Rack PDU	Raritan	PX2-5704U	HONEYPOT LAND		ROOM FOR 10 S...	Aisle for 10.128 ...	Inlet/Outlet Row 2	Rack for 10.128...
<input checked="" type="checkbox"/>	10.128.1.210	10.128.1.210		Rack PDU	Raritan	PX2-2901U	HONEYPOT LAND		ROOM FOR 10 S...	Aisle for 10.128 ...	Inlet/Outlet Row 2	Rack for 10.128...
<input checked="" type="checkbox"/>	10.128.1.211	10.128.1.211		Rack PDU	Raritan	PX2-2901U-A1	HONEYPOT LAND		ROOM FOR 10 S...	Aisle for 10.128 ...	Inlet/Outlet Row 2	Rack for 10.128...
<input checked="" type="checkbox"/>	10.128.1.212	10.128.1.212		Rack PDU	Raritan	PX2-2967U-A1	HONEYPOT LAND		ROOM FOR 10 S...	Aisle for 10.128 ...	Inlet/Outlet Row 2	Rack for 10.128...

**Selected PDUs**

Remove PDUs

	Name	IP Address	Location	Type	Manufacturer	Model	Data Center	Floor	Room	Aisle	Row	Rack
<input checked="" type="checkbox"/>	10.128.1.10	10.128.1.10	IT400	Rack PDU	Raritan	DPCS16A-32BS4...	HONEYPOT LAND		ROOM FOR 10 S...	Aisle for 10.128 ...	Circuit Racks	Rack for 10.128...
<input checked="" type="checkbox"/>	10.128.1.101	10.128.1.101		Rack PDU	Raritan	PX2-5802	HONEYPOT LAND		ROOM FOR 10 S...	Aisle for 10.128 ...	Inlet/Outlet Row 1	Rack for 10.128...
<input checked="" type="checkbox"/>	10.128.1.200	10.128.1.200	Mini Lab	Rack PDU	Raritan	PX2-5704U	HONEYPOT LAND		ROOM FOR 10 S...	Aisle for 10.128 ...	Inlet/Outlet Row 2	Rack for 10.128...

9. Click the Run button.

Upon completion, the password will be updated.

Note: This feature is supported only for Raritan PX2, PX3, and EMX and Server Technology facility items.

Note: If you change the administrator password used by Power IQ for a Server Technology PDU through the PDU UI, you must restart the PDU to ensure that the Server Technology SNAP API will correctly authenticate requests from Power IQ. However, if you change the administrator password through the Power IQ UI, Power IQ will restart the PDU without any additional action by the user.

## Setting Power IQ as the SNMP Trap Destination for Facility Items in Bulk

Site Administrators can set Power IQ as the SNMP trap destination on Raritan and Server Technology facility items.

Setting Power IQ as an SNMP trap destination for one or more Raritan or Server Technology facility items requires creating a new bulk configuration template/plan or editing an existing template, enabling traps, setting the host to a Power IQ IP address, selecting the desired facility items, and then running the template to update the facility items with the new trap destination.

This feature supports SNMP v1/v2 trap configuration only.

---

*Note: Since Power IQ only communicates with the primary PDU in the chain, Power IQ will only display the primary Server Technology PDUs in the list of available PDUs. When you successfully change the password on a primary Server Technology PDU, Power IQ will internally update the username and password for the PDU Administrative Account on the daisy-chained PDUs to the same credentials. Updates to both the primary and daisy-chained PDUs are captured in the Power IQ audit log.*

---

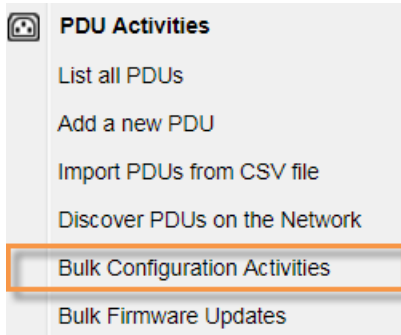
---

*Note: The trap port and community string on the facility item should be set to 162 and "public," respectively.*

---

To set Power IQ as the SNMP trap destination:

1. In the Facility Items tab, select Activities > Bulk Configuration Activities.



2. On the Bulk Configuration Activities page, select Manage Bulk Configuration Templates.
3. On the Templates page, select the existing template you would like to run or click the Add link to create a new template. Templates can be filtered based on the following: Name, Summary, Creator, Number of Runs, and Latest Run State.

---

*Note: If you click the Add link, a new template will automatically be created, and you will be direction to the Actions page, without clicking the Next button. Proceed to Step 6. To edit the template's name or summary, return to the Templates page, select the template, and click the Edit link.*

---

Start / Templates

### Templates

Add   Copy   Edit   Delete   Run   Run History

Name	Summary	Creator	Runs	Latest Run State
New Plan - 20171204 15:50:40	New Bulk Plan created by Admin User	admin	1	Completed with errors
Auto Bulk Template	Auto Bulk Template	admin	1	Completed with errors
12/18/2017 02:26:52.602 PM - Bulk ...	Bulk Template created by user: admin	admin	22	Completed with errors
12/19/2017 11:28:45.053 AM - Bulk ...	Bulk Template created by user: one...	one_pdu	2	Completed with errors
01/10/2018 03:14:19.551 PM - Bulk ...	Bulk Template created by user: admin	admin	0	No runs have been made yet
01/10/2018 03:44:57.076 PM - Bulk ...	Bulk Template created by user: admin	admin	0	Template has no actions to implement

Next

- Click the Next button. The Actions page displays.
- In the Change Trap Destinations panel, use the Enable Traps dropdown to enable, disable, or leave traps unchanged. Select from Enable, Disable, or Unchanged respectively.

### Change Trap Destinations

Enable Traps:

Host 1 IP Address:

Host 2 IP Address:

Host 3 IP Address:

*Note: The Host 2 IP Address is supported for Server Technology PDUs and for SNMPv2c on Raritan PDUs. The Host 3 IP Address is supported for SNMPv2c on Raritan PDUs.*

- For one or more hosts, use the Host dropdown to select an IP address for Power IQ or to type in an IP address for another system. Both IPv4 and IPv6 addresses are supported. You can specify up to three hosts. To remove a host, select the Clear option.



### Change Trap Destinations

Enable Traps:

Host 1:

Host 2:

Host 3:

Host 3:

Host 3:

---

*Note: We strongly recommend that you ensure that one of the host destinations is set to Power IQ's IP Address so that Power IQ can report on the events.*

---

7. Click the Save button in the Change Trap Destinations panel to save your changes. If successful, a success message will display.

---

*Note: On the Actions page, you can also change the administrator password and configure SNMP community credentials without the need to create a new plan. For more information, see [Changing the Administrator Password for Facility Items in Bulk on page 155](#) and [Configuring SNMP Settings for Facility Items in Bulk on page 162](#) respectively.*

---

8. Click the Next link in the upper right corner.
9. Select your desired PDUs from the list of available PDUs and click the Add PDUs link to add your desired PDUs to the selected PDUs.

---

*Note: Since Power IQ only communicates with the primary PDU in the chain, Power IQ will only display the primary Server Technology PDUs in the list of available PDUs. When you successfully change the password on a primary Server Technology PDU, Power IQ will internally update the username and password for the PDU Administrative Account on the daisy-chained PDUs to the same credentials. Updates to both the primary and daisy-chained PDUs are captured in the Power IQ audit log.*

---

---

*Note: You can also review the plan actions in the Template Actions section at the top of the page.*

---



[Start](#) / [Templates](#) / [Actions](#) / Facility Items

#### Template Actions

**Update SNMP Trap Destinations**   Bulk update SNMP trap destinations for the facility items selected on the template

#### Available PDUs

Add PDUs

<input type="checkbox"/>	Name ▲ ▼	IP Address▼	Location ▼	Type ▼	Manufact...▼	Model ▼	Data Cent...▼	Floor ▼	Room ▼	Aisle ▼	Row ▼	Rack ▼	
<input type="checkbox"/>													
<input checked="" type="checkbox"/>	192.168.4...	192.168.4...	Raleigh Lab	Rack PDU	Raritan	PX-3370	Raleigh, NC	Suite 130	Server Ro...		Row B	Rack B5	
<input checked="" type="checkbox"/>	192.168.4...	192.168.4...	Glass-Lab...	Rack PDU	Raritan	PXE-1493	Raleigh, NC	Suite 130	Server Ro...		Row B	Rack B6	
<input checked="" type="checkbox"/>	192.168.4...	192.168.4...	Glass-Lab	Rack PDU	Raritan	PX2-1475...	Raleigh, NC	Suite 130	Server Ro...		Row B	Rack B5	
<input checked="" type="checkbox"/>	192.168.4...	192.168.4...	Data Cent...	Rack PDU	Raritan	EMX2-888	Raleigh, NC	Suite 130	Server Ro...		Row B	Rack B5	
<input checked="" type="checkbox"/>	192.168.4...	192.168.4...	Raleigh D...	Rack PDU	Raritan	EMX-880	Raleigh, NC	Suite 130	Server Ro...		Row B	Rack B5	

#### Selected PDUs

Remove PDUs

<input type="checkbox"/>	Name ▲ ▼	IP Address▼	Location ▼	Type ▼	Manufact...▼	Model ▼	Data Cent...▼	Floor ▼	Room ▼	Aisle ▼	Row ▼	Rack ▼	
<input type="checkbox"/>													

10. Click the Run button.

Upon completion, the trap destinations will be updated.

---

*Note: When running bulk configuration templates, if both SNMP settings and trap destinations are configured in the same template, SNMP settings are configured before trap destinations are configured. As a result, the SNMP configuration on the PDU and as known to Power IQ will be set to its target state prior to the trap destinations being updated to ensure that trap destinations are changed accurately.*

---

*Note: You may need to enable the SNMP agent on Server Technology PDUs for the traps to be handled appropriately. If you disable traps on a Server Technology PDU, you will need to re-enter the hosts values to enable traps at a later date.*

---

*Note: This feature is supported only for Raritan PX2, PX3, and EMX and Server Technology facility items.*

---



## Configuring SNMP Settings for Facility Items in Bulk

Site Administrators can configure SNMP community credentials on Raritan, CPI and Server Technology facility items in Power IQ.

Configuring SNMP community credentials for Power IQ polling for one or more Raritan, CPI and Server Technology facility items requires creating a new bulk configuration template/plan or editing an existing template, specifying SNMP v1/v2 or SNMP v3 settings, updating the appropriate fields, selecting the desired facility items, and then running the plan to update the facility items with the new configuration.

*Note: Before performing bulk configuration actions on PDUs, Sunbird recommends putting them into Maintenance Mode. This will prevent events related to lost connectivity and admin credential checks from being generated while the actions are running. After the bulk configuration plan has completed, be sure take the PDUs out of Maintenance Mode by using the Return to Service option.*

*Note: CPI facility items cannot support both SNMPv2 and SNMPv3 polling simultaneously. A warning message will display if you attempt to configure both v1/v2c and v3 credentials for CPI facility items.*

To configure SNMP community settings:

1. In the Facility Items tab, select Activities > Bulk Configuration Activities.

The screenshot shows the Sunbird Power IQ interface. At the top, there's a navigation bar with 'Facility Items' selected. Below it is a table titled 'Facility Items List' with columns for Name, Label, Location, Manufacturer, Model, Firmware, Health, Current (A), Active Power, Apparent Power, Inlet Temperature, and Belongs to. The table contains various items like 'px130ab0502', 'Row\_A Inline Me...', 'ADAS100084', etc. On the right side, there's an 'Activities' dropdown menu that is open, showing options like 'PDU Activities', 'PDU History', 'Device Activities', and 'Power Scheduling'. The 'Bulk Configuration Activities' option is highlighted with an orange box.

2. On the Bulk Configuration Activities page, select Manage Bulk Configuration Templates.
3. On the Templates page, select the existing template you would like to run or click the Add link to create a new template. Templates can be filtered based on the following: Name, Summary, Creator, Number of Runs, and Latest Run State.



*Note: If you click the Add link, a new plan will automatically be created, and you will be direction to the Actions page, without clicking the Next button. Proceed to Step 6. To edit the plan's name or summary, return to the Templates page, select the template, and click the Edit link.*

Start / Templates

**Templates**

Add   Copy   Edit   Delete   Run   Run History

Name	Summary	Creator	Runs	Latest Run State
New Plan - 20171204 15:50:40	New Bulk Plan created by Admin User	admin	1	Completed with errors
Auto Bulk Template	Auto Bulk Template	admin	1	Completed with errors
12/18/2017 02:26:52.602 PM - Bulk ...	Bulk Template created by user: admin	admin	22	Completed with errors
12/19/2017 11:28:45.053 AM - Bulk ...	Bulk Template created by user: one...	one_pdu	2	Completed with errors
01/10/2018 03:14:19.551 PM - Bulk ...	Bulk Template created by user: admin	admin	0	No runs have been made yet
01/10/2018 03:44:57.076 PM - Bulk ...	Bulk Template created by user: admin	admin	0	Template has no actions to implement

[Next](#)

- Click the Next button. The Actions page will display.
- In the SNMP Configuration panel on the Actions Page, use the Credentials to Use for Power IQ Polling dropdown to select the SNMP type. Select from Read Community, Write Community (SNMP v1/v2) or SNMP v3.

**SNMP Configuration**

Credentials to use for Power IQ polling:

<b>SNMP v1/v2 Credentials</b>		<b>SNMP v3 Credentials</b>	
Enable on PDU:	<input type="text" value="Unchanged"/>	Enable on PDU:	<input type="text" value="Unchanged"/>
Read Community String:	<input type="text"/>	Authorization Level:	<input type="text"/>
Read Community String Confirmation:	<input type="text"/>	Username:	<input type="text"/>
Write Community String:	<input type="text"/>	Authorization Protocol:	<input type="text"/>
Write Community String Confirmation:	<input type="text"/>	Authorization Passkey:	<input type="text"/>
		Authorization Passkey Confirmation:	<input type="text"/>

[Reset](#)   [Save](#)

- In either the SNMP v1/v2 or SNMP v3 section, use the Enable on PDU dropdown to enable, disable, or leave the settings unchanged. Select from Enable, Disable, or Unchanged respectively. (Note: CPI PDUs cannot support both SNMPv2 and SNMPv3 polling simultaneously. A warning message will display if you attempt to configure both v1/v2c and v3 credentials for CPI PDUs.)
- If you choose Read Community or Write Community from the Credentials to Use for Power IQ Polling dropdown, you must provide the Read Community String or Write Community String in the appropriate fields. (required)



8. If you choose SNMP v3 from the Credentials to Use for Power IQ Polling dropdown, you will need to provide the following (the required settings will vary based on your selection):
  - a. Username
  - b. Authentication Level (Select from noAuthNoPriv, authNoPriv, or authPriv)
  - c. Authentication Protocol (Select from MD5 or SHA. Note that SHA is not supported for Server Technology PDUs, only CPI and Raritan PDUs.)
  - d. Authentication Passkey
  - e. Privacy Protocol (Select from AES or DES. Note that AES is not supported for Server Technology PDUs, only CPI and Raritan PDUs.)
  - f. Privacy Passkey
9. Click the Save button in the SNMP Configuration panel to save your changes. If successful, a success message will display.

---

*Note: On the Actions page, you can also update firmware, set Power IQ as a trap destination, and change the administrator password without the need to create a new plan. For more information, see [Updating Firmware for Facility Items in Bulk on page 151](#), [Setting Power IQ as the SNMP Trap Destination for Facility Items in Bulk on page 158](#), and [Changing the Administrator Password for Facility Items in Bulk on page 155](#) respectively.*

---

10. Click the Next link in the upper right corner.
11. Select your desired PDUs from the list of available PDUs and click the Add PDUs link to add your desired PDUs to the selected PDUs.

12. *Note: If you add CPI facility items to your plan that are part of a secure array, you must add both the primary and alternate facility items in order for secure array failover to function properly. Power IQ will provide the option to add the missing alternate facility items, change the configuration, or remove the facility items.*

---

*Note: Since Power IQ only communicates with the primary PDU in the chain, Power IQ will only display the primary Server Technology PDUs in the list of available PDUs. When you successfully change the password on a primary Server Technology PDU, Power IQ will internally update the username and password for the PDU Administrative Account on the daisy-chained PDUs to the same credentials. Updates to both the primary and daisy-chained PDUs are captured in the Power IQ audit log.*

---

*Note: You can also review the template actions in the [Template Actions](#) section at the top of the page.*

---



### 13. Click the Run button.

Start / Templates / Actions / Facility Items Run

---

**Template Actions**

**Update SNMP Configuration**      Bulk update SNMP configuration for the facility items selected on the template      Supported Facility Items: Raritan (except PX1), ServerTech

---

**Available PDUs**

Add PDUs

Name	IP Address	Location	Type	Manufacturer	Model	Firmware Version	Warnings	Data Center	Floor	Room	Aisle	Row	Rack
<input type="checkbox"/>													
<input checked="" type="checkbox"/>	192.168.42.208	192.168.42.208	Raleigh Data Cen...	Rack PDU	Raritan	PX2-3172	3.2.30.5-43188		Raleigh, NC	Suite 130	Server Room	Row B	Rack B5
<input checked="" type="checkbox"/>	192.168.43.105	192.168.43.105	Owen's Desk	Rack PDU	Raritan	PX2-5146R	3.4.0.5-44367		Raleigh, NC	Suite 130		Row B	Demo Rack
<input checked="" type="checkbox"/>	192.168.43.106	192.168.43.106	Lab, Raleigh	Rack PDU	Raritan	PX-2901U	3.4.0.5-44367		Raleigh, NC	Suite 130	Server Room	Row B	Rack B5
<input checked="" type="checkbox"/>	192.168.43.111	192.168.43.111		Rack PDU	Raritan	PX2-5802	2.3.1.5-37516		Raleigh, NC	Suite 130	Server Room	Row A	Rack A1
<input checked="" type="checkbox"/>	192.168.43.112	192.168.43.112		Rack PDU	Raritan	PX2-5802	2.3.1.5-37516		Raleigh, NC	Suite 130	Server Room	Row A	Rack A2
<input checked="" type="checkbox"/>	192.168.43.113	192.168.43.113		Rack PDU	Raritan	PX2-5802	2.3.1.5-37516		Raleigh, NC	Suite 130	Server Room	Row A	Rack A3
<input checked="" type="checkbox"/>	192.168.43.117	192.168.43.117	Raleigh Lab	Rack PDU	Raritan	PX2-5704U	3.4.0.5-44367		Raleigh, NC	Suite 130	Server Room	Row B	Rack B5
<input checked="" type="checkbox"/>	192.168.43.127	192.168.43.127	Jason's Desk	Rack PDU	Raritan	PX2-5146R	3.4.0.5-44367		Raleigh, NC	Suite 130	Office		Jason's Desk
<input checked="" type="checkbox"/>	192.168.43.207	192.168.43.207	Owen's Desk	Rack PDU	Raritan	PX2-1147R	3.4.0.5-44367		Raleigh, NC	Suite 130	Office		Rack A
<input checked="" type="checkbox"/>	192.168.43.63	192.168.43.63	SystemTest pod	Rack PDU	Raritan	PX2-5146R	3.4.0.5-44367		Raleigh, NC	Suite 130	Office		Keith's Desk

---

**Selected PDUs**

Remove PDUs

Name	IP Address	Location	Type	Manufacturer	Model	Firmware Version	Warnings	Data Center	Floor	Room	Aisle	Row	Rack
<input type="checkbox"/>													
<input checked="" type="checkbox"/>	192.168.46.224	192.168.46.224	locationstring1	Rack PDU	Server Technolo...	C2W48CE-YCMF...	Version 8.0g		Raleigh, NC	Suite 130			Demo Rack

Upon completion, the SNMP configuration will be updated.

*Note: When running bulk configuration templates, if both SNMP settings and trap destinations are configured in the same template, SNMP settings are configured before trap destinations are configured. As a result, the SNMP configuration on the PDU and as known to Power IQ will be set to its target state prior to the trap destinations being updated to ensure that trap destinations are changed accurately.*

*Note: This feature is supported only for CPI facility items running firmware version 4.4 or higher, Raritan PX2, PX3, and EMX and Server Technology facility items.*



## Backing Up Facility Item Configuration Files

Users can clone and restore facility item configuration files in Power IQ.

When enabled, backups are made automatically as part of the scheduled database backup. The most recent backup, as well as the backups from the first days of the current and previous months, will be retained.

If you selected a configuration file that was a backup of a facility item, by default that facility item will be added to the selected PDUs list when running the plan.

The backup and the date and time when captured will be displayed on the Choose a PDU Configuration page when editing a plan or creating a new plan.

---

*Note: Users can backup and restore PDU configuration files for Raritan PX1, PX2, PX3, and EMX devices only.*

---

## Enabling/Disabling Facility Item Configuration Backups

Site Administrators can enable or disable backing up of facility item configurations through the Settings tab.

To enable or disable this feature, check or uncheck the “Backup configuration files from supported facility items” checkbox under Settings > Power IQ Settings > Backup Facility Item Configurations.

**Backup Facility Item Configurations**

Backup configuration file from supported facility items

Note: The latest backup, as well as the backup for the 1st of the current and previous month are retained.

By default, the box will be checked.

---

*Note: The most recent backup, as well as the backups from the first days of the current and previous months, will be retained.*

---

## Cloning and Restoring Facility Item Configuration Files

Bulk configuration files can be cloned or restored to facility items on the Choose a PDU Configuration File page when creating a new rollout plan or editing an existing plan.

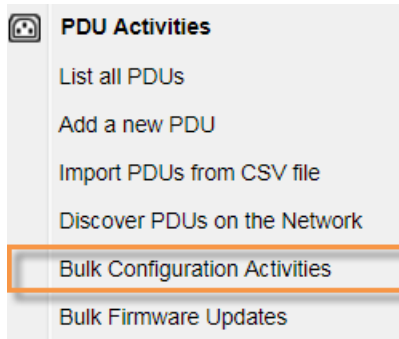
The Choose a PDU Configuration File page is the second step in the rollout plan wizard (after naming the plan). It can also be accessed by clicking the Choose a configuration file link (next to PDU Configuration file) on a plan summary page. For more information, see Plan a New Rollout.

Backup files are listed in the first tab on the page. Backup files can be grouped, sorted and filtered by any of the following:

- Name
- IP Address
- Location
- Type
- Manufacturer
- Model
- Data Center
- Floor
- Room
- Aisle
- Row
- Rack
- PDU
- Backup Date

To clone or restore a backup configuration file to a PDU:

1. In the Facility Items tab, select Activities > Bulk Configuration Activities.



2. On the Bulk Configuration Activities page, select Clone and Restore Configuration Files.
3. Click the Next button.
4. On the Bulk PDU Configuration page, select the plan you would like to change the PDU configuration file for.
5. On the plan summary page, click the Choose a configuration file link. If creating a new rollout, proceed to the second step of the wizard.

**Plan:** Test ([Edit plan name](#))

**PDU Configuration File:** Not selected yet ([Choose a configuration file](#))

**PDUs Selected:** None ([Select PDUs for this plan](#))

**Plan Options** ([Edit plan options](#))

Abort on failure: Yes

Allow simultaneous rollouts: No

**Mode:** Editing

6. On the Choose a PDU Configuration File page, select the desired configuration file. You must select a file to continue.
7. Click the Continue link.
8. Select your desired PDUs. If you selected a configuration file that was a backup of a facility item, by default that facility item will be added to the selected PDUs list.
9. Click the Continue button.
10. Click the Save link.
11. Click Start Roll Out to execute the plan.

To upload a file:



1. On the Choose a PDU Configuration File page, click the Upload File tab.
2. Type in the desired model name.
3. Click the Choose File button to choose your desired configuration file.
4. Click the Upload link to upload the file.
5. Once the file is uploaded, go to the Uploaded Files tab.
6. Select the desired configuration file.
7. Click the Continue link to save your changes.

---

*Note: You can also upload a new configuration file on the PDU Configuration Files page (under Activities > Manage Uploaded Configuration Files).*

---





## PDU Outlet Naming and Setting System Attributes

Power IQ enables you to export all the current PDU Outlet and System Attribute names to a CSV file that you can edit, and then re-import new names. See *Naming Outlets in Bulk with CSV Files* on page 171. Change individual names manually by clicking a field and editing. See *Naming Individual Outlets* on the next page.

Raritan PDU outlet names can be up to 32 characters in length, with no character restrictions. See the manufacturer's specification for naming requirements for other brands of PDUs.

---

*Note: PDUs must be configured in Power IQ with an SNMP community string that has write-level access to allow outlet naming.*

---

*The following PDUs have manufacturer limitations that affect renaming via SNMP: Outlet and system attribute naming is not available via SNMP for Avocent or Geist PDUs. Outlet naming via SNMP is not available for Tripp Lite PDUs or the Eaton Pulluzi model PDU. The standard Eaton model does support outlet naming. System attribute naming via SNMP is not available for Baytech PDUs. Names for Servertech PDUs cannot contain spaces. Setting the MIB-II sysContact value is not supported for Chatsworth (CPI) PDUs. When importing Chatsworth PDUs via CSV import, leave the sysContact value blank.*

---



## Naming Individual Outlets

1. In the Facility Items tab, click the link for a PDU to open the smart view.
2. Scroll down to the Outlets list.
3. Double-click the outlet name, then enter the new name in the field. Use only UTF-8 characters.
4. Press Enter to save the name.

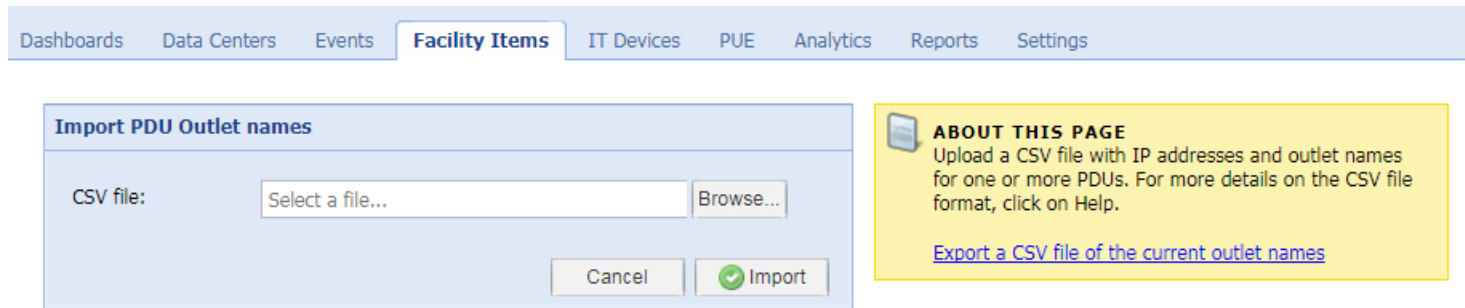
The names are written back to the PDU. If you connect to the PDU directly, the outlets appear there with their new names.



## Naming Outlets in Bulk with CSV Files

When you import an outlet name CSV file, Power IQ names the outlets according to the values in the file. The names are written back to the PDU. If you connect to the PDU directly, the outlets appear there with their new names.

1. In the Facility Items tab, choose Activities > Bulk Configuration Activities.
2. From the list of Bulk Configuration Activities, select Update via CSV Import/Export.
3. Click Next.
4. In the Import PDU Outlet Names section, click Browse to select your updated CSV file.
5. Click Import to initiate the file import.



The screenshot shows the 'Facility Items' tab selected in a navigation bar. Below the navigation bar is a form titled 'Import PDU Outlet names'. The form contains a 'CSV file:' label, a text input field with the placeholder 'Select a file...', and a 'Browse...' button. Below the input field are two buttons: 'Cancel' and 'Import' (with a green checkmark icon). To the right of the form is a yellow callout box titled 'ABOUT THIS PAGE' with a document icon. The text in the callout box reads: 'Upload a CSV file with IP addresses and outlet names for one or more PDUs. For more details on the CSV file format, click on Help.' Below this text is a blue link: 'Export a CSV file of the current outlet names'.

You can export a CSV file of the current outlet names from the Import PDU Outlet Names page. For more information, see *Exporting Outlet Names to a CSV File* on page 174

For details on creating the outlet name CSV file, see *Structure of the Outlet Name CSV File* on page 173.

## Setting SNMP System Attributes for PDUs

In addition to naming the outlets of PDUs, the Outlet Names CSV file can be used to set three SNMP system attributes. These attributes are SYS\_CONTACT, SYS\_NAME and SYS\_LOCATION. These settings are optional values in the CSV file.

1. SYS\_CONTACT: is used to identify a person to contact regarding the PDU. For example, the IT administrator.
2. SYS\_NAME: is used to set the name of the PDU.
3. SYS\_LOCATION: is used to describe where the PDU is located. For example, "Sales Rack - Server Closet 2."

---

*Note: Setting SNMP system attributes is not available for Raritan PX versions lower than 1.3, Baytech, Eaton, Geist, Liebert, or Avocent PDUs. Leave these fields blank for those PDUs.*

---



## Structure of the Outlet Name CSV File

The CSV file used for outlet naming and setting SNMP system attributes uses the following structure. There is one facility item per line/row.

Use only UTF-8 characters.

---

*Note: The following facility items have manufacturer limitations that affect renaming via SNMP: Outlet and system attribute naming is not available via SNMP for Avocent or Geist facility items. Outlet naming via SNMP is not available for Tripp Lite facility items or the Eaton Pulluzi model facility item. The standard Eaton model does support outlet naming. System attribute naming via SNMP is not available for Baytech facility items. Names for Servertech facility items cannot contain spaces. Setting SNMP system attributes is not available for Raritan PX versions lower than 1.3, Baytech, Eaton, Geist, Liebert, or Avocent facility items. Leave these fields blank for those facility items.*

---

- The first column is an IP address identifying a facility item.
- The second column is the Proxy Index value. Leave this value blank if the facility item does not support or is not using this configuration. You cannot change the Proxy Index value via CSV import. See Proxy Index Details.
- **Optional** The third column is the SNMP SYS\_CONTACT value..
- **Optional** The fourth column is for the SNMP SYS\_NAME value.
- **Optional** The fifth column is for the SNMP SYS\_LOCATION value.

Each value/column following the SYS\_LOCATION represents an outlet on that facility item. Outlets start at 1 and increase sequentially with each column.

These values indicate only what is changed by the naming operation:

If an IP address does not appear in the file, no naming operations occur on that facility item.

If an outlet value is blank, its name does not change.

### Example:

```
192.168.77.102,,Michael,Test PX2,RACK1,KVMSwitch1,KVMSwitch2,,Sales FTP Server
```

A facility item at 192.168.77.102 would receive the system name "Test PX2". Its first outlet would be renamed to "KVMSwitch1" and its second outlet renamed to "KVMSwitch2." The third outlet would not be renamed. The fourth outlet would be renamed to "Sales FTP Server."

---

*Note: For proxy indexed facility items, such as those in daisy chains for the BCM2 modules, the pduName will be updated in place of the sysName.*

---



## Exporting Outlet Names to a CSV File

You can export the outlet names in Power IQ to a CSV file.

You can edit the file to change outlet names, then import it. See *Naming Outlets in Bulk with CSV Files* on page 171.

---

*Note: The following PDUs have manufacturer limitations that affect renaming via SNMP: Outlet and system attribute naming is not available via SNMP for Avocent or Geist PDUs. Outlet naming via SNMP is not available for Tripp Lite PDUs or the Eaton Pulluzi model PDU. The standard Eaton model does support outlet naming. System attribute naming via SNMP is not available for Baytech PDUs. Names for Servertech PDUs cannot contain spaces. Setting SNMP system attributes is not available for Raritan PX versions lower than 1.3, Baytech, Eaton, Geist, Liebert, or Avocent PDUs. Leave these fields blank for those PDUs.*

---

1. In the Facility Items tab, choose Activities > Bulk Configuration Activities.
2. Click the Update via CSV Import/Export link.
3. Click the Export a CSV file of the current outlet names link.
4. In the Save As... dialog, provide a name for the CSV file.
5. Click the Save button.



## Bulk Change PDU IP Addresses and View Run History Reports

You can update the IP addresses of multiple PDUs, including facility items such as Floor PDUs, Floor UPS, Power Panels, and so on, using a CSV import. This is useful if you need to repartition a network and move PDUs from one subnet to another.

- Power IQ will report lost connectivity events until the systems are aligned after the bulk IP address change is complete.
- Polling will be interrupted by the bulk IP address change.
- The CSV file is validated at import.
- IP addresses must be properly formatted.
- IPv4 and IPv6 addresses are supported.
- Existing IP addresses cannot be reused as new IP addresses.
- If the existing IP address in your CSV file is not found in Power IQ, that change is rejected.
- New IP addresses that already exist in Power IQ are rejected.

---

*Note: For CPI facility items, if you wish to use an IPv6 address, ensure that an IPv4 address is not specified for the facility item. CPI facility items will not accept an IPv6 address if an IPv4 address is available.*

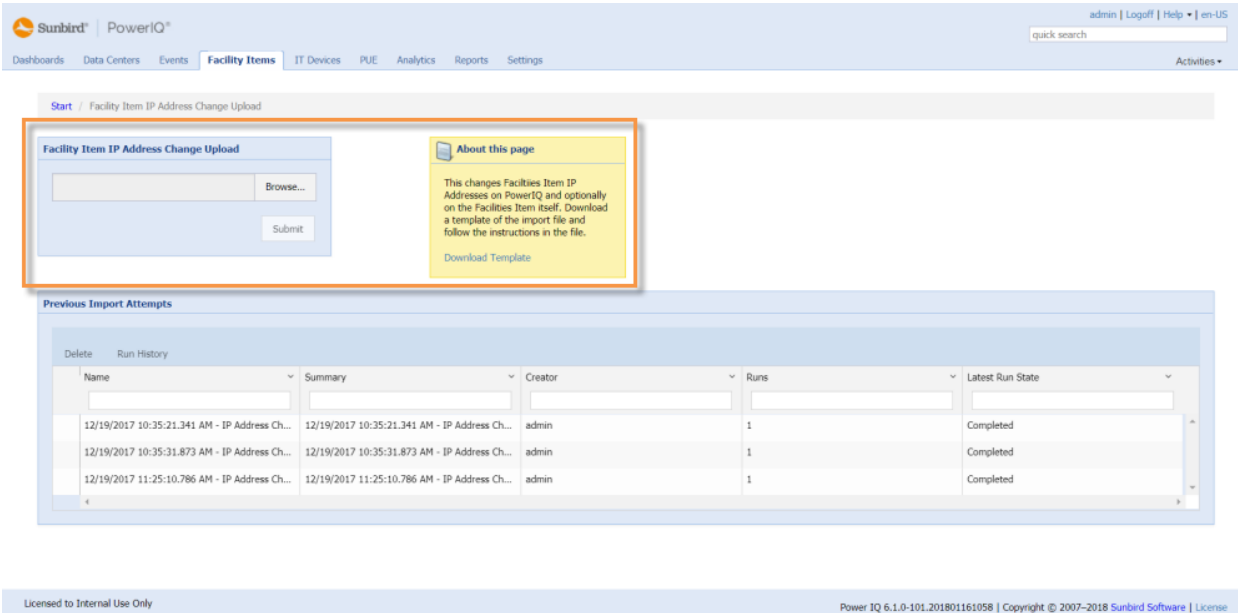
---

## Create and Upload the CSV Import File to Change PDU IP Addresses in Bulk

Create the CSV import file. See *Bulk Change PDU IP Address File Requirements* on the next page.

1. In the Facility Items tab, select the Activities menu > Bulk Configuration Activities.
2. From the list of Bulk Configuration Activities, select Update IP Addresses.
3. Click the Next button.
4. In the Facility Item IP Address Change Upload section, click Browse, then select the CSV file.
5. Click the Submit button.





admin | [Logout](#) | [Help](#) | en-US

quick search

Activity

Start / Facility Item IP Address Change Upload

**Facility Item IP Address Change Upload**

Browse...  
Submit

**About this page**

This changes Facilities Item IP Addresses on PowerIQ and optionally on the Facilities Item itself. Download a template of the import file and follow the instructions in the file.

[Download Template](#)

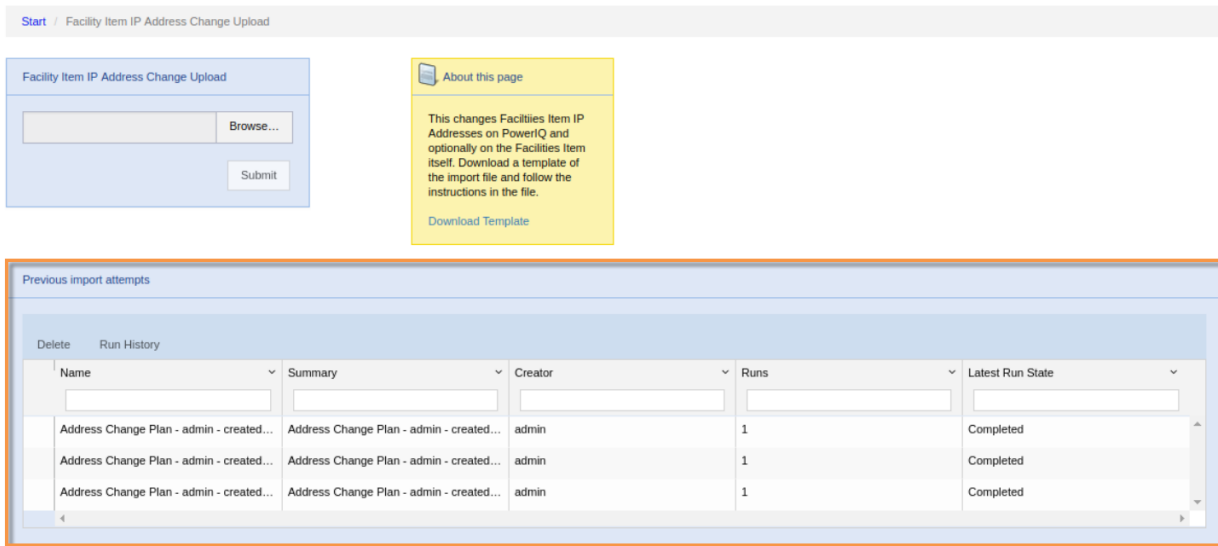
**Previous Import Attempts**

Name	Summary	Creator	Runs	Latest Run State
12/19/2017 10:35:21.341 AM - IP Address Ch...	12/19/2017 10:35:21.341 AM - IP Address Ch...	admin	1	Completed
12/19/2017 10:35:31.873 AM - IP Address Ch...	12/19/2017 10:35:31.873 AM - IP Address Ch...	admin	1	Completed
12/19/2017 11:25:10.786 AM - IP Address Ch...	12/19/2017 11:25:10.786 AM - IP Address Ch...	admin	1	Completed

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- If the upload is successful, Power IQ displays the Live Status page, which displays the status of each operation.
- If any changes fail, an error is displayed in the Import page, and nothing is imported. Correct the errors in the file, and try the import again.
- A history of previous import attempts can be viewed in the Previous Import Attempts section.



Start / Facility Item IP Address Change Upload

**Facility Item IP Address Change Upload**

Browse...  
Submit

**About this page**

This changes Facilities Item IP Addresses on PowerIQ and optionally on the Facilities Item itself. Download a template of the import file and follow the instructions in the file.

[Download Template](#)

**Previous import attempts**

Name	Summary	Creator	Runs	Latest Run State
Address Change Plan - admin - created...	Address Change Plan - admin - created...	admin	1	Completed
Address Change Plan - admin - created...	Address Change Plan - admin - created...	admin	1	Completed
Address Change Plan - admin - created...	Address Change Plan - admin - created...	admin	1	Completed

## Bulk Change PDU IP Address File Requirements

The CSV import file for changing PDU IP address should follow this format.



Column A	Column B	Column C	Column D	Column E
Old IP address	New IP address	Change on Power IQ AND Facilities Item	New Subnet mask	New Gateway

To help you create the CSV file, you can download the IP\_Address\_change\_upload\_template file from the Facility Item IP Address Change Upload page in Power IQ, then follow the instructions in the file to edit the file to prepare it for import.

1. In the Facility Items tab, choose Activities > Bulk Configuration Activities.
2. Select Bulk Update IP in Power IQ.
3. Click the Next button.
4. In the Facility Item IP Address Change Upload section, click the Download Template link.
5. Save or open the file using the dialog that appears.
6. Edit the exported file to contain the following:
  - a. Column A: Old IP addresses (required)
  - b. Column B: New IP addresses (required)
  - c. Column C: Whether the change should take place on Power IQ only or on both Power IQ and the facility item itself (required). Choose from POWERIQ or BOTH for each PDU.

---

*Note: The BOTH option, which allows you to change IP addresses on both Power IQ and the facility item, is supported for Raritan PX2, PX3, EMX PDUs, CPI facility items running firmware version 4.4 and higher and Server Technology PDUs only. However, you can change IP addresses for non-Raritan and non-Server-Tech PDUs in Power IQ only using this feature.*

---

- d. Column D: New subnet mask of the new IP address (required for BOTH; should not be included for POWERIQ)
  - e. Column E: New gateway/router for the facility item (required for BOTH; should not be included for POWERIQ)
7. Save the file.
8. Upload the file on the Facility Item IP Address Change Upload page.

---

*Note: For CPI PDUs, the network settings will revert after a few seconds unless the "Manually Configure IPv4" and the "Manually Configure IPv6" settings are enabled via the PDU GUI.*

---

## Viewing a Bulk Change PDU IP Address Import Attempt Run History

You can view the run history of a previous PDU IP address change and its associated report via the Facility Item IP Address Change Upload page. This is useful when looking for a summary of previous changes or to confirm that a change has been made.

To view the run history for a specific plan:

1. In the Facility Items tab, choose Activities > Bulk Configuration Activities.
2. Select Update IP Addresses.
3. Click the Next button.

4. In the Facility Item IP Address Change Upload section, under Previous Import Attempts, select the previous import attempt whose run history you want to view.
5. Click the Run History link to view the run history page. To delete a previous import attempt, select the previous import attempt you want to delete, and click the Delete link.

On the Run History page, you can select the report you would like to view by clicking the Report link in the far right column of the import attempt you would like to view. The contents of the Run History table can be filtered by the following:

- State
- Summary
- Start Date
- End Date

## Plan Reports

### Report

The following screenshot shows an example plan report for updating an IP address.

### Report for 12/19/2017 10:35:21.341 AM - IP Address Change

**Summary:** 12/19/2017 10:35:21.341 AM - IP Address Change for user: admin  
**Created By:** admin

#### Actions

Title	Description
Change Address of PDUs on PowerIQ	Change the IP Address of PDUs within PowerIQ

#### Summary

Started At	Completed At	Run By	Facility Items		
			Count	Updated	Failed
12/19/2017 10:35:21.378 AM	12/19/2017 10:35:22.416 AM	admin	0	1	0

#### Details

Facility Item	Message Time	Message
192.168.43.117 -> 10.129.1.117		
	12/19/2017 10:35:21.491 AM	Waiting to run
	12/19/2017 10:35:21.543 AM	Started tasks
	12/19/2017 10:35:21.646 AM	Successfully updated IP Address of facilities item in PowerIQ.

Each report includes the following sections:

## Actions

The Actions section provides titles and descriptions for the actions performed (e.g., Change the IP Address of PDUs on Power IQ).

## Summary

The Summary section provides the dates and times the actions were completed. It also indicates who executed the plan and the number of facility items that were included and updated in the plan.

## Details

The Details section provides date- and time-stamped messages for each facility item that indicate the state of each facility item as the plan is executed (e.g., Waiting to run, Started tasks).

Reports also can be exported to PDF.



## Configuring Proxy Connections to Power IQ

If network restrictions prevent some users from connecting directly to Power IQ, they may need access through a proxy server that is authorized to make the connection.

Check your firewall and security settings to ensure that communication between the proxy server and Power IQ is allowed.

1. In the Settings tab, click Server Settings in the Application Administration section.
2. In the Proxy Configuration section, select the web protocol the proxy server communicates over, HTTP or HTTPS.
3. Enter the IP address of the proxy server in the Proxy Host field. Power IQ only accepts proxy communication from this address.
4. Enter the communications port the proxy server uses in the Proxy Port field.
5. If the proxy server is required to authenticate with Power IQ, select Yes in the Authentication Required field, and enter a Username and Password. These fields must use a valid Power IQ username and password combination.
6. Click Save Proxy Settings.



## Configuring Facility Item Display Settings - View Facility Items by IP or Name

Select whether you want all facility items in the system to be identified by facility item name or IP address in the Settings tab. This setting affects all pages where facility items are listed, and is used in email notifications when identifying facility items. This setting applies to all users in the system.

Facility item names are retrieved from the facility item, via SNMP, NOT from the network. Facility item name is not guaranteed to be unique. If a facility item name is not available, the facility item label is set to "Unnamed" and the IP address is included.

The facility item display setting affects the Quick Search feature. If IP address is selected in the display settings, you can search facility items by either name or IP address. If facility item name is selected, only searching by facility item name is permitted. Devices can always be searched by either name or IP address regardless of the facility item display preference.

1. In the Settings tab, click Application Settings in the Appliance Administration section.
2. In the Display Settings box, select Show Facility Item IP Address or Show Facility Item Name, then click Save Display Settings.

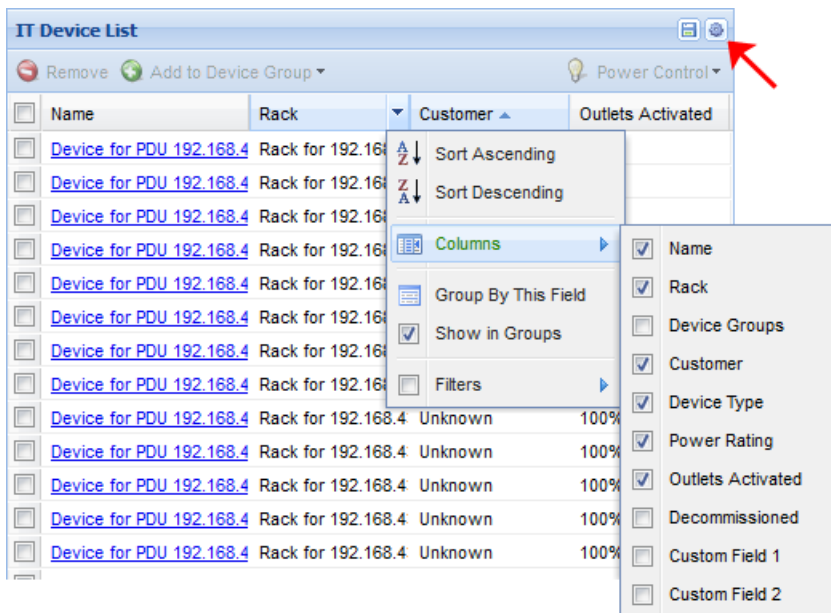


## Customizing Your View of Facility Items, IT Devices, and Events

Each user can save their own customized views of Facility Items, IT Devices, and Events lists in Power IQ. Once you save a customized view, it is retained even if you leave the tab and return, or use a different browser or client.

*Note: If you open the Facility Items List by clicking on a health chart, your view will be filtered by the chart. For example, click the red bar of a health chart to view only the items with red health status.*

- In the Facility Items, IT Devices, or Events tab, drag and drop columns to customize your view. Hover the mouse on a column heading then click the arrow to view a drop-down list of other options. You can hide or show each column, set the ascending or descending order of data, or enter a search term to filter the column to include only items that match the search term.
  - See *Filter the Events List* on page 267.
  - See *Filter the Facility Items List* on page 432.
- Click the Panel Options button in the upper right corner of the list view, then select Save Current Grid Configuration to save your view.



- In the Facility Items, IT Devices, or Events tab, click the Panel Options button in the upper right corner of the list view, then select Use Default Grid Configuration to revert to the default configuration.

## How to Restore and Clone Sever Technology and Raritan Device Configurations

The following information applies to all Raritan devices and Server Technology version 8.x devices. The devices to be configured must be of the same make, model and firmware of the configuration source device.

- Power IQ automatically collects each device's "Configuration File" if this feature is enabled . Click "Settings" tab; click "Power IQ Settings" link; click enable in the following panel at the bottom of the page

### Backup Facility Item Configurations

Backup configuration file from supported facility items

Note: The latest backup, as well as the backup for the 1st of the current and previous month are retained.

Cancel
✔ Save Backup Settings

- It collects it at the admin configurable Power IQ full system back-up time. Click "Settings" tab; click "Data Backups" link; Set the time you want in the following panel at the bottom.

### Backup Scheduling

Daily Backup Schedule:
6:00 AM
▼

Cancel
✔ Save

- Three "Configuration Files" are retained for each device. Today's back-up, the first calendar day of the current month and the first calendar day of last month.
- The Raritan "Configuration File" file does NOT contain any "Device Specific Information" like the following list.
  - Device name
  - SNMP system name, contact and location
  - Part of network settings (IP address, gateway, netmask and so on)
  - Device logs
  - Names, states and values of environmental sensors and actuators
  - TLS certificate
  - Server monitoring entries
  - Asset strip names and rack unit names
  - Outlet names and states



- The Server Technology “Configuration File” contains all settings for a complete restore of a device. Power IQ removes the “Device Specific Information” when you select the clone operation.
- The Server Technology “Configuration File” is an editable text file. You can download it from a Server Tech device GUI and edit it in note pad to include only the settings you want to change on one or more devices. You can then upload it to Power IQ via the “Uploaded Config” page. It will be saved as a template you can use in plan to “Clone” or “Restore” only the specific settings to one or more devices.

**Clone and Restore Configuration**

Backup Configs **Uploaded Configs**

To update the configuration, select the type of configuration update and pick a configuration from the table below. Hit Save when done to add the

Select the type of configuration update:  Clone  Restore

Model	Uploaded	By
bill's file	02/03/2015 10:54:07.543 AM	

- Steps:
  1. Click the “Facility Items”
  2. Select “Bulk Configuration Activities” from the “Activities” drop down
  3. Click “Manage Bulk Configuration Templates” link
  4. Click “Add” button to create a template
  5. Filter the table and select the “Device Configuration” file you was to use by clicking the check symbol. Only one file can be selected at a time.
  6. Select the “Restore “ radio button to push the “Configuration” to one device or “Clone” operation to push to one or more devices.
  7. Click the “Save” button at the bottom of the panel to save your selection.
  8. Click the “Next” button in the upper right of the page. You will be presented with a table of target devices to select from.
  9. Filter the table and select one or more devices as appropriate.
  10. Click the “Add PDUs” button to add them to the plan. Devices in the plan are shown in the second table.
  11. Click the “Run” button in the upper right of the page when you are happy with your plan and what it to run. You can run and export a report of the operation.

---

*Note: The device from the selected “Configuration” is automatically included to the list so you will need to remove it if you don’t want to restore/clone the configuration to it.*

---

For additional information please see the video at

[How To Restore and Close Raritan and Server Tech Device Configurations](#)





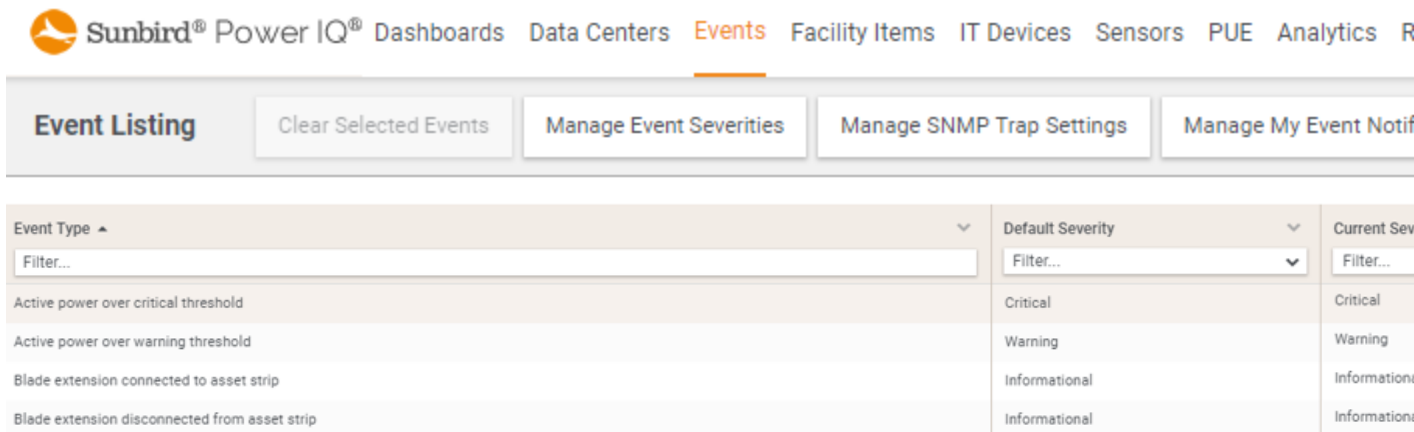
## Adjusting Event Severities

The following information is applicable to all Power IQ events.

Users may adjust the severity of any or all Power IQ “Events”. All device traps, Power IQ system events, Power IQ thresholds and Power IQ failed polls convert into a Power IQ “Event” with a “Default Severity”. There are over 600 unique Power IQ “Events”. Now you can adjust their “Current Severity” so you are only alerted for the “Events” that are important to your organization. The “Event Severity” is a system wide setting. The “Current Event Severity” is what determines the red/yellow/green color of an “Event” in the event list and on the dashboard. Critical is red, warning is yellow and Informational will be green. Severity is also a field filter for email notifications such that you can set a filter to only send emails for critical “Events”.

Steps:

1. Click the “Events” tab
2. Click the “Manage Event Severities” button;
3. Enter text in any of the columns to filter on one or more “Events”
4. Click the “Down Arrow” button in the “Current Severity” column.
5. Select the “Severity Value” of your choice.



The screenshot shows the Sunbird Power IQ interface. At the top, there is a navigation bar with the Sunbird logo and several tabs: Dashboards, Data Centers, Events (highlighted), Facility Items, IT Devices, Sensors, PUE, Analytics, and R. Below the navigation bar is a sub-header with buttons: Event Listing, Clear Selected Events, Manage Event Severities, Manage SNMP Trap Settings, and Manage My Event Notif. The main content area displays a table with columns for Event Type, Default Severity, and Current Severity. The Event Type column has a dropdown menu and a filter input. The Default Severity and Current Severity columns have dropdown menus and filter inputs. The table lists several event types with their corresponding default and current severities.

Event Type	Default Severity	Current Severity
Active power over critical threshold	Critical	Critical
Active power over warning threshold	Warning	Warning
Blade extension connected to asset strip	Informational	Informational
Blade extension disconnected from asset strip	Informational	Informational

For additional information please see the video at

[Adjust Event Severities](#)

## Report and Monitor 3 Phase Power

The following information is applicable to all 3 phase devices that are metered for AMPs on each inlet. These devices can be rack PDUs, rack UPSs, meters, busway drops, end of busway meters, RPPs, panels, floor PDUs and UPSs.

The monitoring feature can be enabled or disabled by the admin. It is disabled by default.

- Enable Rack Power, Unbalanced Current Percentage, Temperature, and Humidity Thresholding
- Enable Circuit Breaker State Thresholding

Power IQ collects the 3 phase inlet amp readings and rating (if available) during each poll.

It calculates an “Unbalanced Current %” with the following equation: “Unbalanced Current %” = (max difference of any one phase from the average of all three phases)/(average of all three phases).

It displays the above readings in a sortable, filterable and exportable table along with other related information such as location, facility item name, inlet name, type, model and health. You can also save your favorite table configuration.

Facilities Item Name	Facilities Item Type	Facilities Item Model	Facilities Item Health	Unbalanced Current (%)	Inlet Rating (A)	Inlet Reading L1 (A)	Inlet Reading L2 (A)
192.168.43.107	RackPdu	EM40_PM15-120	WARNING	8.0	120	0.8	0.8
192.168.43.125	RackPdu	PX-5532	CRITICAL	100.0	35	0.18	0
192.168.42.208	RackPdu	PX2-3172	CRITICAL	65.5	32	1.6	0.9
192.168.43.207	RackPdu	PX2-1147R	GOOD		16	0.2	

Steps:

1. Click “Sensor” tab; click “Inlets” button
2. Filter on one or more columns;
3. Click the 3 dot icon to show/hide columns, export report & save grid configuration.

For additional information please see the video at

[Report and Monitor 3 Phase Power](#)

## Report and Monitor Circuit Breakers

The following information is applicable to all devices for which Power IQ collects circuit breaker information. These devices are typically rack PDUs and busway drops.

The monitoring feature needs to be enabled by the admin.

Steps:

1. Click the “Sensor” tab
2. Click the “Default Thresholds” button
3. Check the “Enable Circuit Breaker State Thresholding” check box

Enable Rack Power, Unbalanced Current Percentage, Temperature, and Humidity Thresholding

Enable Circuit Breaker State Thresholding

Power IQ collects each circuit breaker state, load and rating(if available) during each poll.

It displays the above readings in a sortable, filterable and exportable table along with other related information such as location, facility item name, circuit breaker name, type, model and health. You can also save your favorite table configuration.



Facilities Item Name	Facilities Item Type	Facilities Item Model	Name	Facilities Item Health	State	Current Reading (A)	Rating (A)
192.168.43.125	Rack PDU	PX-5532	CB2	CRITICAL	Open	0.16	20
192.168.43.107	Rack PDU	EM40_PM15-120	C1	WARNING	Unknown	0.2	30
192.168.43.107	Rack PDU	EM40_PM15-120	C2	WARNING	Unknown	0.4	30
192.168.43.107	Rack PDU	EM40_PM15-120	C3	WARNING	Unknown	0.3	30
192.168.43.107	Rack PDU	EM40_PM15-120	C4	WARNING	Unknown	0.4	30

Steps:

1. Click the “Sensor” tab
2. Click the “Circuit Breakers” button
3. Filter on one or more columns
4. Click the 3 dot icon to show/hide columns, export report & save grid configuration.

For additional information please see the video at

[Report and Monitor Circuit Breakers](#)

# Chapter 7: Event and Trap Management

Power IQ can receive SNMP traps from supported PDUs and display them as events. You can also set power thresholds for racks based on capacity, and Power IQ will generate events when the thresholds are exceeded. See *Rack Thresholds* on page 260.

You can also enable notifications, so that Power IQ sends an email message for specific events.



## User Permissions for Event Management

You must have the Event Manager role to view the Events tab. See *Assign Roles to a User* on page 344.

You must have the Create Event Notifications role to manage event notifications. See *Assigning Roles for User Permissions* on page 341.



## Prepare PDUs for Power IQ Event Management

Power IQ receives and displays supported events in the Events tab, and sends notifications if enabled.

You must configure PDUs to send the supported SNMP traps to Power IQ. SNMP v1 and SNMP v2/v3 trap types are supported. See *Supported Events* on the next page.

PDU trap names differ by vendor, so Power IQ maps the trap names to common event names to highlight the common traps across PDUs.



## Supported Events

Power IQ supports SNMP traps from the following vendors and products and converts the traps into Power IQ events. See the vendor/product below for supported events.

- *APC Netbotz Supported Events* on page 199
- *APC Rack PDU Supported Events* on page 193
- *APC Transfer Switch Supported Events* on page 198
- *APC UPS Supported Events* on page 195
- *Aphel Supported Events* on page 201
- *Avocent Supported Events* on page 202
- *Baytech Supported Events* on page 204
- *CPI Supported Events* on page 206
- *Cyberswitching Supported Events* on page 207
- [Eaton eAm004 Supported Events](#)
- *Geist Supported Events* on page 210
- *Geist EM Supported Events* on page 211
- *Geist RCX Supported Events* on page 213
- *Geist V3 Supported Events* on page 214
- *Hewlett Packard Supported Events* on page 216
- *Hewlett Packard PDU2 Supported Events* on page 217
- *Knurr Supported Events* on page 218
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- *MRV Supported Events* on page 222
- *Netbotz Supported Events* on page 223
- *Raritan PX/PX2/PX3 Supported Events* on page 232
- *Raritan EMX Supported Events* on page 224
- *Raritan PX3TS Transfer Switch Supported Events* on page 243
- *Raritan Power Meter Supported Events* on page 227
- *Rittal Supported Events* on page 246
- *Schleifenbauer Supported Events* on page 248
- *Servotech Supported Events* on page 250
- *Servotech PRO2 (Sentry4) Supported Events* on page 251
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## APC Supported Events

The APC standard plugin can be used to manage APC rack PDUs, UPSs, transfer switches, and APC Netbotz devices. For more information on the supported events for each device type, see the following topics:

- *APC Rack PDU Supported Events* on the next page
- *APC UPS Supported Events* on page 195
- *APC Transfer Switch Supported Events* on page 198
- *APC Netbotz Supported Events* on page 199





## APC Rack PDU Supported Events

APC Rack PDU Supported Events		
Event description	Trap name	Common event name
Underload Threshold	rPDULowLoad	inletCurrentLowerWarning
Underload Condition Cleared	rPDULowLoadCleared	inletCurrentLowerWarningClear
Low Overload Threshold	rPDUNearOverload	inletCurrentUpperWarning
Low Overload Threshold cleared	rPDUNearOverloadCleared	inletCurrentUpperWarningClear
Overload Threshold	rPDUOverload	inletCurrentUpperCritical
Overload Threshold cleared	rPDUOverloadCleared	inletCurrentUpperCriticalClear
Outlet Turned on	rPDUOutletOn	outletPowerOn
Outlet Turned off	rPDUOutletOff	outletPowerOff
High temperature threshold violated on the probe	envHighTempThresholdViolation	envTemperatureUpperCritical
High temperature threshold violation cleared on the probe	envHighTempThresholdViolationCleared	envTemperatureUpperCriticalClear
Low temperature threshold violated on the probe	envLowTempThresholdViolation	envTemperatureLowerCritical
Low temperature threshold violation cleared on the probe	envLowTempThresholdViolationCleared	envTemperatureLowerCriticalClear
High humidity threshold violated on the probe	envHighHumidityThresholdViolation	envHumidityUpperCritical

APC Rack PDU Supported Events		
Event description	Trap name	Common event name
High humidity threshold violation cleared on the probe	envHighHumidityThresholdViolationCleared	envHumidityUpperCriticalClear
Low humidity threshold violated on the probe	envLowHumidityThresholdViolation	envHumidityLowerCritical
Low humidity threshold violation cleared on the probe	envLowHumidityThresholdViolationCleared	envHumidityLowerCriticalClear
Trap used to test SNMP trap functionality	apcTestTrap	testTrap



## APC UPS Supported Events

APC UPS Supported Events		
Event description	Trap name	Common event name
UPS load is greater than 100% of its rated capacity	upsOverload	upsOverload
UPS load is greater than 100% of its rated capacity cleared	upsOverloadClear	upsOverloadClear
UPS failed diagnostics self-test	upsDiagnosticsFailed	upsDiagnosticsFailed
UPS failed diagnostics self-test cleared	upsDiagnosticsPassed	upsDiagnosticsFailedClear
UPS batteries are discharged	upsDischarged	upsDepletedBattery
UPS batteries are discharged cleared	dischargeCleared	upsDepletedBatteryClear
UPS has switched to battery backup power	upsOnBattery	upsOnBattery
UPS has switched to battery backup power cleared	powerRestored	upsOnBatteryClear
UPS batteries are low and will soon be exhausted	lowBattery	upsLowBattery
UPS batteries are low and will soon be	returnFromLowBatteryInfo	upsLowBatteryClear

APC UPS Supported Events		
Event description	Trap name	Common event name
exhausted cleared		
UPS batteries need replacement	upsBatteryNeedsReplacement	upsBatteryNeedsReplacement
UPS batteries need replacement cleared	upsBatteryReplaced	upsBatteryNeedsReplacementClear
UPS on bypass due to internal fault	hardwareFailureBypass	upsBypassFailure
UPS on bypass due to internal fault cleared	returnFromBypass	upsBypassFailureClear
UPS battery temperature threshold has been reached	batteryOverTemperature	upsBatteryOverTemperature
UPS battery temperature threshold has been reached cleared	batteryOverTemperatureCleared	upsBatteryOverTemperatureClear
UPS internal over temperature condition exists	upsInternalOverTemperature	upsInternalOverTemperature
UPS internal over temperature condition exists cleared	upsInternalOverTemperatureCleared	upsInternalOverTemperatureClear
UPS inverter over temperature condition exists	upsInverterOverTemperature	upsInverterOverTemperature
UPS inverter over temperature condition exists cleared	upsInverterOverTemperature	upsInverterOverTemperatureClear
UPS battery over voltage	upsBatteryOverVoltage	upsBatteryOverVoltage

APC UPS Supported Events		
Event description	Trap name	Common event name
condition exists		
UPS battery over voltage condition exists cleared	upsBatteryOverVoltageCleared	upsBatteryOverVoltageClear
High temperature threshold violated on the probe	envHighTempThresholdViolation	envTemperatureUpperCritical
High temperature threshold violation cleared on the probe	envHighTempThresholdViolationCleared	envTemperatureUpperCriticalClear
Low temperature threshold violated on the probe	envLowTempThresholdViolation	envTemperatureLowerCritical
Low temperature threshold violation cleared on the probe	envLowTempThresholdViolationCleared	envTemperatureLowerCriticalClear
High humidity threshold violated on the probe	envHighHumidityThresholdViolation	envHumidityUpperCritical
High humidity threshold violation cleared on the probe	envHighHumidityThresholdViolationCleared	envHumidityUpperCriticalClear
Low humidity threshold violated on the probe	envLowHumidityThresholdViolation	envHumidityLowerCritical
Low humidity threshold violation cleared on the probe	envLowHumidityThresholdViolationCleared	envHumidityLowerCriticalClear
Trap used to test SNMP trap functionality	apcTestTrap	testTrap

## APC Transfer Switch Supported Events

APC Transfer Switch Supported Events		
Event description	Trap name	Common event name
Transfer Switch Active Inlet Changed	atsSourceSwitched	transferSwitchActiveInletChangedCritical transferSwitchActiveInletChangedWarning
Transfer Switch Operating State Change	atsLostRedundancy atsLostRedundancy atsRedundancyRestored	transferSwitchOperatingStateNonRedundant transferSwitchOperatingStateStandby transferSwitchOperatingStateNormal

## APC Netbotz Supported Events

*Note: Netbotz devices may be managed by either the APC standard plugin or the Netbotz standard plugin. The MIB used by the target device will determine which standard plugin is used. For supported events for the Netbotz plugin, see [Netbotz Supported Events](#) on page 223.*

APC Netbotz Supported Events		
Event description	Trap name	Common event name
Temp Env Sensor High Threshold	apcEnvHighTempThresholdViolation apcEnvHighTempThresholdViolationCleared apcEnvMaxTempThresholdViolation apcEnvMaxTempThresholdViolationCleared	envOverTemperatureWarning envOverTemperatureWarningClear envOverTemperatureCritical envOverTemperatureCriticalClear
Temp Env Sensor Low Threshold	apcEnvLowTempThresholdViolation apcEnvLowTempThresholdViolationCleared apcEnvMinTempThresholdViolation apcEnvMinTempThresholdViolationCleared	envUnderTemperatureWarning envUnderTemperatureWarningClear envUnderTemperatureCritical envUnderTemperatureCriticalClear
Humidity Env Sensor High Threshold	apcEnvHighHumidityThresholdViolation apcEnvHighHumidityThresholdViolationCleared apcEnvMaxHumidityThresholdViolation apcEnvMaxHumidityThresholdViolationCleared	envOverHumidityWarning envOverHumidityWarningClear envOverHumidityCritical envOverHumidityCriticalClear
Humidity Env Sensor Low Threshold	apcEnvLowHumidityThresholdViolation apcEnvLowHumidityThresholdViolationCleared apcEnvMinHumidityThresholdViolation apcEnvMinHumidityThresholdViolationCleared	envUnderHumidityWarning envUnderHumidityWarningClear envUnderHumidityCritical envUnderHumidityCriticalClear
Contact Closure	apcWarningDiscreteInputContactStateAbnormal apcWarningDiscreteInputContactStateNormal apcCriticalDiscreteInputContactStateAbnormal apcCriticalDiscreteInputContactStateNormal	envContactSensorWarning envContactSensorWarningClear envContactSensorCritical envContactSensorCriticalClear
Powered Dry	apcOutputRelayStateAbnormal	envPoweredDryContactCritical

APC Netbotz Supported Events		
Event description	Trap name	Common event name
Contact	apcOutputRelayStateNormal	envPoweredDryContactCriticalClear
Trap used to test SNMP trap functionality	apcTestTrap	testTrap





## Aphel Supported Events

Aphel Supported Events		
Event description	Trap name	Common event name
Inlet Current Upper Critical Threshold	ampsCT1TRAP ampsCT8TRAP	inletCurrentUpperCritical



## Avocent Supported Events

*Note: The table below lists all Avocent supported events. Not all events are supported for all PDU models.*

Avocent Supported Events		
Event description	Trap name	Common event name
Outlet Turned on	avctPmOutletStatusOnTrap avctPmOutletCmdOnTrap	outletPowerOn
Outlet Turned off	avctPmOutletStatusOffTrap avctPmOutletCmdOffTrap	outletPowerOff
Inlet/Inlet Pole/Circuit Breaker/Outlet Current Upper Critical Threshold	avctPmPduMaxLoadHighTrap	inletOverCurrentCritical inletOverCurrentCritical cbOverCurrentCritical outletOverCurrentCritical
Inlet/Inlet Pole/Circuit Breaker/Outlet Current Low Critical Threshold	avctPmPduMinLoadLowTrap	inletUnderCurrentCritical inletUnderCurrentCritical cbUnderCurrentCritical outletUnderCurrentCritical
Inlet/Inlet Pole/Circuit Breaker/Outlet Current Upper Warning Threshold	avctPmPduWarnLoadTrap	inletOverCurrentWarning inletOverCurrentWarning cbOverCurrentWarning outletOverCurrentWarning
Inlet/Inlet Pole/Circuit Breaker/Outlet Current Low Warning Threshold	avctPmPduLowLoadLowTrap	inletUnderCurrentWarning inletUnderCurrentWarning cbUnderCurrentWarning outletUnderCurrentWarning
Current Threshold Cleared	avctPmPduMaxLoadBackTrap	inletOverCurrentCriticalClear inletOverCurrentCriticalClear cbOverCurrentCriticalClear

## Avocent Supported Events

Event description	Trap name	Common event name
		outletOverCurrentCriticalClear

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*Note: The Current Threshold Cleared event clears any active current threshold event, regardless of event severity. The pmTrapObjectPduElementName varbind value will indicate which PDU element ordinal is specifically targeted. The inlet pole inletOverCurrentCriticalClear event has an event parameter that identifies the specific inlet pole involved.*

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## Baytech Supported Events

Baytech Supported Events		
Event description	Trap name	Common event name
Outlet Turned on	outletOn	outletPowerOn
Outlet Turned off	outletOff	outletPowerOff
Inlet Current Upper Critical Threshold	currentThresholdViolation	inletCurrentUpperCritical
Inlet Current Upper Critical Threshold Cleared	currentThresholdViolationCleared	inletCurrentUpperCriticalClear
Inlet Current Low Critical Threshold	currentUnderThresholdViolation	inletCurrentLowerCritical
Inlet Current Low Critical Threshold Cleared	currentUnderThresholdViolationCleared	inletCurrentLowerCriticalClear
Inlet Voltage Upper Critical Threshold	voltageOverThresholdViolation	inletVoltageUpperCritical
Inlet Voltage Upper Critical Threshold Cleared	voltageOverThresholdViolationCleared	inletVoltageUpperCriticalClear
Inlet Voltage Lower Critical Threshold	voltageUnderThresholdViolation	inletVoltageLowerCritical
Inlet Voltage Lower Critical Threshold Cleared	voltageUnderThresholdViolationCleared	inletVoltageLowerCriticalClear
Circuit Breaker Tripped	circuitBreakerAlarm	cbTripped
Circuit Breaker Recovered	circuitBreakerAlarmClearTrap	cbRecovered
Temp Env Sensor High Threshold	sensorTempThreshHiAlarmTrap	envTemperatureUpperCritical
Temp Env Sensor High Threshold Cleared	sensorTempThreshHiAlarmClearedTrap	envTemperatureUpperCriticalClear

### Baytech Supported Events

Event description	Trap name	Common event name
Temp Env Sensor Low Threshold	sensorTempThreshLoAlarmTrap	envTemperatureLowerCritical
Temp Env Sensor Low Threshold Cleared	sensorTempThreshLoAlarmClearedTrap	envTemperatureLowerCriticalClear



## CPI Supported Events

*Note: Events marked with an asterisk (\*) are only generated when doors have been created and configured with the appropriate sensors correctly. For more information, see [Door Access Management](#) on page 543.*

CPI Supported Events		
Event description	Trap name	Common event name
Branch Maximum Current	maxCurrent	cbOverCurrentCritical
Branch Minimum Current	minCurrent	cbUnderCurrentCritical
Inlet Maximum Voltage	maxVolt	inletOverVoltageCritical
Inlet Minimum Voltage	minVolt	inletUnderVoltageCritical
Maximum Temperature Sensor	maxTemperature	envOverTemperatureCritical
Minimum Temperature Sensor	minTemperature	envUnderTemperatureCritical
Maximum Humidity Sensor	maxHumidity	envOverHumidityCritical
Minimum Humidity Sensor	minHumidity	envUnderHumidityCritical
Outlet Threshold Triggered	outletMaxCurrent	outletOverCurrentCritical
Door Locked/Unlocked State Change*	easLockOpenAlert easLockCloseAlert	envPoweredDryContactCritical electronicallyUnlocked* envPoweredDryContactCriticalClear electronicallyLocked*
Door Opened/Closed State Change*	easDoorOpenAlert easDoorCloseAlert	envContactSensorCritical doorOpen* envContactSensorCriticalClear doorClosed*

## Cyberswitching Supported Events

Cyberswitching Supported Events		
Event description	Trap name	Common event name
Inlet Current Upper Critical Threshold	tricomG2UnitCurrentCritical	inletCurrentUpperCritical
Inlet Current Upper Warning Threshold	tricomG2UnitCurrentWarning	inletCurrentUpperWarning
Outlet Current Upper Warning Threshold	tricomG2OutletHighCurrentWarning	outletCurrentUpperWarning
Outlet Current Lower Warning Threshold	tricomG2OutletLowCurrentWarning	outletCurrentLowerWarning
Circuit Breaker Tripped	tricomG2OutletTripped	cbTripped

## Eaton eAM004 Supported Events

Eaton eAm004 Supported Events		
Enterprise OID - 1.3.6.1.4.1.534.6.6.7		
Event description	Trap name	Common event name
Temperature Sensor Threshold	notifyTemperatureThStatus	envOverTemperatureCriticalClear, envOverTemperatureCritical, envOverTemperatureWarningClear, envOverTemperatureWarning, envUnderTemperatureCriticalClear, envUnderTemperatureCritical, envUnderTemperatureWarningClear, envUnderTemperatureWarning
Humidity Sensor Threshold	notifyHumidityThStatus	envOverHumidityCriticalClear,



## Eaton eAm004 Supported Events

### Enterprise OID - 1.3.6.1.4.1.534.6.6.7

Event description	Trap name	Common event name
		envOverHumidityCritical, envOverHumidityWarningClear, envOverHumidityWarning, envUnderHumidityCriticalClear, envUnderHumidityCritical, envUnderHumidityWarningClear, envUnderHumidityWarning
Outlet Current Threshold	notifyOutletCurrentThStatus	outletOverCurrentCriticalClear, outletOverCurrentCritical, outletOverCurrentWarningClear outletOverCurrentWarning, outletUnderCurrentCriticalClear, outletUnderCurrentCritical, outletUnderCurrentWarningClear, outletUnderCurrentWarning
Outlet Voltage Threshold	notifyOutletVoltageThStatus	outletOverVoltageCriticalClear, outletOverVoltageCritical, outletOverVoltageWarningClear, outletOverVoltageWarning, outletUnderVoltageCriticalClear, outletUnderVoltageCritical outletUnderVoltageWarningClear, outletUnderVoltageWarning
Inlet Current Threshold	notifyInputCurrentThStatus	inletOverCurrentCriticalClear, inletOverCurrentCritical, inletOverCurrentWarningClear, inletOverCurrentWarning,





### Eaton eAm004 Supported Events

#### Enterprise OID - 1.3.6.1.4.1.534.6.6.7

Event description	Trap name	Common event name
		inletUnderCurrentCriticalClear, inletUnderCurrentCritical, inletUnderCurrentWarningClear, inletUnderCurrentWarning
Inlet Voltage Threshold	notifyInputCurrentThStatus	inletOverVoltageCriticalClear, inletOverVoltageCritical, inletOverVoltageWarningClear, inletOverVoltageWarning, inletUnderVoltageCriticalClear, inletUnderVoltageCritical, inletUnderVoltageWarningClear, inletUnderVoltageWarning



## Geist Supported Events

Geist Supported Events		
Event description	Trap name	Common event name
Inlet Current Upper Critical Threshold	totalDeciAmpsPhaseATRAP totalDeciAmpsPhaseBTRAP totalDeciAmpsPhaseCTRAP	inletCurrentUpperCritical
Inlet Current Upper Critical Threshold Cleared		inletCurrentUpperCriticalClear
Circuit Breaker Current Upper Critical Threshold	outlet1ADeciAmpsTRAP outlet12CDeciAmpsTRAP	CBCurrentUpperCritical
Circuit Breaker Current Upper Critical Threshold Cleared		CBCurrentUpperCriticalClear
Outlet Current Upper Critical Threshold	outlet1ADeciAmpsTRAP outlet12CDeciAmpsTRAP	OutletCurrentUpperCritical
Outlet Current Upper Critical Threshold Cleared		OutletCurrentUpperCriticalClear

## Geist EM Supported Events

Geist EM Supported Events		
Event description	Trap name	Common event name
Circuit Breaker Current Threshold Warning Event	mainChannelDeciAmps01WARN mainChannelDeciAmps07WARN	
Circuit Breaker Current Threshold Critical Event	mainChannelDeciAmps01ALARM mainChannelDeciAmps07ALARM	
Outlet Current Threshold Warning Event	auxChannelDeciAmps01WARN auxChannelDeciAmps32WARN outlet1AB-1DeciAmpsWarningTRAP outlet24CA-8DeciAmpsWarningTRAP	OutletCurrentUpperCritical
Outlet Current Threshold Warning Event Cleared		
Outlet Current Threshold Critical Event	auxChannelDeciAmps01ALARM auxChannelDeciAmps32ALARM outlet1AB-1DeciAmpsTRAP outlet24CA-8DeciAmpsTRAP	OutletCurrentUpperCritical
Outlet Current Threshold Critical Event Cleared		OutletCurrentUpperCriticalClear
Phase Current Threshold Warning Event	totalDeciAmpsPhaseAWarningTRAP totalDeciAmpsPhaseCWarningTRAP	inletCurrentUpperWarning
Phase Current Threshold Warning Event Cleared		inletCurrentUpperWarningClear
Phase Current Threshold Critical Event	totalDeciAmpsPhaseATRAP totalDeciAmpsPhaseCTRAP	inletCurrentUpperCritical
Phase Current Threshold Critical Event Cleared		inletCurrentUpperCriticalClear





## Geist RCX Supported Events

Geist RCX Supported Events		
Event description	Trap name	Common event name
Ctrl3ChDELTAdeciAmpsA = Three Phase Inlet Phase A Current	gstCtrl3ChDELTAdeciAmpsANOTIFY (10606)	
Ctrl3ChDELTAdeciAmpsB = Three Phase Inlet Phase B Current	gstCtrl3ChDELTAdeciAmpsBNOTIFY (10607)	
Ctrl3ChDELTAdeciAmpsC = Three Phase Inlet Phase C Current	gstCtrl3ChDELTAdeciAmpsCNOTIFY (10608)	
Pow3ChdeciAmpsA = Three Phase Inlet Phase A Current	gstPow3ChdeciAmpsANOTIFY (11110)	
Pow3ChdeciAmpsB = Three Phase Inlet Phase B Current	gstPow3ChdeciAmpsBNOTIFY (11119)	
Pow3ChdeciAmpsC = Three Phase Inlet Phase C Current	gstPow3ChdeciAmpsCNOTIFY (11128)	
Ctrl3ChIECdeciAmpsA = Three Phase Inlet Phase A Current	gstCtrl3ChIECdeciAmpsANOTIFY (12508)	
Ctrl3ChIECdeciAmpsB = Three Phase Inlet Phase B Current	gstCtrl3ChIECdeciAmpsBNOTIFY (12516)	
Ctrl3ChIECdeciAmpsC = Three Phase Inlet Phase C Current	gstCtrl3ChIECdeciAmpsCNOTIFY (12524)	



## Geist V3 Supported Events

Geist V3 Supported Events		
Event description	Trap name	Common event name
Temperature Threshold High Violation	gstTempSensorTempCNOTIFY gstTempSensorTempFNOTIFY gstClimateTempCNOTIFY gstClimateTempFNOTIFY (alarmTripType = 2)	
Temperature Threshold Low Violation	gstTempSensorTempCNOTIFY gstTempSensorTempFNOTIFY gstClimateTempCNOTIFY gstClimateTempFNOTIFY (alarmTripType = 1)	
Temperature Threshold Clear	gstTempSensorTempCNOTIFY gstTempSensorTempFNOTIFY gstClimateTempCNOTIFY gstClimateTempFNOTIFY (alarmTripType = 0)	
Humidity Threshold High Violation	gstClimateHumidityNOTIFY (alarmTripType = 2)	
Humidity Threshold Low Violation	gstClimateHumidityNOTIFY (alarmTripType = )1	
Humidity Threshold Clear	gstClimateHumidityNOTIFY (alarmTripType = 0)	
Outlet Current Threshold High Violation	gstCtrlOutletDeciAmpsNOTIFY (alarmTripType = 2)	

### Geist V3 Supported Events

Event description	Trap name	Common event name
Outlet Current Threshold Low Violation -	gstCtrlOutletDeciAmpsNOTIFY (alarmTripType = 1)	
Outlet Current Threshold Violation Clear	gstCtrlOutletDeciAmpsNOTIFY (alarmTripType = 0)	



## Hewlett Packard Supported Events

*Note: This plugin supports most HP rack PDUs. For supported events for rack PDUs with HP power strips that use the PDU2 section of the HP-Compaq Power MIB, such as the HP D9N15A (8.6kVA 208V 3Ph 21out NA/JP mPDU) model, see [Hewlett Packard PDU2 Supported Events on the next page](#).*

Hewlett Packard Supported Events		
Event description	Trap name	Common event name
Voltage High Critical	trapCritical	inletOverVoltageCritical
Voltage High Critical Clear	trapCleared	inletOverVoltageCriticalClear
Voltage Low Critical	trapCritical	inletUnderVoltageCritical
Voltage Low Critical Clear	trapCleared	inletUnderVoltageCriticalClear
Current Critical	trapCritical	inletOverCurrentCritical
Current Critical Clear	trapCleared	inletOverCurrentCriticalClear
Voltage High Warning	trapWarning	inletOverVoltageWarning
Voltage High Warning Clear	trapCleared	inletOverVoltageWarningClear
Voltage Low Warning	trapWarning	inletUnderVoltageWarning
Voltage Low Warning Clear	trapCleared	inletUnderVoltageWarningClear
Current Warning	trapWarning	inletOverCurrentWarning
Current Warning Clear	trapCleared	inletOverCurrentWarningClear



## Hewlett Packard PDU2 Supported Events

*Note: This plugin supports rack PDUs with HP power strips that use the PDU2 section of the HP-Compaq Power MIB, such as the HP D9N15A (8.6kVA 208V 3Ph 21out NA/JP mPDU) model. For supported events for other HP hardware, see [Hewlett Packard Supported Events on the previous page](#).*

Hewlett Packard PDU2 Supported Events		
Event description	Trap name	Common event name
Voltage High Critical	trapCritical	inletOverVoltageCritical
Voltage High Critical Clear	trapCleared	inletOverVoltageCriticalClear
Voltage Low Critical	trapCritical	inletUnderVoltageCritical
Voltage Low Critical Clear	trapCleared	inletUnderVoltageCriticalClear
Current High Critical	trapCritical	inletOverCurrentCritical
Current High Critical Clear	trapCleared	inletOverCurrentCriticalClear
Voltage High Warning	trapWarning	inletOverVoltageWarning
Voltage High Warning Clear	trapCleared	inletOverVoltageWarningClear
Voltage Low Warning	trapWarning	inletUnderVoltageWarning
Voltage Low Warning Clear	trapCleared	inletUnderVoltageWarningClear
Current High Warning	trapWarning	inletOverCurrentWarning
Current High Warning Clear	trapCleared	inletOverCurrentWarningClear
Current Low Critical	trapCritical	inletUnderCurrentCritical
Current Low Critical Clear	trapCleared	inletUnderCurrentCriticalClear
Current Low Warning	trapWarning	inletUnderCurrentWarning
Current Low Warning Clear	trapCleared	inletUnderCurrentWarningClear

## Knurr Supported Events

Knurr Supported Events		
Event description	Trap name	Common event name
Inlet Pole Current Upper Warning Threshold	pdu-M1TrapPreWarnPh1 pdu-M1TrapPreWarnPh2 pdu-M1TrapPreWarnPh3 pdu-M2TrapPreWarnPh1 pdu-M2TrapPreWarnPh2 pdu-M2TrapPreWarnPh3 pdu-M3TrapPreWarnPh1 pdu-M3TrapPreWarnPh2 pdu-M3TrapPreWarnPh3 pdu-M4TrapPreWarnPh1 pdu-M4TrapPreWarnPh2 pdu-M4TrapPreWarnPh3	inletOverCurrentWarning
Inlet Pole Current Upper Critical Threshold	pdu-M1TrapAlarmPh1 pdu-M1TrapAlarmPh2 pdu-M1TrapAlarmPh3 pdu-M2TrapAlarmPh1 pdu-M2TrapAlarmPh2 pdu-M2TrapAlarmPh3 pdu-M3TrapAlarmPh1 pdu-M3TrapAlarmPh2 pdu-M3TrapAlarmPh3 pdu-M4TrapAlarmPh1 pdu-M4TrapAlarmPh2 pdu-M4TrapAlarmPh3	inletOverCurrentCritical
Inlet Pole Current Lower Warning Threshold	pdu-M1TrapInfoPh1 pdu-M1TrapInfoPh2	inletUnderCurrentWarning



Knurr Supported Events		
Event description	Trap name	Common event name
	pdu-M1TrapInfoPh3 pdu-M2TrapInfoPh1 pdu-M2TrapInfoPh2 pdu-M2TrapInfoPh3 pdu-M3TrapInfoPh1 pdu-M3TrapInfoPh2 pdu-M3TrapInfoPh3 pdu-M4TrapInfoPh1 pdu-M4TrapInfoPh2 pdu-M4TrapInfoPh3	
Inlet Pole Current Threshold Clear - All	pdu-M1TrapRetToNormPh1 pdu-M1TrapRetToNormPh2 pdu-M1TrapRetToNormPh3 pdu-M2TrapRetToNormPh1 pdu-M2TrapRetToNormPh2 pdu-M2TrapRetToNormPh3 pdu-M3TrapRetToNormPh1 pdu-M3TrapRetToNormPh2 pdu-M3TrapRetToNormPh3 pdu-M4TrapRetToNormPh1 pdu-M4TrapRetToNormPh2 pdu-	inletOverCurrentWarningClear inletOverCurrentCriticalClear inletUnderCurrentWarningClear



Knurr Supported Events		
Event description	Trap name	Common event name
	M4TrapRetToNormPh3	
Inlet Unbalanced Current Upper Warning Threshold	pdu-M1TrapOutOfBal pdu-M2TrapOutOfBal pdu-M3TrapOutOfBal pdu-M4TrapOutOfBal	inletOverUnbalancedCurrentWarning



## Liebert Supported Events

Liebert Supported Events		
Event description	Trap name	Common event name
Outlet turned on	IgpEventRcpPowerStateChangeOn	outletPowerOn
Outlet turned off	IgpEventRcpPowerStateChangeOff	outletPowerOff
"Active:Alarm:Branch Breaker Open [Label] Branch A" "Cleared:Alarm:Branch Breaker Open [Label] Branch A"	IgpSysNotification	cbTripped cbTrippedClear
"Active:Warning:PDU Over Current L3 [Label] MPH2 [Pole] L3 [Value] 1.18A [Threshold] 3%" "Cleared:Warning:PDU Over Current L3 [Label] MPH2"	IgpSysNotification	inletOverCurrentWarning inletOverCurrentWarningClear

## MRV Supported Events

MRV Supported Events		
Event description	Trap name	Common event name
Temp Env Sensor High Threshold	irTempHighTholdAlarmRaised	envTemperatureUpperCritical
Temp Env Sensor High Threshold Cleared	irTempHighTholdAlarmCleared	envTemperatureUpperCriticalClear
Temp Env Sensor Low Threshold	irTempLowTholdAlarmRaised	envTemperatureLowerCritical
Temp Env Sensor Low Threshold Cleared	irTempLowTholdAlarmCleared	envTemperatureLowerCriticalClear
Humidity Env Sensor High Threshold	irHumidityHighTholdAlarmRaised	envHumidityUpperCritical
Humidity Env Sensor High Threshold Cleared	irHumidityHighTholdAlarmCleared	envHumidityUpperCriticalClear
Humidity Env Sensor Low Threshold	irHumidityLowTholdAlarmRaised	envHumidityLowerCritical
Humidity Env Sensor Low Threshold Cleared	irHumidityLowTholdAlarmCleared	envHumidityUpperCriticalClear

## Netbotz Supported Events

*Note: Netbotz devices may be managed by either the APC standard plugin or the Netbotz standard plugin. The MIB used by the target device will determine which standard plugin is used. For Netbotz supported events for the APC plugin, see [APC Netbotz Supported Events](#) on page 199.*

Netbotz Supported Events		
Event description	Trap name	Common event name
Temp Env Sensor High Threshold	netBotzTempTooHigh	envTemperatureUpperCritical
Temp Env Sensor High Threshold Cleared	netBotzTempTooHighRTN	envTemperatureUpperCriticalClear
Temp Env Sensor Low Threshold	netBotzTempTooLow	envTemperatureLowerCritical
Temp Env Sensor Low Threshold Cleared	netBotzTempTooLowRTN	envTemperatureLowerCriticalClear
Humidity Env Sensor High Threshold	netBotzHumidityTooHigh	envHumidityUpperCritical
Humidity Env Sensor High Threshold Cleared	netBotzHumidityTooHighRTN	envHumidityUpperCriticalClear
Humidity Env Sensor Low Threshold	netBotzHumidityTooLow	envHumidityLowerCritical
Humidity Env Sensor Low Threshold Cleared	netBotzHumidityTooLowRTN	envHumidityLowerCriticalClear

## Raritan EMX Supported Events

*Note: Events marked with an asterisk (\*) are only generated when doors have been created and configured correctly. For more information, see [Door Access Management on page 543](#).*

Raritan EMX Supported Events		
Event description	Trap name	Common event name
Server Reachability from PDU	serverReachable serverNotReachable	serverNotReachableClear serverNotReachable
External Sensor Slot State Change	External sensor ' [EXTSENSORNAME]' in slot ' [EXTSENSORSLOT]' is closed.	SensorContactOpen SensorContactClosed
Contact Closure	externalSensorStateChange	envContactSensorCritical envContactSensorCriticalClear
Powered Dry Contact	externalSensorStateChange	envPoweredDryContactCritical envPoweredDryContactCriticalClear
Door Open Sensor State Change*	externalSensorStateChange	doorOpen doorOpenClear
Handle Open Sensor State Change*	externalSensorStateChange	handleOpen handleOpenClear
Electronic Lock Sensor State Change*	externalSensorStateChange	electronicallyUnlocked electronicallyUnlockedClear
Water	externalSensorStateChange	envWaterSensorCritical envWaterSensorCriticalClea envWaterSensorUnavailable envWaterSensorUnavailableClear
Smoke	externalSensorStateChange	envSmokeSensorCritical envSmokeSensorCriticalClea envSmokeSensorUnavailable



Raritan EMX Supported Events		
Event description	Trap name	Common event name
		envSmokeSensorUnavailableClear
Vibration	externalSensorStateChange	envVibrationSensorCritical envVibrationSensorCriticalClear envVibrationSensorUnavailable envVibrationSensorUnavailableClear
Temperature	externalSensorStateChange	envOverTemperatureCritical envOverTemperatureCriticalClear envOverTemperatureWarning envOverTemperatureWarningClear envUnderTemperatureCritical envUnderTemperatureCriticalClear envUnderTemperatureWarning envUnderTemperatureWarningClear envTemperatureSensorUnavailable envTemperatureSensorUnavailableClear
Humidity	externalSensorStateChange	envOverHumidityCritical envOverHumidityCriticalClear envOverHumidityWarning envOverHumidityWarningClear envUnderHumidityCritical envUnderHumidityCriticalClear envUnderHumidityWarning envUnderHumidityWarningClear envHumiditySensorUnavailable envHumiditySensorUnavailableClear
Air Flow	externalSensorStateChange	envOverAirFlowCritical envOverAirFlowCriticalClear envOverAirFlowWarning



Raritan EMX Supported Events		
Event description	Trap name	Common event name
		envOverAirFlowWarningClear envUnderAirFlowCritical envUnderAirFlowCriticalClear envUnderAirFlowWarning envUnderAirFlowWarningClear envAirFlowSensorUnavailable envAirFlowSensorUnavailableClear
Air Pressure	externalSensorStateChange	envOverAirPressureCritical envOverAirPressureCriticalClear envOverAirPressureWarning envOverAirPressureWarningClear envUnderAirPressureCritical envUnderAirPressureCriticalClear envUnderAirPressureWarning envUnderAirPressureWarningClear envAirPressureSensorUnavailable envAirPressureSensorUnavailableClear



## Raritan Power Meter Supported Events

Raritan Power Meter Supported Events		
Event description	Trap name	Common event name
Circuit Voltage	circuitSensorStateChange circuitPoleSensorStateChange	circuitOverVoltageCriticalClear circuitOverVoltageCritical circuitOverVoltageWarningClear circuitOverVoltageWarning circuitUnderVoltageCriticalClear circuitUnderVoltageCritical circuitUnderVoltageWarningClear circuitUnderVoltageWarning circuitVoltageSensorUnavailable circuitVoltageSensorUnavailableClear
Circuit Current	circuitSensorStateChange circuitPoleSensorStateChange	circuitOverCurrentCriticalClear circuitOverCurrentCritical circuitOverCurrentWarningClear circuitOverCurrentWarning circuitUnderCurrentCriticalClear circuitUnderCurrentCritical circuitUnderCurrentWarningClear circuitUnderCurrentWarning circuitCurrentSensorUnavailable circuitCurrentSensorUnavailableClear
Circuit Active Power	circuitSensorStateChange circuitPoleSensorStateChange	circuitOverActivePowerCriticalClear circuitOverActivePowerCritical circuitOverActivePowerWarningClear circuitOverActivePowerWarning circuitUnderActivePowerCriticalClear circuitUnderActivePowerCritical

Raritan Power Meter Supported Events		
Event description	Trap name	Common event name
		circuitUnderActivePowerWarningClear circuitUnderActivePowerWarning circuitActivePowerSensorUnavailable circuitActivePowerSensorUnavailableClear
Circuit Apparent Power	circuitSensorStateChange circuitPoleSensorStateChange	circuitOverApparentPowerCriticalClear circuitOverApparentPowerCritical circuitOverApparentPowerWarningClear circuitOverApparentPowerWarning circuitUnderApparentPowerCriticalClear circuitUnderApparentPowerCritical circuitUnderApparentPowerWarningClear circuitUnderApparentPowerWarning circuitApparentPowerSensorUnavailable circuitApparentPowerSensorUnavailableClear
Circuit Power Factor	circuitSensorStateChange circuitPoleSensorStateChange	circuitOverPowerFactorCriticalClear circuitOverPowerFactorCritical circuitOverPowerFactorWarningClear circuitOverPowerFactorWarning circuitUnderPowerFactorCriticalClear circuitUnderPowerFactorCritical circuitUnderPowerFactorWarningClear circuitUnderPowerFactorWarning circuitPowerFactorSensorUnavailable circuitPowerFactorSensorUnavailableClear
Circuit Phase Angle	circuitSensorStateChange circuitPoleSensorStateChange	circuitOverPhaseAngleCriticalClear circuitOverPhaseAngleCritical circuitOverPhaseAngleWarningClear circuitOverPhaseAngleWarning circuitUnderPhaseAngleCriticalClear



Raritan Power Meter Supported Events		
Event description	Trap name	Common event name
		circuitUnderPhaseAngleCritical circuitUnderPhaseAngleWarningClear circuitUnderPhaseAngleWarning circuitPhaseAngleSensorUnavailable circuitPhaseAngleSensorUnavailableClear
Circuit Frequency	circuitSensorStateChange circuitPoleSensorStateChange	circuitOverFrequencyCriticalClear circuitOverFrequencyCritical circuitOverFrequencyWarningClear circuitOverFrequencyWarning circuitUnderFrequencyCriticalClear circuitUnderFrequencyCritical circuitUnderFrequencyWarningClear circuitUnderFrequencyWarning circuitFrequencySensorUnavailable circuitFrequencySensorUnavailableClear
Water	externalSensorStateChange	envWaterSensorCritical envWaterSensorCriticalClea envWaterSensorUnavailable envWaterSensorUnavailableClear
Smoke	externalSensorStateChange	envSmokeSensorCritical envSmokeSensorCriticalClea envSmokeSensorUnavailable envSmokeSensorUnavailableClear
Vibration	externalSensorStateChange	envVibrationSensorCritical envVibrationSensorCriticalClear envVibrationSensorUnavailable envVibrationSensorUnavailableClear
Temperature	externalSensorStateChange	envOverTemperatureCritical

Raritan Power Meter Supported Events		
Event description	Trap name	Common event name
		envOverTemperatureCriticalClear envOverTemperatureWarning envOverTemperatureWarningClear envUnderTemperatureCritical envUnderTemperatureCriticalClear envUnderTemperatureWarning envUnderTemperatureWarningClear envTemperatureSensorUnavailable envTemperatureSensorUnavailableClear
Humidity	externalSensorStateChange	envOverHumidityCritical envOverHumidityCriticalClear envOverHumidityWarning envOverHumidityWarningClear envUnderHumidityCritical envUnderHumidityCriticalClear envUnderHumidityWarning envUnderHumidityWarningClear envHumiditySensorUnavailable envHumiditySensorUnavailableClear
Air Flow	externalSensorStateChange	envOverAirFlowCritical envOverAirFlowCriticalClear envOverAirFlowWarning envOverAirFlowWarningClear envUnderAirFlowCritical envUnderAirFlowCriticalClear envUnderAirFlowWarning envUnderAirFlowWarningClear envAirFlowSensorUnavailable envAirFlowSensorUnavailableClear



### Raritan Power Meter Supported Events

Event description	Trap name	Common event name
Air Pressure	externalSensorStateChange	envOverAirPressureCritical envOverAirPressureCriticalClear envOverAirPressureWarning envOverAirPressureWarningClear envUnderAirPressureCritical envUnderAirPressureCriticalClear envUnderAirPressureWarning envUnderAirPressureWarningClear envAirPressureSensorUnavailable envAirPressureSensorUnavailableClear

## Raritan PX/PX2/PX3 Supported Events

Some Raritan PX models support Event Rules, so that you can specify which events will be sent to Power IQ

Set up rules to reduce the number of traps sent to Power IQ. Optional.

Once rules are created, associate the rule with the SNMP Trap Action, with Power IQ as the trap destination.

See Event Rules or Actions in the Raritan PX User Guide.

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*Note: Model numbers that begin with "PX2" or "PX3" support Event Rules.*

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*Note: Events marked with an asterisk (\*) are only generated when doors have been created and configured correctly. For more information, see [Door Access Management](#) on page 543.*

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Raritan PX Supported Events		
Event description	Trap name	Common event name
Server Reachability from PDU	serverReachable serverNotReachable	serverNotReachableClear serverNotReachable
Peak Current	inletSensorStateChange	inletOverPeakCurrentCriticalClear inletOverPeakCurrentCritical inletOverPeakCurrentWarningClear inletOverPeakCurrentWarning inletUnderPeakCurrentCriticalClear inletUnderPeakCurrentCritical inletUnderPeakCurrentWarningClear inletUnderPeakCurrentWarning inletPeakCurrentSensorUnavailable inletPeakCurrentSensorUnavailableClear
Unbalanced Current	inletSensorStateChange	inletOverUnbalancedCurrentCriticalClear InletOverUnbalancedCurrentCritical inletOverUnbalancedCurrentWarningClear inletOverUnbalancedCurrentWarning inletUnderUnbalancedCurrentCriticalClear



Raritan PX Supported Events		
Event description	Trap name	Common event name
		inletUnderUnbalancedCurrentCritical inletUnderUnbalancedCurrentWarningClear inletUnderUnbalancedCurrentWarning inletUnbalancedCurrentSensorUnavailable inletUnbalancedCurrentSensorUnavailableClear
Active Power	inletSensorStateChange	inletOverActivePowerCriticalClear inletOverActivePowerCritical inletOverActivePowerWarningClear inletOverActivePowerWarning inletUnderActivePowerCriticalClear inletUnderActivePowerCritical inletUnderActivePowerWarningClear inletUnderActivePowerWarning inletActivePowerSensorUnavailable inletActivePowerSensorUnavailableClear
Apparent Power	inletSensorStateChange	inletOverApparentPowerCriticalClear inletOverApparentPowerCritical inletOverApparentPowerWarningClear inletOverApparentPowerWarning inletUnderApparentPowerCriticalClear inletUnderApparentPowerCritical inletUnderApparentPowerWarningClear inletUnderApparentPowerWarning inletApparentPowerSensorUnavailable inletApparentPowerSensorUnavailableClear
Power Factor	inletSensorStateChange	inletOverPowerFactorCriticalClear inletOverPowerFactorCritical inletOverPowerFactorWarningClear

Raritan PX Supported Events		
Event description	Trap name	Common event name
		inletOverPowerFactorWarning inletUnderPowerFactorCriticalClear inletUnderPowerFactorCritical inletUnderPowerFactorWarningClear inletUnderPowerFactorWarning inletPowerFactorSensorUnavailable inletPowerFactorSensorUnavailableClear
Frequency	inletSensorStateChange	inletOverFrequencyCriticalClear inletOverFrequencyCritical inletOverFrequencyWarningClear inletOverFrequencyWarning inletUnderFrequencyCriticalClear inletUnderFrequencyCritical inletUnderFrequencyWarningClear inletUnderFrequencyWarning inletFrequencySensorUnavailable inletFrequencySensorUnavailableClear
Phase Angle	inletSensorStateChange	inletOverPhaseAngleCriticalClear inletOverPhaseAngleCritical inletOverPhaseAngleWarningClear inletOverPhaseAngleWarning inletUnderPhaseAngleCriticalClear inletUnderPhaseAngleCritical inletUnderPhaseAngleWarningClear inletUnderPhaseAngleWarning inletPhaseAngleSensorUnavailable inletPhaseAngleSensorUnavailableClear
Residual Current	inletSensorStateChange	inletOverResidualCurrentCriticalClear



Raritan PX Supported Events		
Event description	Trap name	Common event name
		inletOverResidualCurrentCritical inletOverResidualCurrentWarningClear inletOverResidualCurrentWarning inletUnderResidualCurrentCriticalClear inletUnderResidualCurrentCritical inletUnderResidualCurrentWarningClear inletUnderResidualCurrentWarning inletResidualCurrentSensorUnavailable inletResidualCurrentSensorUnavailableClear
Power Quality	inletSensorStateChange	powerQualityUnavailable powerQualityUnavailableClear powerQualityWarning powerQualityWarningClear powerQualityCritical powerQualityCriticalClear
Voltage Line to Neutral	InletPoleSensorStateChange	inletOverVoltageLnCriticalClear inletOverVoltageLnCritical inletOverVoltageLnWarningClear inletOverVoltageLnWarning inletUnderVoltageLnCriticalClear inletUnderVoltageLnCritical inletUnderVoltageLnWarningClear inletUnderVoltageLnWarning inletVoltageLnSensorUnavailable inletVoltageLnSensorUnavailableClear
Peak Current	outletSensorStateChange	outletOverPeakCurrentCriticalClear outletOverPeakCurrentCritical outletOverPeakCurrentWarningClear



Raritan PX Supported Events		
Event description	Trap name	Common event name
		outletOverPeakCurrentWarning outletUnderPeakCurrentCriticalClear outletUnderPeakCurrentCritical outletUnderPeakCurrentWarningClear outletUnderPeakCurrentWarning outletPeakCurrentSensorUnavailable outletPeakCurrentSensorUnavailableClear
Unbalanced Current	outletSensorStateChange	outletOverUnbalancedCurrentCriticalClear outletOverUnbalancedCurrentCritical outletOverUnbalancedCurrentWarningClear outletOverUnbalancedCurrentWarning outletUnderUnbalancedCurrentCriticalClear outletUnderUnbalancedCurrentCritical outletUnderUnbalancedCurrentWarningClear outletUnderUnbalancedCurrentWarning outletUnbalancedCurrentSensorUnavailable outletUnbalancedCurrentSensorUnavailableClear
Active Power	outletSensorStateChange	outletOverActivePowerCriticalClear outletOverActivePowerCritical outletOverActivePowerWarningClear outletOverActivePowerWarning outletUnderActivePowerCriticalClear outletUnderActivePowerCritical outletUnderActivePowerWarningClear outletUnderActivePowerWarning outletActivePowerSensorUnavailable outletActivePowerSensorUnavailableClear
Apparent Power	outletSensorStateChange	outletOverApparentPowerCriticalClear



Raritan PX Supported Events		
Event description	Trap name	Common event name
		outletOverApparentPowerCritical outletOverApparentPowerWarningClear outletOverApparentPowerWarning outletUnderApparentPowerCriticalClear outletUnderApparentPowerCritical outletUnderApparentPowerWarningClear outletUnderApparentPowerWarning outletApparentPowerSensorUnavailable outletApparentPowerSensorUnavailableClear
Power Factor	outletSensorStateChange	outletOverPowerFactorCriticalClear outletOverPowerFactorCritical outletOverPowerFactorWarningClear outletOverPowerFactorWarning outletUnderPowerFactorCriticalClear outletUnderPowerFactorCritical outletUnderPowerFactorWarningClear outletUnderPowerFactorWarning outletPowerFactorSensorUnavailable outletPowerFactorSensorUnavailableClear
Frequency	outletSensorStateChange	outletOverPowerFactorCriticalClear outletOverPowerFactorCritical outletOverPowerFactorWarningClear outletOverPowerFactorWarning outletUnderPowerFactorCriticalClear outletUnderPowerFactorCritical outletUnderPowerFactorWarningClear outletUnderPowerFactorWarning outletPowerFactorSensorUnavailable



Raritan PX Supported Events		
Event description	Trap name	Common event name
		outletPowerFactorSensorUnavailableClear
Phase Angle	outletSensorStateChange	outletOverPhaseAngleCriticalClear outletOverPhaseAngleCritical outletOverPhaseAngleWarningClear outletOverPhaseAngleWarning outletUnderPhaseAngleCriticalClear outletUnderPhaseAngleCritical outletUnderPhaseAngleWarningClear outletUnderPhaseAngleWarning outletPhaseAngleSensorUnavailable outletPhaseAngleSensorUnavailableClear
Voltage Line to Neutral	outletPoleSensorStateChange	outletOverVoltageLnCriticalClear outletOverVoltageLnCritical outletOverVoltageLnWarningClear outletOverVoltageLnWarning outletUnderVoltageLnCriticalClear outletUnderVoltageLnCritical outletUnderVoltageLnWarningClear outletUnderVoltageLnWarning outletVoltageLnSensorUnavailable outletVoltageLnSensorUnavailableClear
Outlet Power State On/Off	outletSensorStateChange	outletPowerStateUnavailable outletPowerStateUnavailableClear outletPowerStateOff outletPowerStateOffClear outletPowerStateOn outletPowerStateOnClear



Raritan PX Supported Events		
Event description	Trap name	Common event name
Circuit Breaker Peak Current	overCurrentProtectorSensorStateChange	cbOverPeakCurrentCriticalClear cbOverPeakCurrentCritical cbOverPeakCurrentWarningClear cbOverPeakCurrentWarning cbUnderPeakCurrentCriticalClear cbUnderPeakCurrentCritical cbUnderPeakCurrentWarningClear cbUnderPeakCurrentWarning cbPeakCurrentSensorUnavailable cbPeakCurrentSensorUnavailableClear
Contact Closure	externalSensorStateChange	envContactSensorCritical envContactSensorCriticalClear
Powered Dry Contact	externalSensorStateChange	envPoweredDryContactCritical envPoweredDryContactCriticalClear
Door Open Sensor State Change*	externalSensorStateChange	doorOpen doorOpenClear
Handle Open Sensor State Change*	externalSensorStateChange	handleOpen handleOpenClear
Electronic Lock Sensor State Change*	externalSensorStateChange	electronicallyUnlocked electronicallyUnlockedClear
Water	externalSensorStateChange	envWaterSensorCritical envWaterSensorCriticalClea envWaterSensorUnavailable envWaterSensorUnavailableClear



Raritan PX Supported Events		
Event description	Trap name	Common event name
Smoke	externalSensorStateChange	envSmokeSensorCritical envSmokeSensorCriticalClear envSmokeSensorUnavailable envSmokeSensorUnavailableClear
Vibration	externalSensorStateChange	envVibrationSensorCritical envVibrationSensorCriticalClear envVibrationSensorUnavailable envVibrationSensorUnavailableClear
Temperature	externalSensorStateChange	envOverTemperatureCritical envOverTemperatureCriticalClear envOverTemperatureWarning envOverTemperatureWarningClear envUnderTemperatureCritical envUnderTemperatureCriticalClear envUnderTemperatureWarning envUnderTemperatureWarningClear envTemperatureSensorUnavailable envTemperatureSensorUnavailableClear
Humidity	externalSensorStateChange	envOverHumidityCritical envOverHumidityCriticalClear envOverHumidityWarning envOverHumidityWarningClear envUnderHumidityCritical envUnderHumidityCriticalClear envUnderHumidityWarning envUnderHumidityWarningClear envHumiditySensorUnavailable envHumiditySensorUnavailableClear





Raritan PX Supported Events		
Event description	Trap name	Common event name
Air Flow	externalSensorStateChange	envOverAirFlowCritical envOverAirFlowCriticalClear envOverAirFlowWarning envOverAirFlowWarningClear envUnderAirFlowCritical envUnderAirFlowCriticalClear envUnderAirFlowWarning envUnderAirFlowWarningClear envAirFlowSensorUnavailable envAirFlowSensorUnavailableClear
Air Pressure	externalSensorStateChange	envOverAirPressureCritical envOverAirPressureCriticalClear envOverAirPressureWarning envOverAirPressureWarningClear envUnderAirPressureCritical envUnderAirPressureCriticalClear envUnderAirPressureWarning envUnderAirPressureWarningClear envAirPressureSensorUnavailable envAirPressureSensorUnavailableClear
Motion Detection	motionDetection	envMotionDetectionCritical envMotionDetectionCriticalClear envMotionDetectionUnavailable envMotionDetectionUnavailableClear
Tamper Detection	tamperDetection	envTamperDetectionCritical envTamperDetectionCriticalClear envTamperDetectionUnavailable envTamperDetectionUnavailableClear





## Raritan PX3TS Transfer Switch Supported Events

Raritan PX3TS Supported Events		
Event description	Trap name	Common event name
Transfer Switch Active Inlet Changed	transferSwitchStateChange	transferSwitchActiveInletChangedCritical transferSwitchActiveInletChangedCriticalClear transferSwitchActiveInletChangedWarning
Transfer Switch Operating State Change	transferSwitchStateChange	transferSwitchOperatingStateNormal transferSwitchOperatingStateStandby
Water	externalSensorStateChange	envWaterSensorCritical envWaterSensorCriticalClea envWaterSensorUnavailable envWaterSensorUnavailableClear
Smoke	externalSensorStateChange	envSmokeSensorCritical envSmokeSensorCriticalClea envSmokeSensorUnavailable envSmokeSensorUnavailableClear
Vibration	externalSensorStateChange	envVibrationSensorCritical envVibrationSensorCriticalClear envVibrationSensorUnavailable envVibrationSensorUnavailableClear
Temperature	externalSensorStateChange	envOverTemperatureCritical envOverTemperatureCriticalClear envOverTemperatureWarning envOverTemperatureWarningClear envUnderTemperatureCritical envUnderTemperatureCriticalClear envUnderTemperatureWarning

Raritan PX3TS Supported Events		
Event description	Trap name	Common event name
		envUnderTemperatureWarningClear envTemperatureSensorUnavailable envTemperatureSensorUnavailableClear
Humidity	externalSensorStateChange	envOverHumidityCritical envOverHumidityCriticalClear envOverHumidityWarning envOverHumidityWarningClear envUnderHumidityCritical envUnderHumidityCriticalClear envUnderHumidityWarning envUnderHumidityWarningClear envHumiditySensorUnavailable envHumiditySensorUnavailableClear
Air Flow	externalSensorStateChange	envOverAirFlowCritical envOverAirFlowCriticalClear envOverAirFlowWarning envOverAirFlowWarningClear envUnderAirFlowCritical envUnderAirFlowCriticalClear envUnderAirFlowWarning envUnderAirFlowWarningClear envAirFlowSensorUnavailable envAirFlowSensorUnavailableClear
Air Pressure	externalSensorStateChange	envOverAirPressureCritical envOverAirPressureCriticalClear envOverAirPressureWarning envOverAirPressureWarningClear envUnderAirPressureCritical envUnderAirPressureCriticalClear



### Raritan PX3TS Supported Events

Event description	Trap name	Common event name
		envUnderAirPressureWarning envUnderAirPressureWarningClear envAirPressureSensorUnavailable envAirPressureSensorUnavailableClear



## Rittal Supported Events

Rittal Supported Events		
Event description	Trap name	Common event name
Inlet Current Upper Critical Threshold	alarmUnit1 alarmUnit2 alarmUnit3 alarmUnit4	inletCurrentUpperCritical
Inlet Current Upper Critical Threshold Cleared	alarmUnit1 alarmUnit2 alarmUnit3 alarmUnit4	inletCurrentUpperCriticalClear
Inlet Current Lower Critical Threshold	alarmUnit1 alarmUnit2 alarmUnit3 alarmUnit4	inletCurrentLowerCritical
Inlet Current Lower Critical Threshold Cleared	alarmUnit1 alarmUnit2 alarmUnit3 alarmUnit4	inletCurrentLowerCriticalClear
Inlet Voltage Upper Critical Threshold	alarmUnit1 alarmUnit2 alarmUnit3 alarmUnit4	inletVoltageUpperCritical
Inlet Voltage Upper Critical Threshold Cleared	alarmUnit1 alarmUnit2 alarmUnit3 alarmUnit4	inletVoltageUpperCriticalClear

Rittal Supported Events		
Event description	Trap name	Common event name
Inlet Voltage Lower Critical Threshold	alarmUnit1 alarmUnit2 alarmUnit3 alarmUnit4	inletVoltageLowerCritical
Inlet Voltage Lower Critical Threshold Cleared	alarmUnit1 alarmUnit2 alarmUnit3 alarmUnit4	inletVoltageLowerCriticalClear
Temp Env Sensor Upper Critical	alarmUnit1 alarmUnit2 alarmUnit3 alarmUnit4	envTemperatureUpperCritical
Temp Env Sensor Upper Critical Cleared	alarmUnit1 alarmUnit2 alarmUnit3 alarmUnit4	envTemperatureUpperCriticalClear
Temp Env Sensor Low Critical	alarmUnit1 alarmUnit2 alarmUnit3 alarmUnit4	envTemperatureLowerCritical
Temp Env Sensor Low Critical Cleared	alarmUnit1 alarmUnit2 alarmUnit3 alarmUnit4	envTemperatureLowerCriticalClear
Humidity Env Sensor Upper Critical	alarmUnit1 alarmUnit2 alarmUnit3	envHumidityUpperCritical



Rittal Supported Events		
Event description	Trap name	Common event name
	alarmUnit4	
Humidity Env Sensor Upper Critical Cleared	alarmUnit1 alarmUnit2 alarmUnit3 alarmUnit4	envHumidityUpperCriticalClear
Humidity Env Sensor Lower Critical	alarmUnit1 alarmUnit2 alarmUnit3 alarmUnit4	envHumidityLowerCritical
Humidity Env Sensor Lower Critical Cleared	alarmUnit1 alarmUnit2 alarmUnit3 alarmUnit4	envHumidityLowerCriticalClear

## Schleifenbauer Supported Events

Schleifenbauer Supported Events		
Event description	Trap name	Common event name
Temperature High Threshold	sdbDevSsTemperatureAlertDetected	envOverTemperatureCritical
Inlet Current High Threshold	sdbDevSsInputCurrentAlertDetected	inletOverCurrentCritical
Outlet Current High Threshold	sdbDevSsOutletCurrentAlertDetected	outletOverCurrentCritical
Inlet Voltage High Threshold	sdbDevSsInputVoltageAlertDetected	inletOverVoltageCritical
Outlet Current Low	sdbDevSsOutletCurrentDropAlertDetected	outletUnderCurrentCritical





Schleifenbauer Supported Events		
Event description	Trap name	Common event name
Threshold		
Inlet Current Low Threshold	sdbDevSsInputCurrentDropAlertDetected	inletUnderCurrentCritical
Outlet Voltage Low Threshold	sdbDevSsOutletVoltageDropAlertDetected	outletUnderVoltageCritical
Trap Used for Clearing Events	sdbDevSsDeviceStatusCodeChanged	envOverTemperatureCriticalClear inletOverCurrentCriticalClear inletUnderCurrentCriticalClear inletOverVoltageCriticalClear outletOverCurrentCriticalClear outletUnderCurrentCriticalClear outletUnderVoltageCriticalClear

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*Note: To work optimally with PIQ, the Auto Reset Alert option under Settings > Reset in the Schleifenbauer PDU settings should be enabled and set to one-minute intervals (the shortest possible time interval).*

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*Note: Power IQ natively supports Schleifenbauer hybrid PDUs but can also manage Classic PDUs in a daisy chain configuration where a hybrid PDU is the primary or head PDU of the chain.*

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## Servertech Supported Events

*Note: This plugin supports hardware prior to Server Technology's next-generation "PRO2" series of CDU (cabinet distribution unit). For supported events for PRO2 series hardware, see [Servertech PRO2 \(Sentry4\) Supported Events on the next page](#).*

Servertech Supported Events		
Event description	Trap name	Common event name
Infeed Current High Threshold	infeedLoadEvent	inletCurrentUpperCritical inletCurrentUpperCriticalClear
Infeed Current Low Threshold	infeedLoadEvent	inletCurrentLowerCritical inletCurrentLowerCriticalClear
Outlet Current High Thresholds	outletLoadEvent	outletCurrentUpperCritical outletCurrentUpperCriticalClear
Outlet Current Low Thresholds	outletLoadEvent	outletCurrentLowerCritical outletCurrentLowerCriticalClear
Outlet Current Status Change	outletChangeEvent	outletPowerOn outletPowerOff
Temp Env Sensor High Threshold	tempHumidSensorTempEvent	envTemperatureUpperCritical envTemperatureUpperCriticalClear
Temp Env Sensor Low Threshold	tempHumidSensorTempEvent	envTemperatureLowerCritical envTemperatureLowerCriticalClear
Humidity Env Sensor High Thresholds	tempHumidSensorHumidEvent	envHumidityUpperCritical envHumidityUpperCriticalClear
Humidity Env Sensor Low Thresholds	tempHumidSensorHumidEvent	envHumidityLowerCritical envHumidityLowerCriticalClear
Water		envWaterSensorCriticalClear envWaterSensorCritical

Servertech Supported Events		
Event description	Trap name	Common event name
Contact Closure		envContactSensorCriticalClear envContactSensorCritical

## Servertech PRO2 (Sentry4) Supported Events

*Note: The Sentry4 plugin supports Server Technology's next-generation "PRO2" series of CDU (cabinet distribution unit). For supported events for the original Servertech plugin, which supports hardware prior to the PRO2 series, see [Servertech Supported Events on the previous page](#).*

*Note: To access the environmental sensors, water sensor, and dry contact closure door sensors available on the Servertech EMCU-1-1B unit, you must first add the EMCU-1-1B to Power IQ with a proxy ID of 5 that extends the existing Star topology.*

Servertech Supported Events		
Event description	Trap name	Common event name
Inlet Active Power	st4InputCordActivePowerEvent	inletOverActivePowerCriticalClear inletOverActivePowerCritical inletOverActivePowerWarningClear inletOverActivePowerWarning inletUnderActivePowerCriticalClear inletUnderActivePowerCritical inletUnderActivePowerWarningClear inletUnderActivePowerWarning
Inlet Apparent Power	st4InputCordApparentPowerEvent	inletOverApparentPowerCriticalClear inletOverApparentPowerCritical inletOverApparentPowerWarningClear inletOverApparentPowerWarning inletUnderApparentPowerCriticalClear

Servertech Supported Events		
Event description	Trap name	Common event name
		inletUnderApparentPowerCritical inletUnderApparentPowerWarningClear inletUnderApparentPowerWarning
Inlet Power Factor	st4InputCordPowerFactorEvent	inletUnderPowerFactorCriticalClear inletUnderPowerFactorCritical inletUnderPowerFactorWarningClear inletUnderPowerFactorWarning
Inlet Voltage	st4InputCordVoltageEvent	inletOverVoltageCriticalClear inletOverVoltageCritical inletOverVoltageWarningClear inletOverVoltageWarning inletUnderVoltageCriticalClear inletUnderVoltageCritical inletUnderVoltageWarningClear inletUnderVoltageWarning
Inlet Unbalanced Current	st4InputCordOutOfBalanceEvent	inletOverUnbalancedCurrentCriticalClear inletOverUnbalancedCurrentCritical inletOverUnbalancedCurrentWarningClear inletOverUnbalancedCurrentWarning
Outlet Current	st4OutletCurrentEvent	outletOverCurrentCriticalClear outletOverCurrentCritical outletOverCurrentWarningClear outletOverCurrentWarning outletUnderCurrentCriticalClear outletUnderCurrentCritical outletUnderCurrentWarningClear outletUnderCurrentWarning



Servertech Supported Events		
Event description	Trap name	Common event name
Outlet Active Power	st4OutletActivePowerEvent	outletOverActivePowerCriticalClear outletOverActivePowerCritical outletOverActivePowerWarningClear outletOverActivePowerWarning outletUnderActivePowerCriticalClear outletUnderActivePowerCritical outletUnderActivePowerWarningClear outletUnderActivePowerWarning
Outlet Power Factor	st4OutletPowerFactorEvent	outletUnderPowerFactorCriticalClear outletUnderPowerFactorCritical outletUnderPowerFactorWarningClear outletUnderPowerFactorWarning
Circuit Protector (Breaker) Tripped	st4OcpStatusEvent	cbTrippedClear cbTripped
Outlet Power Status Change	st4OutletStateChangeEvent	outletPowerStateOff outletPowerStateOn
Contact Closure Sensor Status	st4CcSensorStatusEvent	envContactSensorCriticalClear envContactSensorCritical
Water Sensor Status	st4WaterSensorStatusEvent	envWaterSensorCriticalClear envWaterSensorCritical
Temperature Sensor Status	st4TempSensorEvent	envOverTemperatureCriticalClear envOverTemperatureCritical envOverTemperatureWarningClear envOverTemperatureWarning envUnderTemperatureCriticalClear envUnderTemperatureCritical envUnderTemperatureWarningClear



Servertech Supported Events		
Event description	Trap name	Common event name
		envUnderTemperatureWarning
Humidity Sensor Status	st4HumidSensorEvent	envOverHumidityCriticalClear envOverHumidityCritical envOverHumidityWarningClear envOverHumidityWarning envUnderHumidityCriticalClear envUnderHumidityCritical envUnderHumidityWarningClear envUnderHumidityWarning

## Sinetica Supported Events

*Note: The Sinetica plugin supports Unite Technologies/Panduit PDUs.*

*Note: Events marked with an asterisk (\*) are only generated when doors have been created and configured correctly. For more information, see [Door Access Management](#) on page 543.*

Event description	Trap name	Common event name
Temp Env Sensor High Threshold	alarmCritical alarmWarning alarmCleared	envOverTemperatureCritical envOverTemperatureWarning envOverTemperatureCriticalClear envOverTemperatureWarningClear
Temp Env Sensor Low Threshold	alarmCritical alarmWarning alarmCleared	envUnderTemperatureCritical envUnderTemperatureWarning envUnderTemperatureCriticalClear envUnderTemperatureWarningClear
Humidity Env Sensor High Threshold	alarmCritical alarmWarning	envOverHumidityCritical envOverHumidityWarning



Event description	Trap name	Common event name
	alarmCleared	envOverHumidityCriticalClear envOverHumidityWarningClear
Humidity Env Sensor Low Threshold	alarmCritical alarmWarning alarmCleared	envUnderHumidityCritical envUnderHumidityWarning envUnderHumidityCriticalClear envUnderHumidityWarningClear
Contact Closure	alarmCritical alarmCleared	envContactSensorCritical envContactSensorCriticalClear
Powered Dry Contact	alarmCritical alarmCleared	envPoweredDryContactCritical envPoweredDryContactCriticalClear
Inlet Voltage High Threshold	alarmCritical alarmWarning alarmCleared	inletOverVoltageCritical inletOverVoltageWarning inletOverVoltageCriticalClear inletOverVoltageWarningClear
Inlet Voltage Low Threshold	alarmCritical alarmWarning alarmCleared	inletUnderVoltageCritical inletUnderVoltageWarning inletUnderVoltageCriticalClear inletUnderVoltageWarningClear
Inlet Current High Threshold	alarmCritical alarmWarning alarmCleared	inletOverCurrentCritical inletOverCurrentWarning inletOverCurrentCriticalClear inletOverCurrentWarningClear
Inlet Current Low Threshold	alarmCritical alarmWarning alarmCleared	inletUnderCurrentCritical inletUnderCurrentWarning inletUnderCurrentCriticalClear inletUnderCurrentWarningClear

Event description	Trap name	Common event name
Inlet Apparent Power High Threshold	alarmCritical alarmWarning alarmCleared	inletOverApparentPowerCritical inletOverApparentPowerWarning inletOverApparentPowerCriticalClear
Inlet Active Power High Threshold	alarmCritical alarmWarning alarmCleared	activePowerCritical activePowerWarning activePowerCriticalClear activePowerWarningClear
Inlet Power Factor Threshold	alarmCritical alarmCriticalCleared	inletOverPowerFactorCritical inletOverPowerFactorCriticalClear
Inlet Frequency Threshold	alarmCritical alarmCriticalCleared	inletOverFrequencyCritical inletOverFrequencyCriticalClear
Door Open Sensor State Change*	alarmCritical alarmCriticalCleared	doorOpen doorOpenClear
Handle Open Sensor State Change*	alarmCritical alarmCriticalCleared	handleOpen handleOpenClear
Electronic Lock Sensor State Change*	alarmCritical alarmCriticalCleared	electronicallyUnlocked electronicallyUnlockedClear
PSU Failure	alarmCritical alarmCriticalCleared	pduInternalFault pduInternalFaultClear



## Starline Supported Events

Starline Supported Events		
Event description	Trap name	Common event name
Circuit Current	cpmDcInfOvCurrAssertEv cpmDcInfOvCurrDeassertEv cpmDcInfUnCurrAssertEv cpmDcInfUnCurrDeassertEv  cpmAcInfOvCurrAssertEv cpmAcInfOvCurrDeassertEv cpmAcInfUnCurrAssertEv cpmAcInfUnCurrDeassertEv	inletCurrentUpperCritical inletCurrentUpperCriticalClear
Circuit Voltage	cpmDcInfOvVoltAssertEv cpmDcInfOvVoltDeassertEv cpmDcInfUnVoltAssertEv cpmDcInfUnVoltDeassertEv  cpmAcInfOvVoltAssertEv cpmAcInfOvVoltDeassertEv cpmAcInfUnVoltAssertEv cpmAcInfUnVoltDeassertEv	circuitOverVoltageCritical circuitUnderVoltageCritical

## Tripplite Supported Events

Tripplite Supported Events		
Event description	Trap name	Common event name
Environmental sensor events	tlUpsTrapAlarmEntryAdded	envTemperatureUpperCritical



### Tripplite Supported Events

Event description	Trap name	Common event name
		envTemperatureUpperWarning envHumidityUpperCritical envHumidityUpperWarning
	tlUpsTrapAlarmEntryRemoved	envTemperatureUpperCriticalClear envTemperatureUpperWarningClear envHumidityUpperCriticalClear envHumidityUpperWarningClear



## PDU Connectivity Lost and Restored Events

Power IQ generates PDU connectivity events when connectivity with a PDU changes.

When Health Polling is enabled, the Health Poller and Data Poller work together to report events on these two aspects of connectivity: responding to ping and responding to data collection, each based on the specified intervals. The PDU's health status will change to red when connectivity is lost. Loss of connectivity is a critical severity event.

The Data Poller checks for data connectivity every 15 minutes. If a PDU remains inaccessible for 1 hour, the Connectivity Lost event is generated. Once communication with the PDU is restored, the Connectivity Restored event is generated, and the health status will update.

The Health Poller checks for network connectivity and device operational status by sending a ping and getting a response. The Health Poll process is generally quicker than a data poll.

In Power IQ 5.2 and above, backup IP addresses are supported for PDUs. Health Poller will poll all of the IP addresses available for a PDU. If at least one IP address is reachable, no event will be created. Health Poller will continue to poll the backup IP address until it becomes unreachable. For more information, see [Configuring Backup IP Addresses for PDUs](#).

To configure email notifications for this event, see [Configuring Notification Filters](#) on page 275. Event notifications must be enabled. See [Enable or Disable Event Notifications](#) on page 273.

The event details are in the table.

Event description	Event name
A PDU has not responded to the Health Poller pings after all retries.	Lost Connectivity: Ping Failed
A PDU has not responded to the Data Poller's data collection attempts after all retries.	Lost Connectivity: Data Collection Failed
A PDU becomes responsive to the Data Poller.	Persistent Data Collection Failed Clear
A PDU becomes responsive to the Health Poller pings.	Ping Failed Clear
A PDU has an unsupported device configuration change and cannot be managed anymore.	Unsupported PDU Configuration Change Event

## Rack Thresholds

Rack thresholding creates events and event notifications when a rack reaches a set percentage of the rack's capacity, measured using active power (kW).

Calculations use the maximum active power reading found for each inlet, during each polling period, and the total active power for each circuit associated with an IT device in the rack. The maximum values are summed to determine the rack active power. If the summed value exceeds a set threshold, an event is triggered.

The threshold calculation interval is based on the configured polling interval. For example, with a polling interval of 15 minutes, Power IQ will also run a rack threshold calculation every 15 minutes.

---

*Note: Calculations are estimates. Raritan PDUs with buffered data retrieval ("data logging") enabled will give more accurate maximum readings. Other PDU types may have less accurate maximum readings, which can cause false negatives or false positives.*

---

Warning or critical rack threshold events are not cleared unless all inlets on all PDUs in a rack are responding. A new warning or critical event will still be issued even when a rack has PDUs that are not responding, if the collected readings from the PDUs that are responding are enough to exceed the configured capacity threshold.

You can set rack thresholds under Power IQ settings > Threshold Settings or on rack smart pages. For more information, see:

- [Configuring Default Threshold Settings.](#)
- [Set Rack Capacity and Override Threshold Percentages.](#)

To receive event notifications, configure notification filters to include Rack events. See [Configuring Notification Filters](#) on page 275.

## Configuring Default Threshold Settings

When you enable calculating of rack thresholds, Power IQ calculates each rack's active power at the polling interval. The calculation uses the inlet active power of each PDU. For PDUs with buffered data retrieval, the maximum active power reading is used.

Power IQ uses the threshold percentages to determine when a rack is nearing capacity.

- Default upper warning threshold: 80%
- Default upper critical threshold: 90%

These percentages apply to all racks, unless you set an override at the rack level. See [Set Rack Capacity and Override Threshold Percentages.](#)

Events are triggered when the calculated capacity of the rack equals or exceeds the threshold.

Each rack must have a configured capacity for rack thresholds to be calculated. See [Set Rack Capacity and Override Threshold Percentages.](#)

To edit default thresholds:



1. Click the Settings Tab.
2. Under Appliance Administration, click the Default Thresholds link.
3. On the Default Thresholds page, check the Enable Power, Temperature, and Humidity Thresholding box.

---

*Note: To disable thresholding, uncheck the Enable Power, Temperature, and Humidity Thresholding box. However, if you disable thresholding, a message will display indicating that changing polling options requires the poller software to restart, which may take up to a few seconds. To confirm and continue, click the OK button. Otherwise, click the Cancel button to return to the Default Thresholds page.*

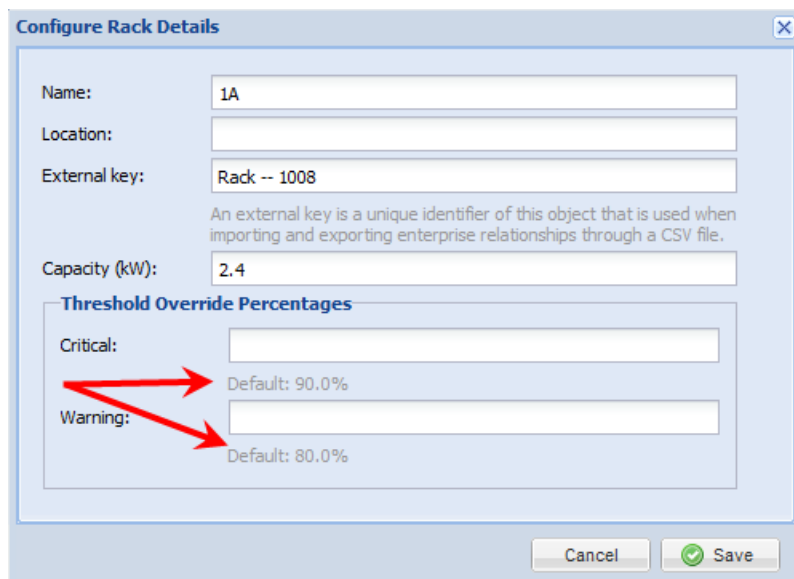
---

4. To edit the lower warning, lower critical, upper warning, and upper critical thresholds, double-click in each cell.
5. Your changes are saved automatically. A green success message will display at the top of the page when a threshold change has successfully been saved.

## Set Rack Capacity and Override Threshold Percentages

Power IQ uses the rack capacity to calculate when a threshold has been exceeded, and generate an event. Power IQ uses the default threshold unless you set a different percentage at the rack level, to override the default setting.

To set capacity and override threshold percentages for multiple racks simultaneously, use the EDM import function. See [Import EDM Object Mappings](#).



**Configure Rack Details**

Name:

Location:

External key:

An external key is a unique identifier of this object that is used when importing and exporting enterprise relationships through a CSV file.

Capacity (kW):

**Threshold Override Percentages**

Critical:  Default: 90.0%

Warning:  Default: 80.0%

Cancel Save

1. In the Data Centers tab, select the rack. The Rack smart view opens.
2. Click Actions, then choose Edit Details.
3. Enter the capacity for the rack in kW.
4. Enter a percentage in the Critical or Warning level fields to override the default global thresholds. When these fields are blank, the defaults are used. See [Configure Default Threshold Settings](#).



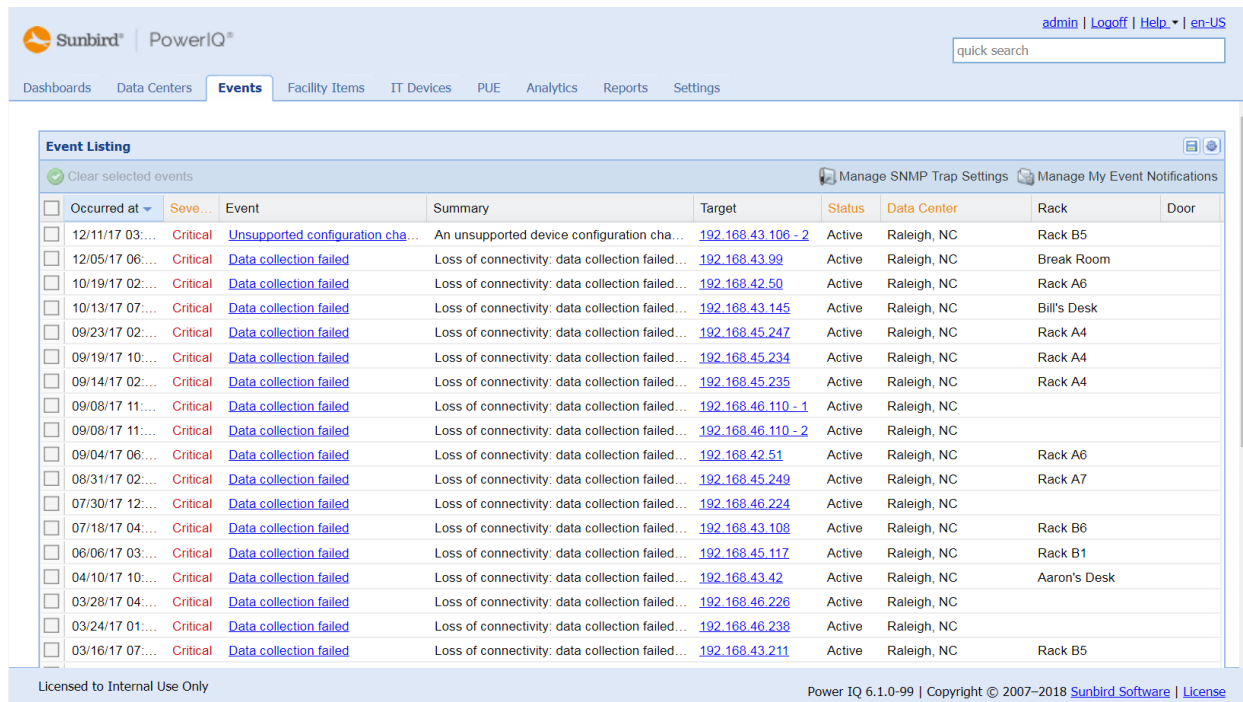
## Viewing Events

The Events tab displays all events that Power IQ receives from configured facility items. For each event, it includes the date- and time-stamped:

- Severity
- Event
- Summary
- IP or Name of the Target Device
- Status

Additional EDM location information is also available on the Event Details pages and the Event Listing on the Events tab. For more information, see *EDM Location Information for Events* on the next page and *EDM Locations in the Events Tab* on page 264.

Each column can be sorted or filtered. See *Filter the Events List* on page 267 for more information.



The screenshot shows the Sunbird PowerIQ interface. At the top, there's a navigation bar with 'admin | Logoff | Help | en-US' and a search box. Below that, a breadcrumb trail shows 'Dashboards > Data Centers > Events'. The main content area is titled 'Event Listing' and contains a table of events. The table has columns for 'Occurred at', 'Severity', 'Event', 'Summary', 'Target', 'Status', 'Data Center', 'Rack', and 'Door'. The events listed are all 'Critical' and 'Data collection failed', with various target IP addresses and locations like 'Rack B5', 'Break Room', 'Rack A6', etc.

Occurred at	Severity	Event	Summary	Target	Status	Data Center	Rack	Door
12/11/17 03:...	Critical	Unsupported configuration cha...	An unsupported device configuration cha...	192.168.43.106 - 2	Active	Raleigh, NC	Rack B5	
12/05/17 06:...	Critical	Data collection failed	Loss of connectivity: data collection failed...	192.168.43.99	Active	Raleigh, NC	Break Room	
10/19/17 02:...	Critical	Data collection failed	Loss of connectivity: data collection failed...	192.168.42.50	Active	Raleigh, NC	Rack A6	
10/13/17 07:...	Critical	Data collection failed	Loss of connectivity: data collection failed...	192.168.43.145	Active	Raleigh, NC	Bill's Desk	
09/23/17 02:...	Critical	Data collection failed	Loss of connectivity: data collection failed...	192.168.45.247	Active	Raleigh, NC	Rack A4	
09/19/17 10:...	Critical	Data collection failed	Loss of connectivity: data collection failed...	192.168.45.234	Active	Raleigh, NC	Rack A4	
09/14/17 02:...	Critical	Data collection failed	Loss of connectivity: data collection failed...	192.168.45.235	Active	Raleigh, NC	Rack A4	
09/08/17 11:...	Critical	Data collection failed	Loss of connectivity: data collection failed...	192.168.46.110 - 1	Active	Raleigh, NC		
09/08/17 11:...	Critical	Data collection failed	Loss of connectivity: data collection failed...	192.168.46.110 - 2	Active	Raleigh, NC		
09/04/17 06:...	Critical	Data collection failed	Loss of connectivity: data collection failed...	192.168.42.51	Active	Raleigh, NC	Rack A6	
08/31/17 02:...	Critical	Data collection failed	Loss of connectivity: data collection failed...	192.168.45.249	Active	Raleigh, NC	Rack A7	
07/30/17 12:...	Critical	Data collection failed	Loss of connectivity: data collection failed...	192.168.46.224	Active	Raleigh, NC		
07/18/17 04:...	Critical	Data collection failed	Loss of connectivity: data collection failed...	192.168.43.108	Active	Raleigh, NC	Rack B6	
06/06/17 03:...	Critical	Data collection failed	Loss of connectivity: data collection failed...	192.168.45.117	Active	Raleigh, NC	Rack B1	
04/10/17 10:...	Critical	Data collection failed	Loss of connectivity: data collection failed...	192.168.43.42	Active	Raleigh, NC	Aaron's Desk	
03/28/17 04:...	Critical	Data collection failed	Loss of connectivity: data collection failed...	192.168.46.226	Active	Raleigh, NC		
03/24/17 01:...	Critical	Data collection failed	Loss of connectivity: data collection failed...	192.168.46.238	Active	Raleigh, NC		
03/16/17 07:...	Critical	Data collection failed	Loss of connectivity: data collection failed...	192.168.43.211	Active	Raleigh, NC	Rack B5	

To view event details:

1. Click the Events tab. The Events Listing displays.
2. Click the links in the Events column to open the Event details pages for different events.

*Note: For Raritan PX, PX2 and EMX, Power IQ also displays the actual measured reading values for the event whenever that information is available in notifications.*

## Events Page Auto-Refresh

The Events panel on the Events tab auto-refreshes every 30 seconds. This simplifies event management for users who want to monitor for new events by watching this tab.

The refresh is based on your current settings for filters, sort order, and page (e.g., page 5 of 20). When the panel is set to sort descending based on "Occurred at," newer events appear at the top when the page is auto-refreshed.

## EDM Location Information for Events

A Location value displays in the details for all non-internal Power IQ services events and notifications, showing the EDM path to the target item and ending with its parent.

**Event Details**

**Event** Active power over critical threshold

**Status** Active **Severity** Critical

**Location** My Data Center / My Floor / My Room

**Occurred at** 01/16/18 03:10:00 PM UTC **Target** [My Rack](#)

**Summary** Active power value of 0.041kW exceeds 2% of 0.001kW

**Cleared events** None

Event Parameters		
Ordinal	Parameter	Value
	activePowerKW	0.041
	timestamp	1516115400000
	activePowerThresholdPercentage	2
	activePowerThresholdValueKW	0.00002
	activePowerRackCapacityKW	0.001
	thresholdingActualSourceCount	3
	thresholdingExpectedSourceCount	3

For internal Power IQ services events, the Location field displays "System."



### Event Details

<b>Event</b>	Trap fuse tripped		
<b>Status</b>	Cleared by system event 01/17/18 06:16:19 AM UTC	<b>Severity</b>	Warning
<b>Location</b>	System		
<b>Occurred at</b>	01/17/18 06:14:48 AM UTC	<b>Target</b>	<a href="#">Power IQ</a>
<b>Summary</b>	Incoming traps have exceeded trap fuse threshold		
<b>Cleared events</b>	None		

[Can](#)

### Event Parameters

Ordinal	Parameter	Value
1	trapFuseThreshold	15
2	trapFuseThresholdWindow	10
3	trapFuseRecoveryPercentage	0.30000001192092896
4	trapRate	38.99721448467967

## EDM Locations in the Events Tab

Additionally, EDM locations are available in the Event Listing on the Events tab. A column for each EDM level that is a possible parent of the target item of the event displays in the Event Listing:

- Data Center
- Floor
- Room
- Aisle
- Row
- Rack





## EDM Location Information in Event Notifications

EDM location information is also available in email and HTTP event notifications.

For email notifications for events, the "Located in" field will display the EDM location.

**From:** Power IQ

**Date:** Friday, December 1, 2017 at 8:42 AM

**Subject:** [CRITICAL] Break Room: Active power over critical threshold

**CRITICAL: Active power value of 1.234kW exceeds 10% of 1.5kW**

Fri 12/01/17 08:40:00

### DETAILS

Generated by [Break Room](#)

Located in Raleigh, NC / Suite 130 / Office

Event is **Active**

Event parameters		
Ordinal	Parameter	Value
	<a href="#">activePowerKW</a>	1.234
	<a href="#">timestamp</a>	1512135600000
	<a href="#">activePowerThresholdPercentage</a>	10
	<a href="#">activePowerThresholdValueKW</a>	0.15
	<a href="#">activePowerRackCapacityKW</a>	1.5
	<a href="#">thresholdingActualSourceCount</a>	1
	<a href="#">thresholdingExpectedSourceCount</a>	1

### ACTIONS

- [View this event](#)
- [Configure your event notifications](#)

Location fields are included in the notification JSON sent to the specified HTTP end point for event notifications. The location fields include:

- data\_center\_name
- data\_center\_id
- floor\_name
- floor\_id
- room\_name
- room\_id
- aisle\_name
- aisle\_id
- row\_name
- row\_id
- rack\_name
- rack\_id
- door\_name
- door\_id

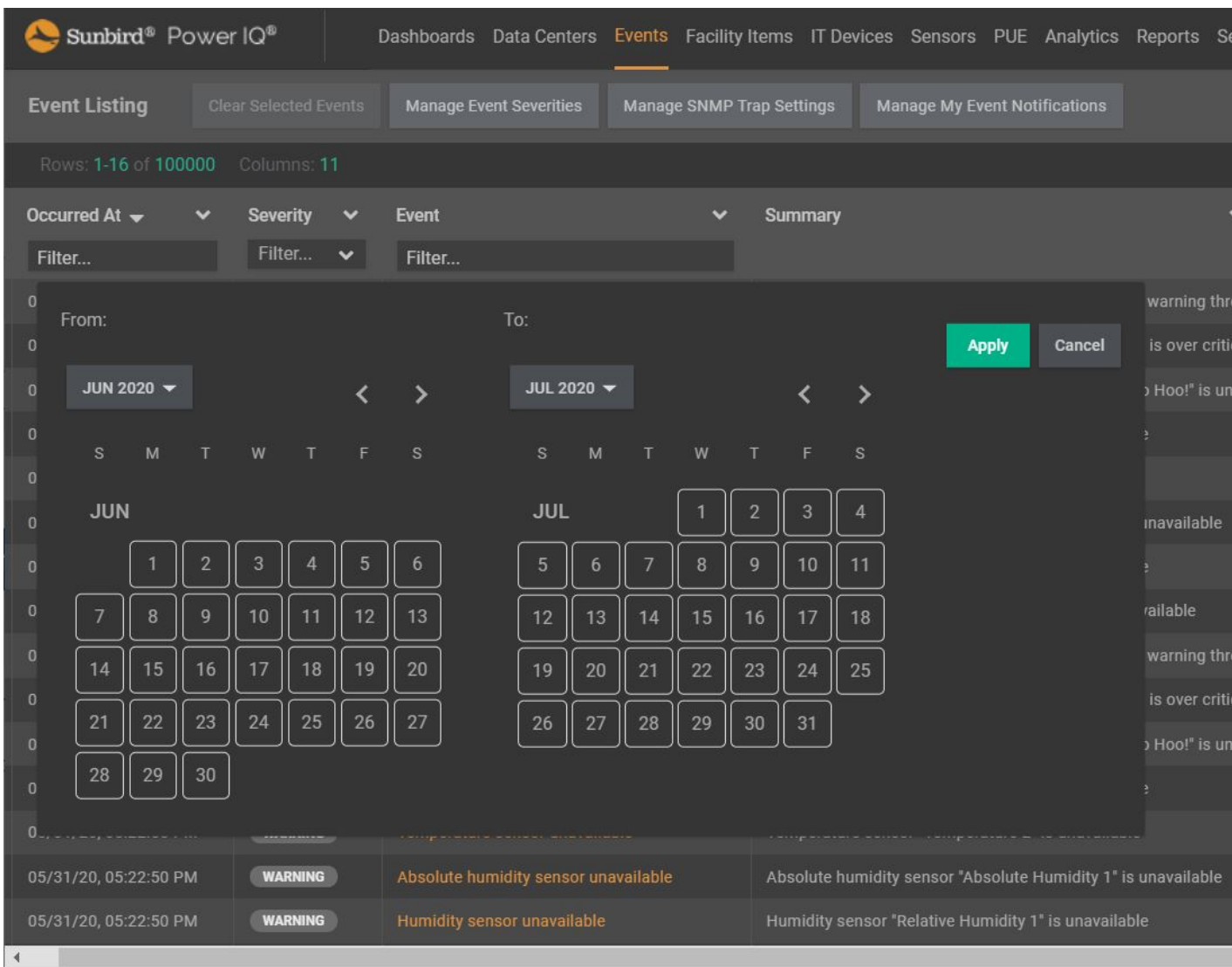


## Filter the Events List

You can customize your view of the Events list by using filters and sorting.

See *Customizing Your View of Facility Items, IT Devices, and Events* on page 182

1. In the Events tab, all events in the system display in a list.
2. All columns of data contain a filter criteria selection. Enter the filter criteria in the filter boxes located below each column header.
3. Filter by date: The Occurred At column accepts valid date ranges. To enter a date range select the Year, Month and Day using the Calendar Selector for both the "From" and "To" dates and click "Apply".



The screenshot shows the Sunbird Power IQ interface. At the top, there are navigation tabs: Dashboards, Data Centers, **Events**, Facility Items, IT Devices, Sensors, PUE, Analytics, Reports, and Settings. Below the navigation is a sub-header for "Event Listing" with buttons for "Clear Selected Events", "Manage Event Severities", "Manage SNMP Trap Settings", and "Manage My Event Notifications".

The main content area shows a table with columns: Occurred At, Severity, Event, and Summary. Each column has a "Filter..." dropdown menu. The "Occurred At" filter is currently open, showing a date range selector. It has "From:" and "To:" fields. The "From:" field is set to "JUN 2020" and the "To:" field is set to "JUL 2020". Below these are two calendar grids for June and July 2020. The "Apply" button is highlighted in green, and the "Cancel" button is in grey.

Below the modal, the table displays two event entries:

Occurred At	Severity	Event	Summary
05/31/20, 05:22:50 PM	WARNING	Absolute humidity sensor unavailable	Absolute humidity sensor "Absolute Humidity 1" is unavailable
05/31/20, 05:22:50 PM	WARNING	Humidity sensor unavailable	Humidity sensor "Relative Humidity 1" is unavailable

4. Filter by event severity: In the Severity column filter, select the checkbox for the severity of events you want to view. Select multiple options as needed.
5. Filter by event name: In the Event column filter, enter an event name to view.
6. Filter by PDU associated with the event: In the Associated PDU column filter, enter a PDU name or IP address to view events associated with a PDU.
7. Filter by event status: In the Status column filter, select the checkbox for the status of events you want to view, either active, or cleared. Select multiple options as needed.

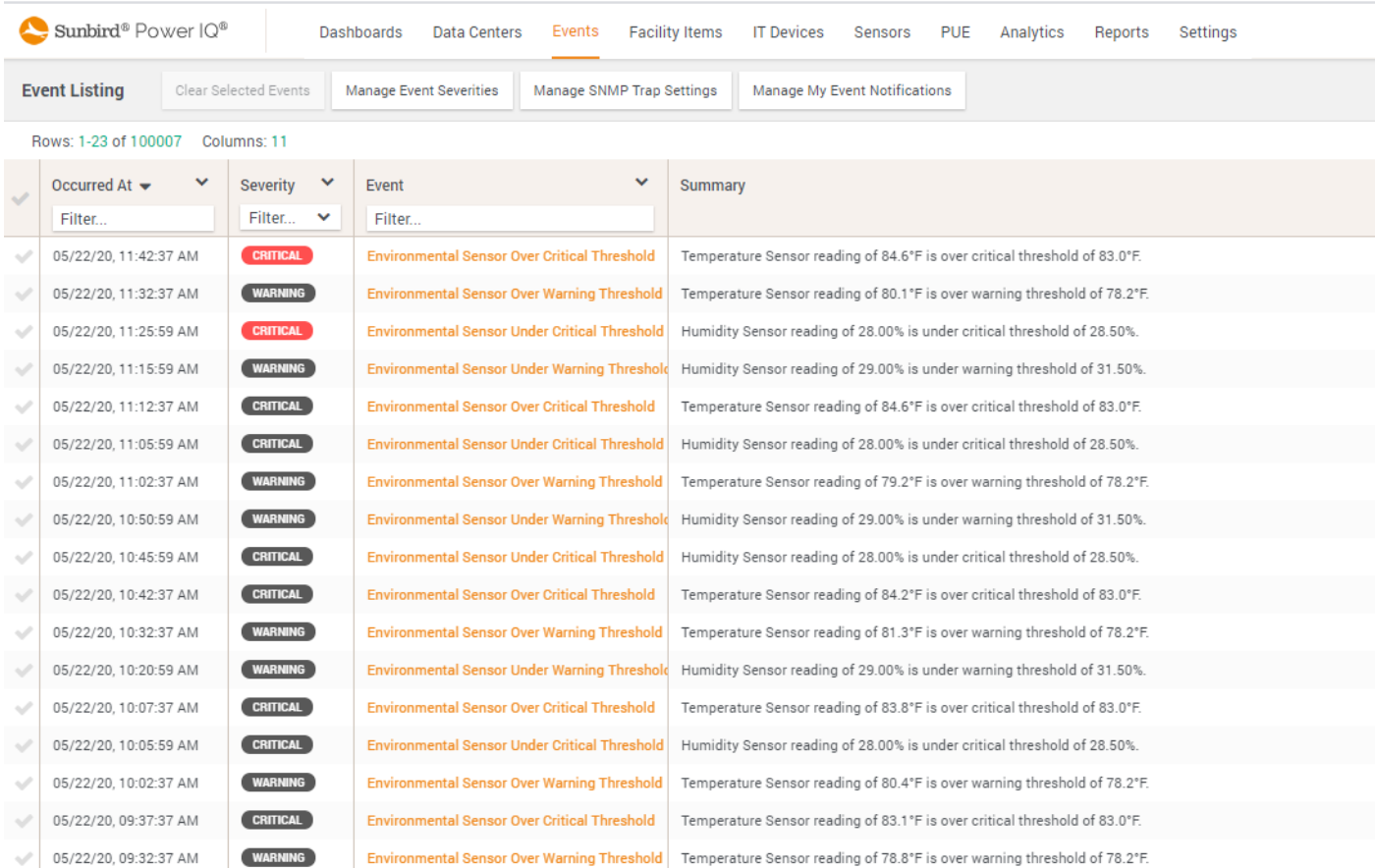


## Exporting the Events List to CSV

Export the Events list to create a CSV file that contains all the information in the grid on the Events tab.

If you have applied filters, the same filters will apply to the exported information. Export includes all records matching the filter criteria. The export is not limited by the number of events shown in the list grid.

1. In the Events tab, click the Settings icon in the upper right corner of the grid.
2. Select the Export Grid Data to CSV option.



✓	Occurred At	Severity	Event	Summary
✓	05/22/20, 11:42:37 AM	CRITICAL	Environmental Sensor Over Critical Threshold	Temperature Sensor reading of 84.6°F is over critical threshold of 83.0°F.
✓	05/22/20, 11:32:37 AM	WARNING	Environmental Sensor Over Warning Threshold	Temperature Sensor reading of 80.1°F is over warning threshold of 78.2°F.
✓	05/22/20, 11:25:59 AM	CRITICAL	Environmental Sensor Under Critical Threshold	Humidity Sensor reading of 28.00% is under critical threshold of 28.50%.
✓	05/22/20, 11:15:59 AM	WARNING	Environmental Sensor Under Warning Threshold	Humidity Sensor reading of 29.00% is under warning threshold of 31.50%.
✓	05/22/20, 11:12:37 AM	CRITICAL	Environmental Sensor Over Critical Threshold	Temperature Sensor reading of 84.6°F is over critical threshold of 83.0°F.
✓	05/22/20, 11:05:59 AM	CRITICAL	Environmental Sensor Under Critical Threshold	Humidity Sensor reading of 28.00% is under critical threshold of 28.50%.
✓	05/22/20, 11:02:37 AM	WARNING	Environmental Sensor Over Warning Threshold	Temperature Sensor reading of 79.2°F is over warning threshold of 78.2°F.
✓	05/22/20, 10:50:59 AM	WARNING	Environmental Sensor Under Warning Threshold	Humidity Sensor reading of 29.00% is under warning threshold of 31.50%.
✓	05/22/20, 10:45:59 AM	CRITICAL	Environmental Sensor Under Critical Threshold	Humidity Sensor reading of 28.00% is under critical threshold of 28.50%.
✓	05/22/20, 10:42:37 AM	CRITICAL	Environmental Sensor Over Critical Threshold	Temperature Sensor reading of 84.2°F is over critical threshold of 83.0°F.
✓	05/22/20, 10:32:37 AM	WARNING	Environmental Sensor Over Warning Threshold	Temperature Sensor reading of 81.3°F is over warning threshold of 78.2°F.
✓	05/22/20, 10:20:59 AM	WARNING	Environmental Sensor Under Warning Threshold	Humidity Sensor reading of 29.00% is under warning threshold of 31.50%.
✓	05/22/20, 10:07:37 AM	CRITICAL	Environmental Sensor Over Critical Threshold	Temperature Sensor reading of 83.8°F is over critical threshold of 83.0°F.
✓	05/22/20, 10:05:59 AM	CRITICAL	Environmental Sensor Under Critical Threshold	Humidity Sensor reading of 28.00% is under critical threshold of 28.50%.
✓	05/22/20, 10:02:37 AM	WARNING	Environmental Sensor Over Warning Threshold	Temperature Sensor reading of 80.4°F is over warning threshold of 78.2°F.
✓	05/22/20, 09:37:37 AM	CRITICAL	Environmental Sensor Over Critical Threshold	Temperature Sensor reading of 83.1°F is over critical threshold of 83.0°F.
✓	05/22/20, 09:32:37 AM	WARNING	Environmental Sensor Over Warning Threshold	Temperature Sensor reading of 78.8°F is over warning threshold of 78.2°F.

3. The following is the list of exported columns:

- Occurred At
- Cleared By
- Cleared At
- Notification Status
- HTTP Notification Status



- Created At
- Region Name
- Country Name
- Territory
- Name
- City Name
- Data Center Name
- Floor Name
- Room Name
- Aisle Name
- Row Name
- Rack Name
- Door Name
- Region ID
- Country ID
- Territory ID
- City ID
- Data Center ID
- Floor ID Room ID
- Aisle ID
- Row ID
- Rack ID
- Door ID
- Type Seen in Events
- ID Seen in Events
- Name Summary
- Severity Code
- Severity
- Name Seen in Events



## Clearing Events

Events can be automatically cleared by other events, or you can clear them manually.

1. In the Events tab, select the checkbox for an event in the list. Select multiple checkboxes to choose multiple events to clear.
2. Click Clear Selected Events.
3. To clear an event from the Events details page:
4. In the Events tab, click the link for an event to open the Event details page. The link to open Event details is in the Events column.
5. In the Event details page, click "Clear this event".



## Automatic Delete of Cleared Events

Power IQ automatically deletes cleared events from the system hourly.

Cleared events will only be deleted when there are more than 100,000 events in the database.

The oldest events in the system are eligible to be deleted first. If there are 100,000 or fewer events in the database at the hourly check, then no events will be deleted.

Only cleared events are eligible to delete. Power IQ will not delete active events.

You can access events and event configurations via ODBC views. If you need to keep a log of all generated events, run a script periodically that retrieves event data via ODBC before Power IQ deletes cleared events automatically.

Events generated by dynamic plugins are not automatically cleared. See *Event Clearing* on page 684.





## Enable or Disable Event Notifications

### Enable or Disable Event Notifications via Email

If you would like to receive email notification for events that Power IQ receives, you must enable event notifications. When event notification is enabled, Power IQ sends an email message for every event. Set up notification filters if you want to receive emails for every event. See *Configuring Notification Filters* on page 275.

1. In the Settings tab, click Power IQ Settings in the Application Administration section.
2. In the Event Notification Settings box, select the "Enable e-mail delivery of event notifications" checkbox to enable event notifications.

or

3. Deselect the "Enable e-mail delivery of event notifications" checkbox to disable event notifications.
4. Click Save.

After enabling event notifications, the "Configure event notifications for your account" link appears. Click this link to use filters to manage your notifications.

After enabling, configure the SMTP settings for your system. See *SMTP Server Settings* on page 277

You can also receive event notifications via JSON. For more information, see *Enable or Disable Event Notifications via JSON* on the facing page.



## Enable or Disable Event Notifications via JSON

In addition to event notifications via email, you can also receive event notifications via JSON over HTTP or HTTPS through an endpoint that you choose. Only Site Administrators can enable or disable event notification settings within Power IQ.

1. In the Settings tab, click Power IQ Settings in the Application Administration section.
2. In the Event Notification Settings box, select the "Enable HTTP delivery of event notifications" checkbox to enable event notifications via JSON.  
or
3. Deselect the "Enable HTTP delivery of event notifications" checkbox to disable event notifications via JSON.
4. If enabling, provide the following information:
  - a. Endpoint (required)
  - b. Username (optional)
  - c. Password (optional)
5. Click the Save Event Notification Settings button to save your changes.

### Event Notification Settings

Enable e-mail delivery of event notifications

Enable HTTP delivery of event notifications

Endpoint:

Username:

Password:

Confirm Password:

---

*Note: The endpoint is required and must start with http:// or https://. Username and password are optional to allow you to set up basic authentication for your endpoint (if preferred).*

---

When event notifications via JSON are enabled or disabled, the changes will be captured in the system audit log.

Send events using the same format as when retrieving them via the API. For more info, see the [Power IQ API Guide](#).



## Configuring Notification Filters

When event notification is enabled, Power IQ sends an email message for every event. Set up notification filters if you want to receive emails for every event.

1. Click your username link, next to the Logoff link in the upper right corner of Power IQ.
2. Click Manage Event Notifications.
3. Click "Add a filter."
4. Select the Enable this Filter checkbox.
5. Select the Severity levels of the events for which you want Power IQ to send email notifications: Critical, Warning, and Informational.
6. Select the Sources of the events for which you want Power IQ to send email notifications: Outlet, Inlet, Circuit Breaker, Environmental Sensors, PDU Connectivity, Rack, and Internal Power IQ Services.
  - PDU connectivity events is for failed communication events reported by Health or Data Poller.
  - Rack sources is for rack capacity threshold events.
  - Power IQ Internal services is for Enterprise Power IQ extraction failure events.
7. Select "Send notifications for all PDUs" to receive email notifications for all PDUs that meet the Severity level and Source criteria selected.

or

8. Select "Send notifications only for the following PDUs" and then enter IP addresses for PDUs or values for Custom Fields associated with PDUs.
9. Enter a value in either or both custom fields to receive email notifications only for PDUs that have those custom field values assigned. Custom Field 1 and Custom Field 2 may be renamed in your system. See [Configuring Custom Fields](#).
10. Click Add to enter the IP addresses of the PDUs for which email notifications should be sent. Enter a partial IP address to specify a group of PDUs in sequence.

For example, enter 192.168.45 to specify all IP addresses beginning with that sequence. Click See Matching PDUs to verify the list of PDUs for which Power IQ will send email notifications.

---

*Note: IP address filters do not apply to rack events or internal Power IQ service events.*

---

11. Click Save.



## Managing Event Notifications for Users

Users with the Site Administrator role can manage other user's event notification settings.

1. In the Settings tab, click User Accounts in the Authorization and Authentication section.
2. Click the username link for the user whose event notification settings you want to view.
3. Click "Manage event notifications."
4. Change the settings as needed and click Save. See [Configure Notification Filters](#) for details.



## SMTP Server Settings

Configure the SMTP server settings to determine how email notifications are sent when Power IQ receives events.

You must reboot Power IQ after changing the encryption method in the SMTP server settings. See [Shutting Down and Restarting Power IQ](#).

1. In the Settings tab, click Server Settings in the Appliance Administration section.
2. In the SMTP Server Settings section, enter the basic settings for the SMTP server.
  - Server name/IP address: Enter the email server's domain name or IP address.
  - Port: The default port is 25. Change this number if you use a different port.
  - "Sender email address": Enter the Power IQ's IP address.
  - In the Authentication and Encryption Settings section, select the method for your SMTP server.
  - Authentication type: Select None or Password. If you select Password, enter the Username, Password, and Confirm password.
3. Select an Encryption method.
4. Click Send a Test Email to enter your email address and try sending an email message using the settings you configured. If you see a success message, click Save SMTP Settings.
5. If you see a failure message, edit your settings and try again. A password must be entered in the page to test the settings. Once saved, passwords do not display in the page for security.



## Events That Clear Quickly

If two events occur, active and cleared, within 30 seconds, only one event notification is sent, for the cleared event. For example, if a PDU experiences a temperature spike, but the temperature returns to normal within one second, only the event notification for the cleared event is sent.

The event notification contains information indicating when the original event occurred and when that event was cleared.



## SNMP Trap Filtering and Event-Based Trap Forwarding

In Power IQ 5.2 and above, users with the global Site Administrator role are able to specify the traps that they want to discard or filter out (trap filtering) and to forward SNMP traps from PDUs to other network devices (trap forwarding) based on Power IQ events.

The SNMP Trap Settings panel is accessible through the Event Listings page or on the Power IQ Settings page. For detailed instructions, see *Accessing the SNMP Trap Settings Panel* on the facing page.

Individual filters can be created for both trap forwarding and trap filtering. For more information, see *Managing Individual Trap Drop Filters* on page 284 and *Managing Individual Trap Forwarding Filters* on page 294.

---

*Note: Trap forwarding is supported only for SNMPv1/v2 traps. SNMPv3 trap forwarding not supported.*

---



## Accessing the SNMP Trap Settings Panel

SNMP trap settings can be configured by users with the Site Administrator role from the SNMP Trap Settings panel. Users can access the SNMP Trap Settings panel through the Event Listings page or on the Power IQ Settings page.

- From the Event Listings page: Click the Manage SNMP Settings button and icon in the upper right corner of the Event Listings grid. A new page with the SNMP Trap Settings panel will load.
- From the Power IQ Settings page: Click the Settings tab > Power IQ Settings > SNMP Trap Settings to load the SNMP Trap Settings panel.

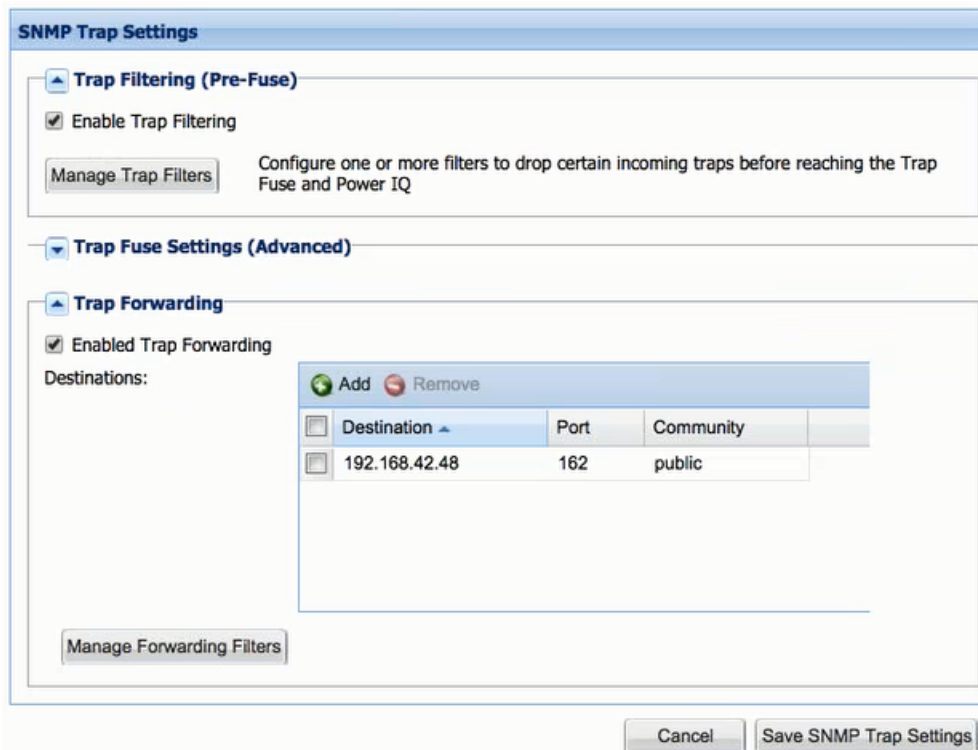




## SNMP Trap Settings Panel

The SNMP Trap Settings panel contains three distinct subpanels that can be updated independently of each other. For more information on how to access SNMP Trap Settings in Power IQ, see [Accessing the SNMP Trap Settings Panel](#).

Below is an example screenshot of the SNMP Trap Settings panel, followed by the details of each subpanel.



**SNMP Trap Settings**

**Trap Filtering (Pre-Fuse)**

Enable Trap Filtering

Configure one or more filters to drop certain incoming traps before reaching the Trap Fuse and Power IQ

**Trap Fuse Settings (Advanced)**

**Trap Forwarding**

Enabled Trap Forwarding

Destinations:

<input type="checkbox"/> Destination	Port	Community
<input type="checkbox"/> 192.168.42.48	162	public

### Trap Filtering (Pre-Fuse)

The Trap Filtering (Pre-Fuse) sub-panel is located at the top of the panel and provides controls for enabling/disabling trap filtering, which allows you to specify which traps you wish to filter out or discard, and for configuring specific individual trap filters. You can configure trap filters by clicking the Manage Trap Filters button, which will take you to the Manage Trap Drop Filters page. For more information, see [Managing Individual Trap Drop Filters](#).

*Note: "Pre-Fuse" refers to the fact that traps that are filtered out do not count toward tripping the fuse. They are dropped before the fuse. For more information, see [Trap Fuse Handling](#) on page 288.*

### Trap Fuse Settings (Advanced)

The Trap Fuse Settings (Advanced) subpanel is located in middle of the SNMP Trap Settings panel and provides controls for you to customize the settings for Power IQ's trap fuse. For more information, see [Trap Fuse Handling](#) on page 288.

---

*Note: This section is expandable/collapsible and will be collapsed by default when the SNMP Trap Settings panel is loaded initially.*

---

## Trap Forwarding

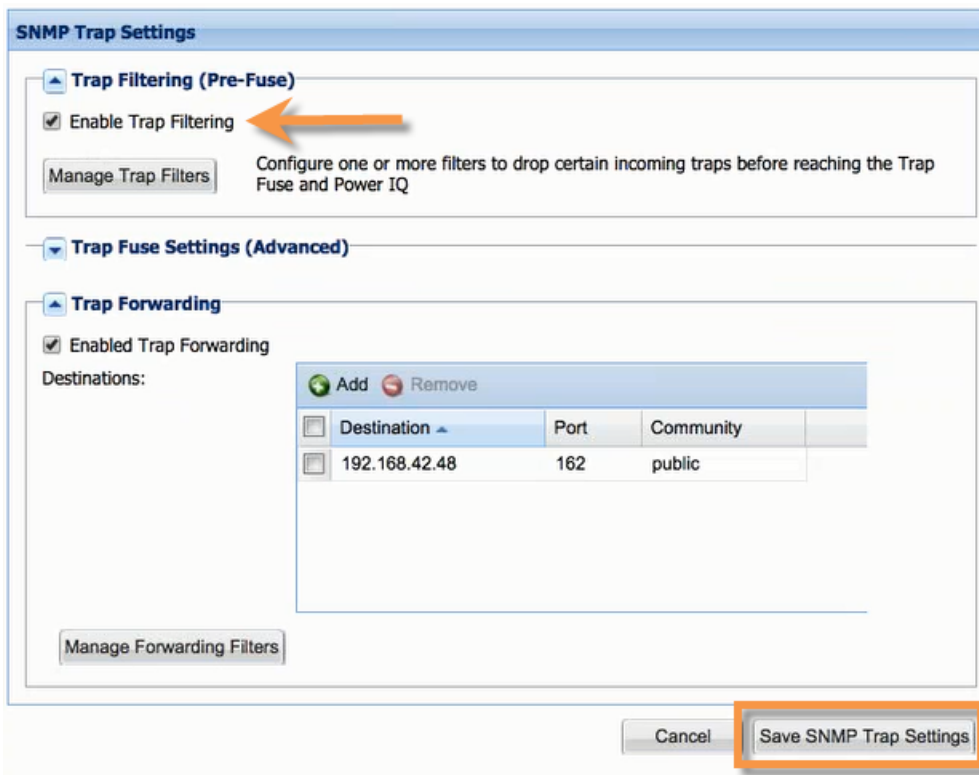
The Trap Forwarding subpanel is located at the bottom of the SNMP Trap Settings panel and provides controls for enabling/disabling trap forwarding and for configuring specific individual event-based trap forwarding filters. You can configure trap forwarding filters by clicking the Manage Forwarding Filters button, which will take you to the Manage Trap Forwarding Filters page. For more information, see *Managing Individual Trap Forwarding Filters* on page 294.



## Enabling/Disabling Trap Filtering

Users with the Site Administrator role can enable/disable trap drop filtering from the SNMP Trap Settings panel.

1. Click Events > Manage SNMP Settings to load a new page with the SNMP Trap Settings panel.
2. In the Trap Filtering (Pre-Fuse) subpanel, check/uncheck the box labeled Enable Trap Filtering.
  - a. Check the Enable Trap Filtering box to enable trap filtering.
  - b. Uncheck the Enable Trap Filtering box to disable trap filtering.
3. Click the Save SNMP Trap Settings button at the bottom of the SNMP Trap Settings panel to save your changes.



**SNMP Trap Settings**

**Trap Filtering (Pre-Fuse)**

Enable Trap Filtering

Configure one or more filters to drop certain incoming traps before reaching the Trap Fuse and Power IQ

**Trap Fuse Settings (Advanced)**

**Trap Forwarding**

Enabled Trap Forwarding

Destinations:

<input type="checkbox"/>	Destination	Port	Community
<input type="checkbox"/>	192.168.42.48	162	public

*Note: By default, trap forwarding is disabled.*

## Managing Individual Trap Drop Filters

You can enable/disable and add/edit/delete individual trap filters from the Manage Trap Drop Filters page, which is accessible by clicking the Manage Trap Filters button (via the SNMP Trap Settings panel > Trap Filtering (Pre-Fuse) subpanel).

Trap filters are organized by name, which is in bold at the top of the trap filter's details. Whether the trap filter is enabled or disabled will be indicated in parentheses to the right of the trap filter name.

Editable fields on the Manage Trap Drop Filters page include the Filter Name, Trap OID, and Source IP. Traps can be filtered by Trap OID and Source IP. For more information on filtering criteria for the Trap OID and Source IP, see *Trap Drop Filtering Criteria* on page 287.

The details of each trap filter can be expanded/collapsed by clicking the button next to the trap filter name. By default, only the first filter will be expanded when the page is initially loaded; all other filters will be collapsed. To expand/collapse the details of all trap filters, click Expand All/Collapse All in the upper-left corner.

### Manage Trap Drop Filters

Expand All Collapse All Save Back to SNMP Trap Settings

**⚠** Incoming traps will be dropped (discarded) when they match the criteria of any of the filters below. If no filters are defined, no traps will be dropped.

---

**▶ Drop Outlet Power Control traps From the .43 subnet (enabled)**

Enable this filter

Filter Name:

Trap OID:

Source IP: Add Remove

IP Address Patterns ▲

192.168.43.\*

## Adding a New Trap Filter

1. On the Manage Trap Drop Filters page, click the Add a filter link and icon.
2. A new filter with its details expanded will display.
3. Edit the Filter Name: The Filter Name can be edited by making your changes to the Filter Name text field.

4. Edit the Trap OID: The Trap OID can be specified by making your changes to the Trap OID text field. The Trap OID field supports a single wild card in the last position.  
For example: 1.3.6.1.4.1.13742.6.\*
5. Add/Edit/Delete Source IP address patterns: One or more Source IP address patterns can be specified. Click the Add button to add a new Source IP address. You can edit or delete Source IP addresses once they have been added. Both IPv4 and IPv6 addresses are supported.
  - a. Add a New Source IP Address Pattern: Click the Add link and icon next to Source IP. A new IP Address Pattern will be added to the box. The default IP displayed will be 0.0.0.0. Click the new IP Address Pattern to edit it with your desired IP.
  - b. Edit a Source IP Address: Simply click the Source IP to edit it. The Trap IP address field supports a single wild card in the last position.  
For example: 10.10.10.\*
  - c. Delete a Source IP Address: Click the IP address pattern to select it, then click the Remove button. The IP address pattern will be deleted. If no IP address is selected, the Remove button will be grayed out.
6. Optional: To generate a list of PDUs matching your filtering criteria, click the See Matching PDUs button. For more information on filtering the Trap OID and Source IP, see Trap Filtering Criteria.
7. On the Manage Trap Drop Filter panel, click the Save button to save your changes.
8. Click the Back to SNMP Trap Settings link to return to the SNMP Trap Settings panel.

## Editing an Existing Trap Filter

1. On the Manage Trap Drop Filters page, click the trap filter name to expand the filter details.
2. Edit the Filter Name: The Filter Name can be edited by making your changes to the Filter Name text field.
3. Edit the Trap OID: The Trap OID can be edited by making your changes to the Trap OID text field.
4. Add/Edit/Delete Source IP addresses: Existing Source IP address patterns can be edited or deleted, or you can add a new Source IP. Both IPv4 and IPv6 addresses are supported.
  - a. Add a New Source IP Address Pattern: Click the Add link and icon next to Source IP. A new IP Address Pattern will be added to the box. The default IP displayed will be 0.0.0.0. Click the new IP Address Pattern to edit it with your desired IP.
  - b. Edit a Source IP Address: Simply click the Source IP to edit it.
  - c. Delete a Source IP Address: Click the IP address pattern to select it, then click the Remove button. The IP address pattern will be deleted. If no IP address is selected, the Remove button will be grayed out.
5. Optional: To generate a list of PDUs matching your filtering criteria, click the See Matching PDUs button. For more information on filtering the Trap OID and Source IP, see Trap Filtering Criteria.
6. On the Manage Trap Drop Filter panel, click the Save button to save your changes.
7. Click the Back to SNMP Trap Settings link to return to the SNMP Trap Settings panel.

## Deleting an Existing Trap Filter

1. On the Manage Trap Drop Filters page, click the trap filter name to expand the filter details.
2. Click the Remove button.
3. The trap filter will be deleted.



4. On the Manage Trap Drop Filter panel, click the Save button to save your changes.
5. Click the Back to SNMP Trap Settings link to return to the SNMP Trap Settings panel.



## Trap Drop Filtering Criteria

Incoming traps are discarded or filtered out based on criteria defined in each filter. Filters must be defined for traps to be discarded.

Traps can be filtered by trap OID and/or IP pattern. Filtering for both the trap OID and the IP address can be based on an exact match or a partial match via wildcard. If both the trap OID and IP address are specified in a filter, then filtering occurs only if the trap matches both criteria.

Power IQ supports a single asterisk (\*) as the wildcard character. The wildcard must be the last character of the trap OID or IP address. If no wildcard is specified, then filtering occurs based on an exact match of the filtering criteria.

For more information, see *Managing Individual Trap Drop Filters* on page 284.



## Trap Fuse Handling

The trap fuse is a precautionary measure in place to protect Power IQ and guard against performance issues caused by an excessive amount of incoming traps (a trap storm).

Power IQ receives traps, processes them, and, when applicable, converts the traps into events. The trap fuse is tripped if the rate of the incoming traps exceeds the configured threshold. When the trap fuse is tripped, any new traps received will be discarded until the incoming trap rate drops to an acceptable rate, and the fuse is reset.

By default, the trap fuse is tripped when the sustained incoming trap rate exceeds 15 traps per second for 10 seconds, and a tripped trap fuse will reset (resume processing traps) when the incoming trap rate drops 30% below the configured traps/second threshold.

Users with the Site Administrator role can customize the default values for Power IQ's trap fuse under SNMP Trap Settings > Trap Fuse Settings (Advanced). For more information, see *Configuring Trap Fuse Settings* on the next page.

---

*Note: The trap rate is recalculated and the fuse state reevaluated every time a trap is received. Therefore, a tripped trap fuse will be reset only after a subsequent trap is received, and the trap rate is determined to have dropped sufficiently.*

---

When the fuse is tripped, Power IQ will create an event indicating that the fuse has been tripped and including the trap rate. When the fuse is reset, the event will be cleared.

---

*Note: Although traps from facility items in Maintenance Mode will be dropped (they will not be processed), they will still impact the trap fuse and could contribute to the fuse tripping resulting in other traps being dropped.*

---





## Configuring Trap Fuse Settings

Power IQ utilizes an event/trap fuse that trips when the rate of traps received exceeds the maximum allowed. Power IQ will stop processing traps until after the fuse has been reset. For more information, see *Trap Fuse Handling* on the previous page.

Users with the Site Administrator role can configure trap fuse settings from the SNMP Trap Settings panel.

**SNMP Trap Settings**

**Trap Filtering (Pre-Fuse)**

Enable Trap Filtering
 

Configure one or more filters to drop certain incoming traps before reaching the Trap Fuse and Power IQ

**Trap Fuse Settings (Advanced)**

**⚠** You should only change these settings if the fuse is tripping too often. Changing these settings could adversely affect the performance of Power IQ. Please consult the User Guide or contact Technical Support for guidance.

Trap rate to trip fuse:

Duration for measuring trap rate:

Drop in rate to reset fuse:

Trap fuse will be tripped when Power IQ receives 15 or more traps per seconds for the past 10 seconds (i.e. 150 traps over 10 seconds). The fuse will be reset when the rate drops 30% (i.e. less than 11 traps per second)

**Trap Forwarding**

Enabled Trap Forwarding
 

Destinations:

Destination	Port	Community
<input type="checkbox"/> 192.168.42.48	162	public

1. Click Events > Manage SNMP Settings to load a new page with the SNMP Trap Settings panel.
2. In the Trap Fuse Settings (Advanced) subpanel, change the default values to your desired values.
  - a. Trap rate to trigger fuse: The number of traps received per second that is required to trip the fuse. The default is 15 with a maximum of 999.
  - b. Duration for measuring trap rate: The length of time in seconds over which the number of traps received is divided. The default is 10 seconds with a maximum of 300 seconds.
  - c. Drop in rate to reset fuse: The percentage drop in the rate of traps received to reset the fuse. The default is 30%.

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3. Optional: To restore the default values, click the Restore Defaults button.
4. Click the Save SNMP Trap Settings button at the bottom of the SNMP Trap Settings panel to save your changes.

---

*Note: Editing these settings is not recommended unless the trap fuse is tripping often. For help with determining the appropriate values for your environment, please contact Sunbird Technical Support.*

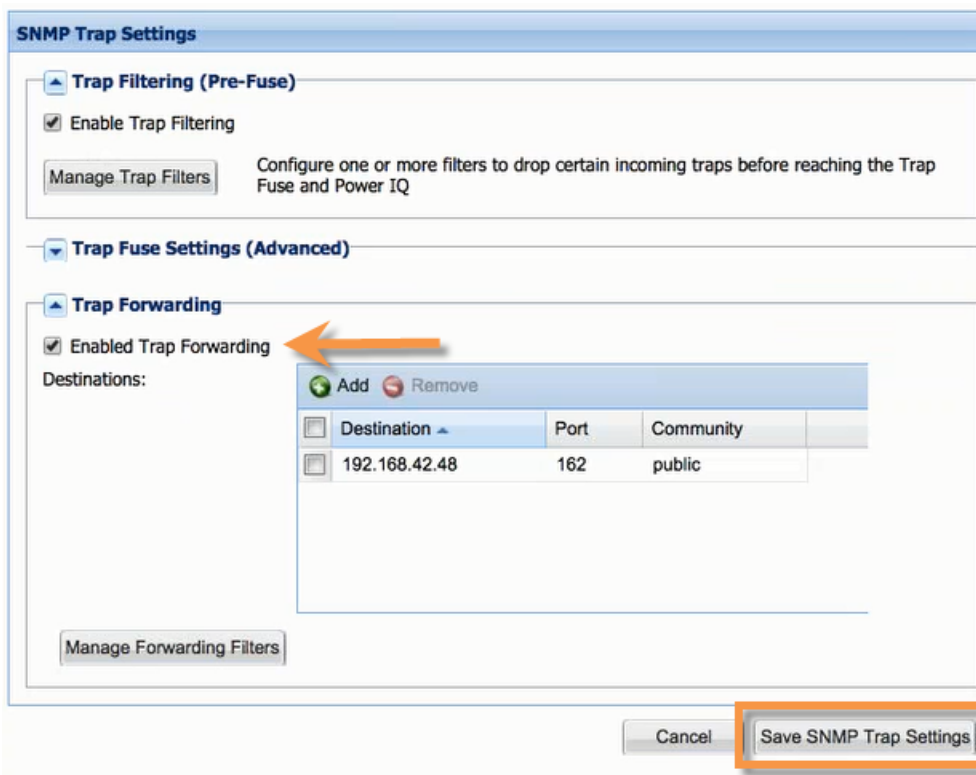
---



## Enabling/Disabling Event-Based Trap Forwarding

Users with the Site Administrator role can enable/disable trap forwarding from the SNMP Trap Settings panel.

1. Click the Events tab > Manage SNMP Settings to load a new page with the SNMP Trap Settings panel.
2. In the Trap Forwarding subpanel, check/uncheck the box labeled Enable Trap Forwarding.
  - a. Check the Enable Trap Forwarding box to enable trap forwarding.
  - b. Uncheck the Enable Trap Forwarding box to disable trap forwarding.
3. Click the Save SNMP Trap Settings button at the bottom of the SNMP Trap Settings panel to save your changes.



**SNMP Trap Settings**

**Trap Filtering (Pre-Fuse)**

Enable Trap Filtering

[Manage Trap Filters](#) Configure one or more filters to drop certain incoming traps before reaching the Trap Fuse and Power IQ

**Trap Fuse Settings (Advanced)**

**Trap Forwarding**

Enabled Trap Forwarding

Destinations:

<input type="checkbox"/>	Destination	Port	Community
<input type="checkbox"/>	192.168.42.48	162	public

[Add](#) [Remove](#)

[Manage Forwarding Filters](#)

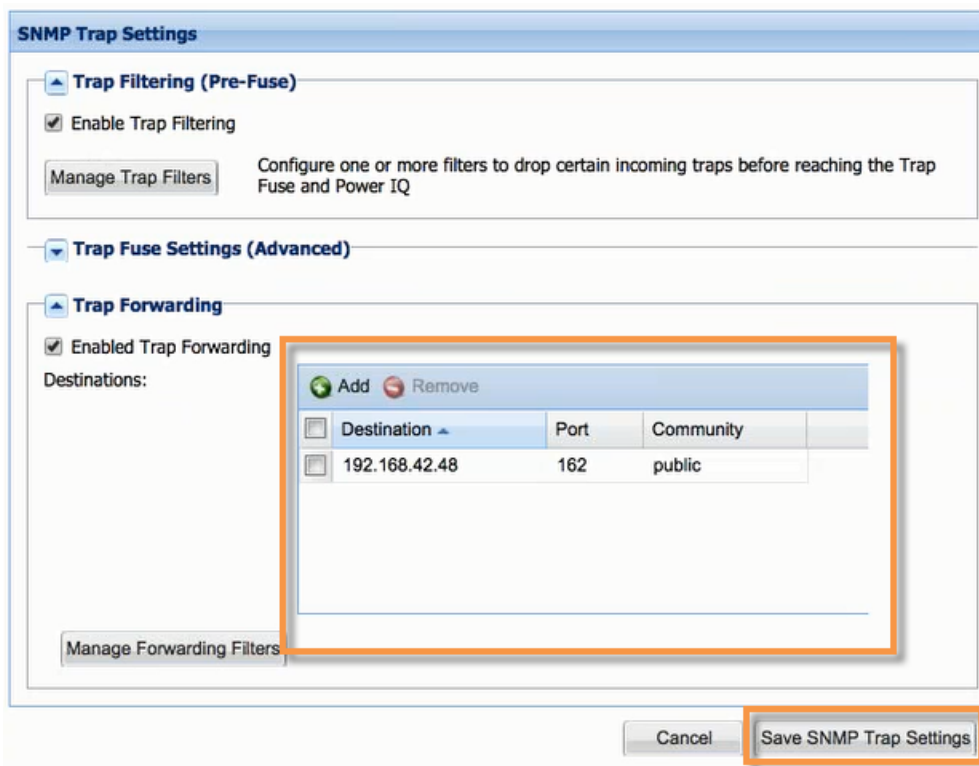
[Cancel](#) [Save SNMP Trap Settings](#)

## Configuring Trap Forwarding Destinations

Once trap forwarding is enabled, users with the Site Administrator role are able to configure up to four IP addresses as trap forwarding destinations. Trap destinations must be unique. Both IPv4 and IPv6 addresses are supported.

To enable trap forwarding, select the Enable Trap Forwarding box via the SNMP Trap Settings panel > Trap Forwarding sub-panel.

*Note: To edit trap destinations, trap forwarding must be enabled. If trap forwarding is disabled, the trap destinations will be grayed out and will not be editable.*



**SNMP Trap Settings**

**Trap Filtering (Pre-Fuse)**

Enable Trap Filtering

[Manage Trap Filters](#) Configure one or more filters to drop certain incoming traps before reaching the Trap Fuse and Power IQ

**Trap Fuse Settings (Advanced)**

**Trap Forwarding**

Enabled Trap Forwarding

Destinations:

Destination	Port	Community
<input type="checkbox"/> 192.168.42.48	162	public

[Add](#) [Remove](#)

[Manage Forwarding Filters](#)

[Cancel](#) [Save SNMP Trap Settings](#)

### Adding a New Trap Forwarding Destination

1. Click the Events tab > Manage SNMP Settings to load a new page with the SNMP Trap Settings panel.
2. In the Trap Forwarding subpanel, click the Add link and icon next to Destinations.
3. Destination: A new destination will be added. The default IP displayed will be 0.0.0.0. Click the new destination to edit it with your desired IP address.
4. Port: Click the field under Port to edit the field with your desired port. Power IQ will accept non-standard ports for this field.
5. Community: Click the field under Community to edit the field with your desired community string.
6. Click the Save SNMP Trap Settings button to save your changes.

## Editing an Existing Trap Destination

1. Click the Events tab > Manage SNMP Settings to load a new page with the SNMP Trap Settings panel.
2. In the Trap Forwarding subpanel, click the destination you wish to edit.
3. Destination: Click the destination to edit it with your desired IP address.
4. Port: Click the field under Port to edit the field with your desired port. Power IQ will accept non-standard ports for this field.
5. Community: Click the field under Community to edit the field with your desired community string.
6. Click the Save SNMP Trap Settings button to save your changes.

## Deleting an Existing Trap Destination

1. Click the Events tab > Manage SNMP Settings to load a new page with the SNMP Trap Settings panel.
2. In the Trap Forwarding subpanel, click the destination you wish to delete to select it. If no destination is selected, the Remove button will be grayed out.
3. Click the Remove button. The destination will be removed.
4. Click the Save SNMP Trap Settings button to save your changes.



## Managing Individual Trap Forwarding Filters

Users with the global Site Administrator role can enable/disable and add/edit/delete individual trap forwarding filters from the Manage Trap Forwarding Filters page, which is accessible by clicking the Manage Forwarding Filters button (in the Trap Forwarding subpanel of the SNMP Trap Settings panel).

When a trap is received, Power IQ will convert the trap and generate an event. If trap forwarding is enabled and the criteria for forwarding traps is defined, Power IQ will evaluate the event against the defined criteria. If the event matches the criteria, Power IQ will forward the original trap that generated the event.

The following severity and source criteria can be defined for trap forwarding filters:

- **Severity:** Available options include Critical, Warning, and/or Information.
- **Source:** Available options include PDU, Inlet, Transfer Switch, UPS, Circuit Breaker, Circuit, Outlet, Environmental Sensor, Asset Strip, Door, and/or Dynamic Plugin.

At least one selection each must be made for Severity and Source. The event must match both the Severity and Source criteria for the underlying trap to be forwarded.


Trap forwarding filters are organized by name, which is in bold at the top of the filter's details. Whether the trap forwarding filter is enabled or disabled will be indicated in parentheses to the right of the filter name.

The details of each trap forwarding filter can be expanded/collapsed by clicking the button next to the trap filter name. By default, only the first filter will be expanded when the page is initially loaded; all other filters will be collapsed. To expand/collapse the details of all trap filters, click Expand All/Collapse All in the upper-left corner.



### Manage Trap Forwarding Filters


[Expand All](#) [Collapse All](#)[Save](#) [Back to SNMP Trap Settings](#)

 When Trap Forwarding is enabled, traps from supported PowerIQ Events that match the criteria of any filter defined below will be forwarded. If no filters are defined below, no traps will be forwarded.

#### Pass All Traps (enabled)

 Enable this forwarding filter

Filter Name:

Severity Critical Warning InformationalSource PDU Inlet Transfer Switch UPS Circuit Breaker Circuit Outlet Environmental Sensor Asset Strip Door Dynamic Plugin[Add a filter](#)

## Adding a New Trap Forwarding Filter

1. On the Manage Trap Forwarding Filters page, click the Add a filter link and icon.
2. A new filter will display with its details expanded.
3. Edit the Filter Name: The Filter Name can be edited by making your changes to the Filter Name text field.
4. Select the Severity: Check/uncheck the boxes to select/deselect the appropriate Severity. Multiple boxes can be checked.

5. Select the Source: Check/uncheck the boxes to select/deselect the appropriate trap Source. Multiple boxes can be checked.
6. On the Manage Trap Drop Filter panel, click the Save button to save your changes.
7. Click the Back to SNMP Trap Settings link to return to the SNMP Trap Settings panel.

## Editing an Existing Trap Forwarding Filter

1. On the Manage Trap Forwarding Filters page, click the trap filter name to expand the filter details.
2. Edit the Filter Name: The Filter Name can be edited by making your changes to the Filter Name text field.
3. Select the Severity: Check/uncheck the boxes to select/deselect the appropriate Severity. Multiple boxes can be checked.
4. Select the Source: Check/uncheck the boxes to select/deselect the appropriate trap Source. Multiple boxes can be checked.
5. On the Manage Trap Drop Filter panel, click the Save button to save your changes.
6. Click the Back to SNMP Trap Settings link to return to the SNMP Trap Settings panel.

## Deleting an Existing Trap Forwarding Filter

1. On the Manage Trap Forwarding Filters page, click the trap filter name to expand the filter details.
2. Click the Remove button.
3. The trap filter will be deleted.
4. On the Manage Trap Drop Filter panel, click the Save button to save your changes.
5. Click the Back to SNMP Trap Settings link to return to the SNMP Trap Settings panel.





## Trap Queue Handling

Power IQ 6.0.2 introduces improvements to how SNMP traps are processed, including new configuration options for handling the trap backlog (the queue of traps to be processed). Once the maximum trap backlog queue size has been reached, trap handling will be disabled, the trap backlog will be processed, and incoming traps will be dropped until the backlog queue size has dropped to within the specified trap backlog recovery percentage. At that point, new incoming traps will once again be added to the queue for processing.

The following options are configurable via the database:

- trap\_handling\_pool\_threads\_per\_core (default: 5)
- trap\_max\_backlog\_threshold\_per\_core (default: 500)
- trap\_backlog\_threshold\_warning\_percentage (default: .50)
- trap\_backlog\_threshold\_critical\_percentage (default: .80)
- trap\_max\_backlog\_recovery\_percentage (default: .15)

New events and audit log messages have been added for cases when the trap handling queue is backlogged or if traps are being dropped because the backlog threshold is exceeded.

The table below summarizes the trap queue handling events and audit log messages:

Description	Event Name	Event Text	Event Summary	Audit Log Message
When the trap backlog state transitions from NORMAL or CRITICAL to WARNING, a warning event is generated.	trapHandlingBacklogWarning	Trap backlog warning	Trap backlog warning threshold exceeded.	Trap backlog warning threshold exceeded.
When the trap backlog state transitions from WARNING to NORMAL, a clearing event is generated.	trapHandlingBacklogWarningClear	N/A	N/A	Trap backlog state has returned to normal.
When the trap backlog state transitions from NORMAL or WARNING to CRITICAL, a critical event is generated.	trapHandlingBacklogCritical	Trap backlog critical	Trap critical threshold exceeded.	Trap backlog critical threshold exceeded.
When the trap backlog state transitions from CRITICAL to NORMAL, a clearing event is generated.	trapHandlingBacklogCriticalClear	N/A	N/A	Trap backlog state has returned to normal.
When the trap backlog reaches the maximum permitted trap	trapHandlingHaltedDueToBacklog	Trap handling	Trap handling temporarily	Trap handling tem-

Description	Event Name	Event Text	Event Summary	Audit Log Message
backlog size, a critical event is generated.		halted due to backlog	halted due to trap backlog.	porarily halted due to trap backlog.
If a trapHandlingHaltedDueToBacklog event is active, when the trap backlog drops below the maximum trap backlog recovery percentage, a clearing event is generated.	trapHandlingHaltedDueToBacklogClear	N/A	N/A	Trap handling backlog has been cleared sufficiently to resume trap processing.

---

*Note: Contact Sunbird Technical Support for assistance with modifying the trap backlog threshold values.*

---



---

*Note: Clearing events simply clear active events but are not persisted as events in Power IQ.*

---



## Configuring Event (Trap) Notification Settings for APC Devices

This topic provides instructions for how to configure APC devices (including APC Netbotz devices and Rack PDUs) that support repeating and non-repeating modes for sensor threshold traps so that the devices work most effectively with Power IQ.

All sensor threshold-related event (trap) notifications should be configured via the APC web user interface with the following settings:

- Event notification repeating should be disabled
- All critical threshold event notifications should be configured with a five-second delay
- All warning threshold event notifications should be configured with a zero-second delay

These recommendations eliminate the possibility of race conditions that affect trap reception in Power IQ. With these settings, if a sensor state changes, Power IQ should receive and process the traps in the correct order. In this case, if a sensor state changes from normal to critical, Power IQ should receive the warning trap before the critical trap.

The APC web user interface provides two options for configuring event notification settings:

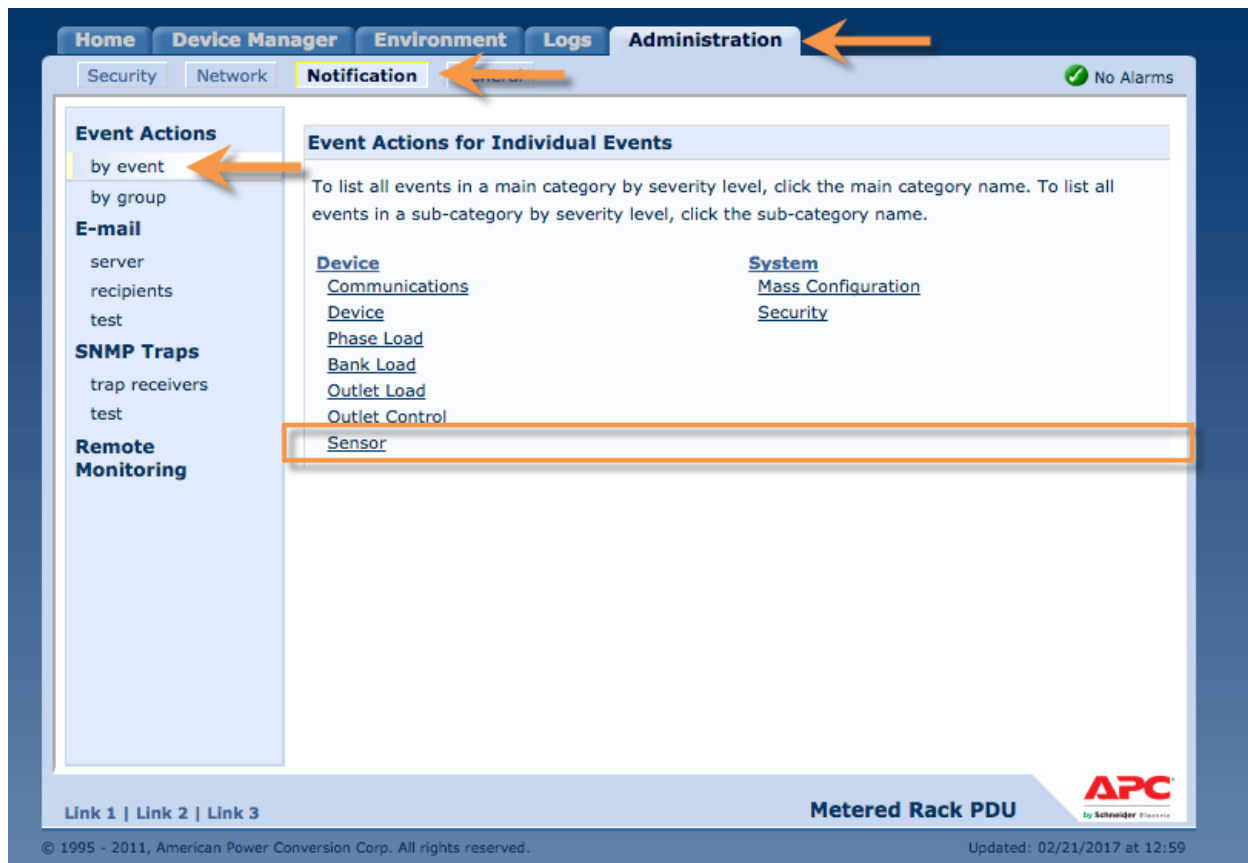
- Configure by event: Configure settings for an individual event. For more information, see *Configuring Notifications by Individual Event* on the facing page.
- Configure by group: Configure settings for a group of events. For more information, see *Configuring Notifications by Event Group* on page 305.



## Configuring Notifications by Individual Event

To configure notifications for an individual event in the APC web user interface:

1. Select the Administration tab > Notification on the top menu bar > Event Actions in the left navigation bar > by event. The main (right) pane displays the Event Actions for Individual Events page, which lists event categories and sub-categories.
2. In the main pane under Devices, select Sensor to display the sensor sub-category events.



The screenshot shows the APC web user interface. At the top, there is a navigation bar with tabs: Home, Device Manager, Environment, Logs, and Administration. The Administration tab is selected. Below this, there is a sub-navigation bar with tabs: Security, Network, and Notification. The Notification tab is selected. On the left side, there is a navigation menu with sections: Event Actions (with sub-items 'by event' and 'by group'), E-mail (with sub-items 'server', 'recipients', 'test'), SNMP Traps (with sub-items 'trap receivers', 'test'), and Remote Monitoring. The 'by event' option is selected. The main content area is titled 'Event Actions for Individual Events'. It contains a text instruction: 'To list all events in a main category by severity level, click the main category name. To list all events in a sub-category by severity level, click the sub-category name.' Below this, there are two columns of links. The left column is under the heading 'Device' and includes links for Communications, Device, Phase Load, Bank Load, Outlet Load, and Sensor. The right column is under the heading 'System' and includes links for Mass Configuration and Security. The 'Sensor' link is highlighted with an orange box. At the bottom of the page, there is a footer with 'Link 1 | Link 2 | Link 3', 'Metered Rack PDU', the APC logo, and copyright information: '© 1995 - 2011, American Power Conversion Corp. All rights reserved.' and 'Updated: 02/21/2017 at 12:59'.

3. Click the name of an event notification to view or change its current configuration.

*Note: In these example screenshots, the critical event Rack PDU: Maximum temperature threshold violation is selected.*

Home
Device Manager
Environment
Logs
Administration

Security
Network
Notification
General
✔ No Alarms

**Event Actions**

- by event
- by group

**E-mail**

- server
- recipients
- test

**SNMP Traps**

- trap receivers
- test

**Remote Monitoring**

**Sensor**

Critical Events	Event Log	E-mail	Trap
<a href="#">Rack PDU: Maximum temperature threshold violation.</a>	•		•
<a href="#">Rack PDU: Minimum humidity threshold violation.</a>	•		•


  

Warning Events	Event Log	E-mail	Trap
<a href="#">Rack PDU: Sensor comm lost.</a>	•		•
<a href="#">Rack PDU: Unable to determine sensor type.</a>	•		•
<a href="#">Rack PDU: Connected Universal Sensor is not a supported type.</a>	•		•
<a href="#">Rack PDU: High temperature threshold violation.</a>	•		•
<a href="#">Rack PDU: Low humidity threshold violation.</a>	•		•

Informational Events	Event Log	E-mail	Trap
<a href="#">Rack PDU: Sensor configuration change.</a>	•		•
<a href="#">Rack PDU: Sensor connected.</a>	•		•

Link 1 | Link 2 | Link 3

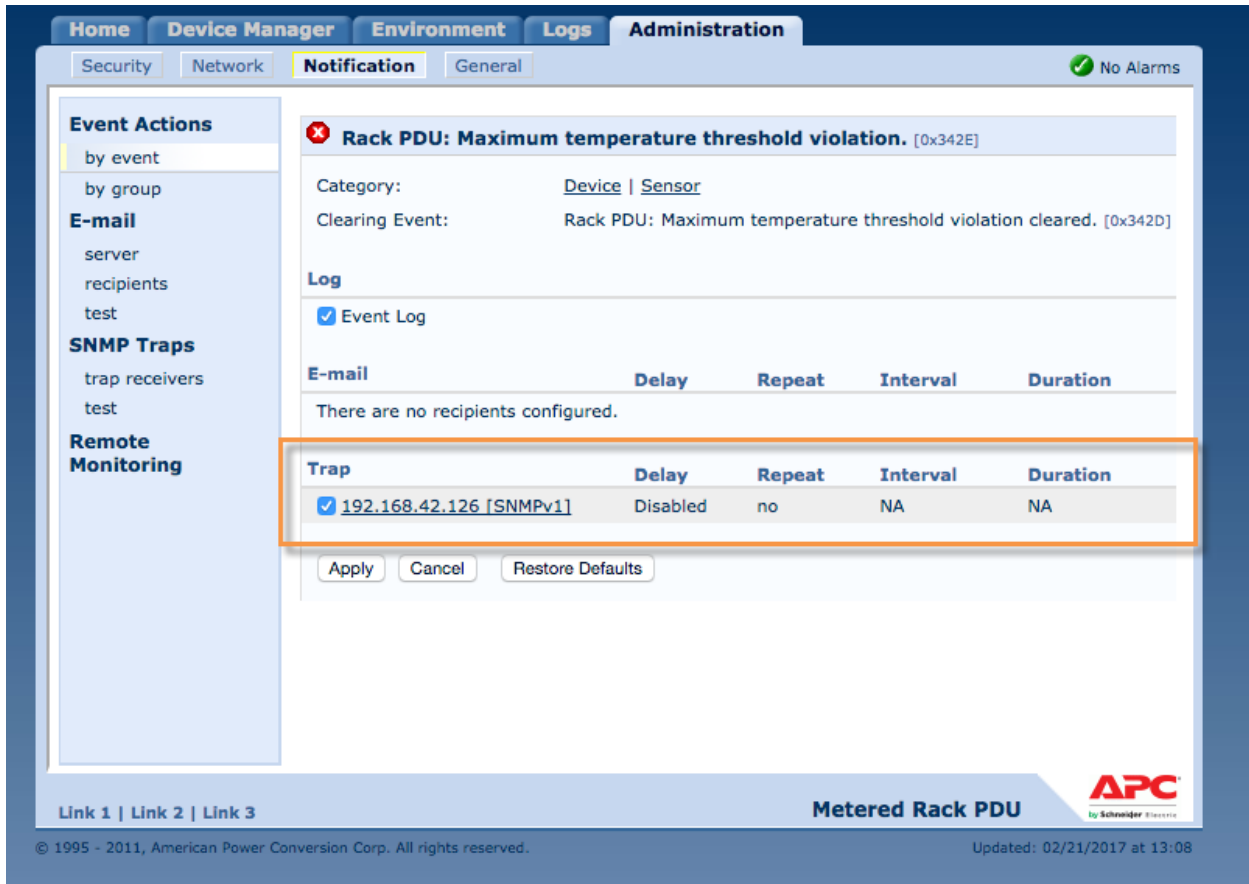


**Metered Rack PDU**

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Updated: 02/21/2017 at 13:06

4. Under Trap, choose a trap receiver to view or configure its notifications for the selected event.

*Note: You must have at least one trap receiver configured to select this option.*



Home Device Manager Environment Logs Administration

Security Network Notification General ✔ No Alarms

**Event Actions**

- by event
- by group

**E-mail**

- server
- recipients
- test

**SNMP Traps**

- trap receivers
- test

**Remote Monitoring**

**✖ Rack PDU: Maximum temperature threshold violation. [0x342E]**

Category: [Device](#) | [Sensor](#)

Clearing Event: Rack PDU: Maximum temperature threshold violation cleared. [0x342D]

**Log**

Event Log

**E-mail**


	Delay	Repeat	Interval	Duration
There are no recipients configured.				

**Trap**

	Delay	Repeat	Interval	Duration
<input checked="" type="checkbox"/> 192.168.42.126 [SNMPv1]	Disabled	no	NA	NA

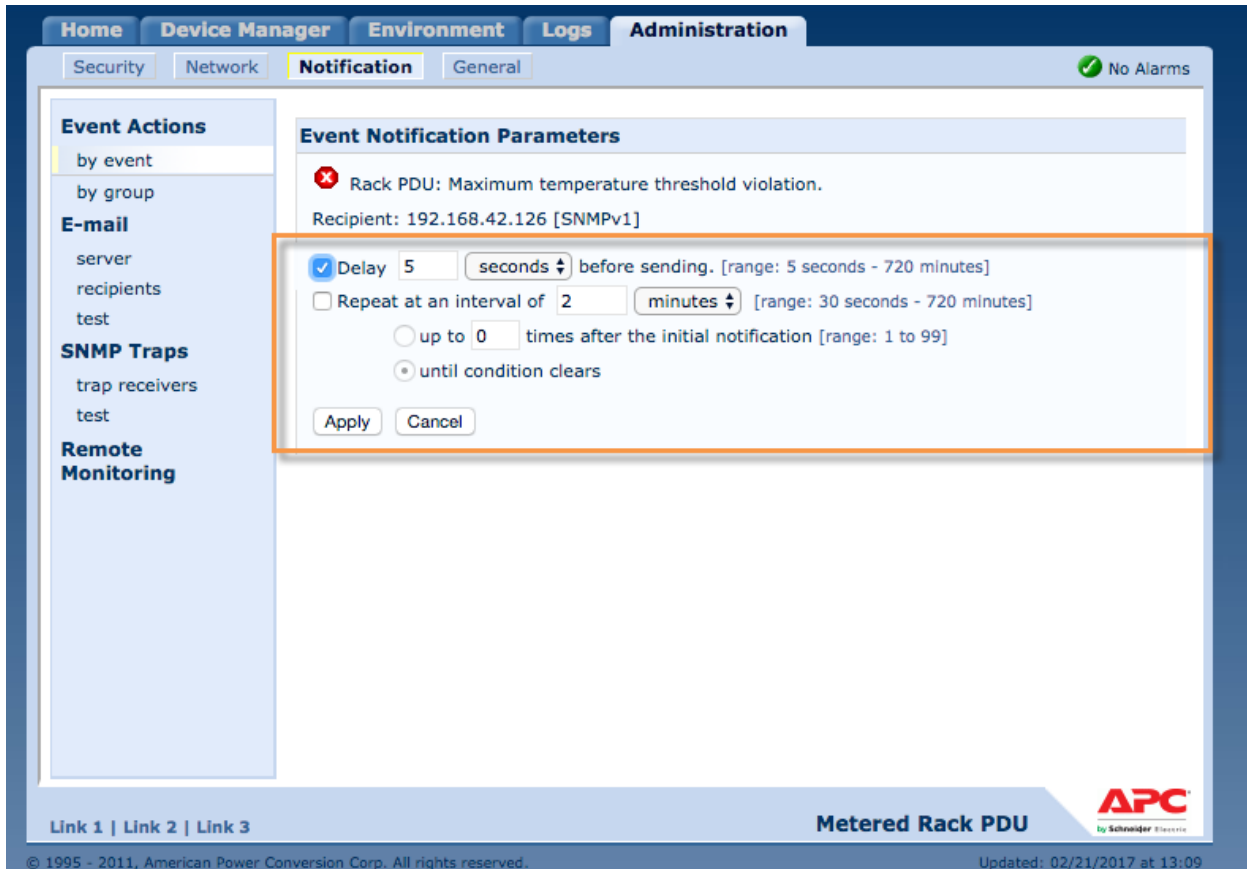
Apply Cancel Restore Defaults

Link 1 | Link 2 | Link 3

**Metered Rack PDU** 

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5. The Event Notification Parameters page for the trap receiver displays.



The screenshot shows the 'Event Notification Parameters' configuration page for a 'Metered Rack PDU'. The notification is for a 'Rack PDU: Maximum temperature threshold violation.' with a recipient of '192.168.42.126 [SNMPv1]'. The configuration options are:

- Delay 5 seconds before sending. [range: 5 seconds - 720 minutes]
- Repeat at an interval of 2 minutes [range: 30 seconds - 720 minutes]
  - up to 0 times after the initial notification [range: 1 to 99]
  - until condition clears

Buttons for 'Apply' and 'Cancel' are visible at the bottom of the configuration area.

Set the following parameters:

Event Parameter	Description	Configuration for Power IQ
Delay x time before sending	If the event persists for the specified time, a notification is sent. If the condition clears before the time expires, no notification is sent.	Set parameter checkbox to checked.  Set parameter to 5 seconds for critical threshold event notifications.  Set parameter to 0 seconds for warning threshold event notifications.
Repeat at an interval of x time	The notification is sent at the specified interval.	Set parameter checkbox to unchecked to disable repeating.
Up to x times	During an active event, the notification repeats	Disabled when repeating is disabled. No con-

Event Parameter	Description	Configuration for Power IQ
	for this number of times.	figuration required.
Until condition clears	The notification is sent repeatedly until the condition clears or is resolved.	Disabled when repeating is disabled. No configuration required.

6. Click Apply to save your changes.



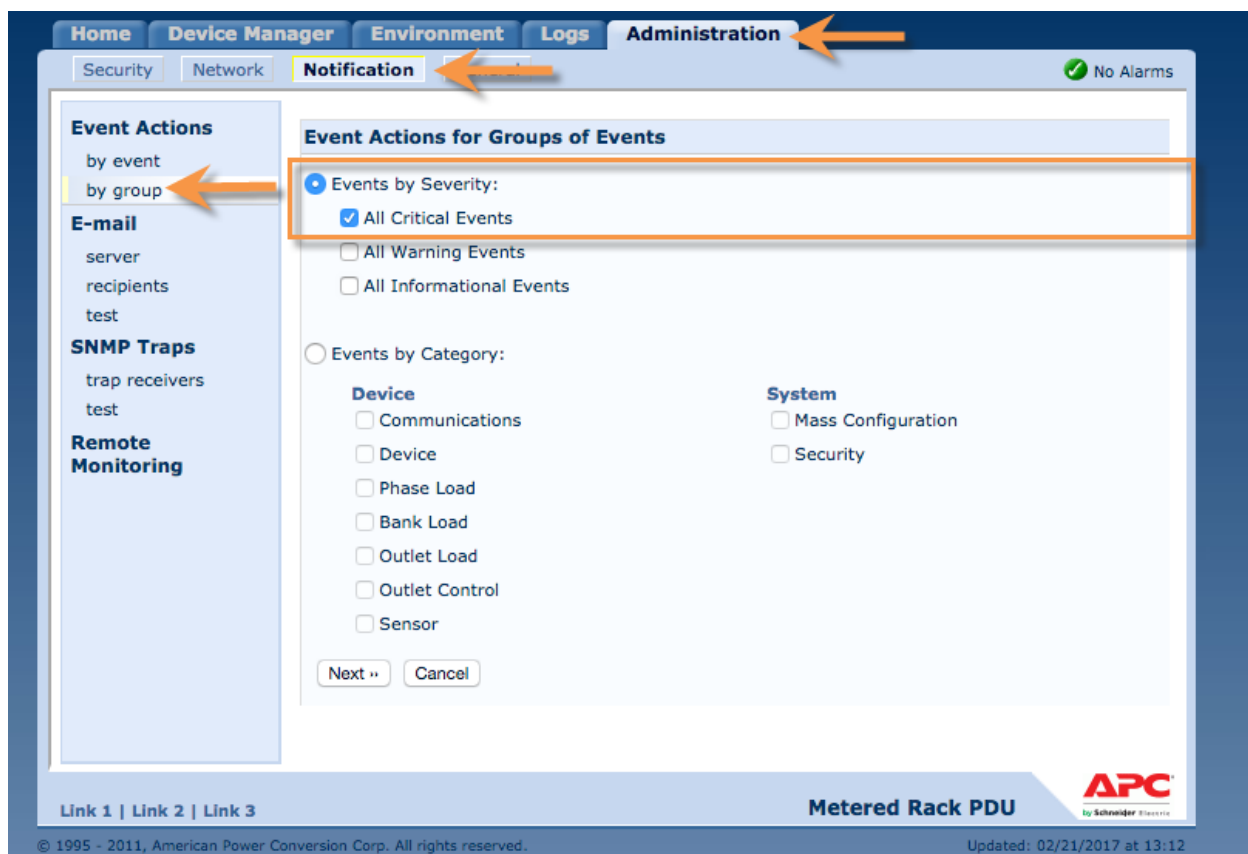


## Configuring Notifications by Event Group

To configure notifications for a group of events:

1. Select the Administration tab > Notification on the top menu bar > Event Actions in the left navigation bar > by group under Event Actions. The main (right) pane will display the Event Actions for Groups of Events page, which lists options for grouping event actions.
2. In the main pane, choose Events by Severity and select the severity level to be configured.

*Note: The severity levels include: Critical, Warning, and Informational events. In these example screenshots, the option for All Critical Events has been selected.*



The screenshot shows the APC Metered Rack PDU web interface. The top navigation bar includes Home, Device Manager, Environment, Logs, and Administration. The Administration tab is selected, and the Notification sub-tab is active. The left navigation pane shows Event Actions, E-mail, SNMP Traps, and Remote Monitoring. Under Event Actions, 'by group' is selected. The main content area displays 'Event Actions for Groups of Events' with the following options:

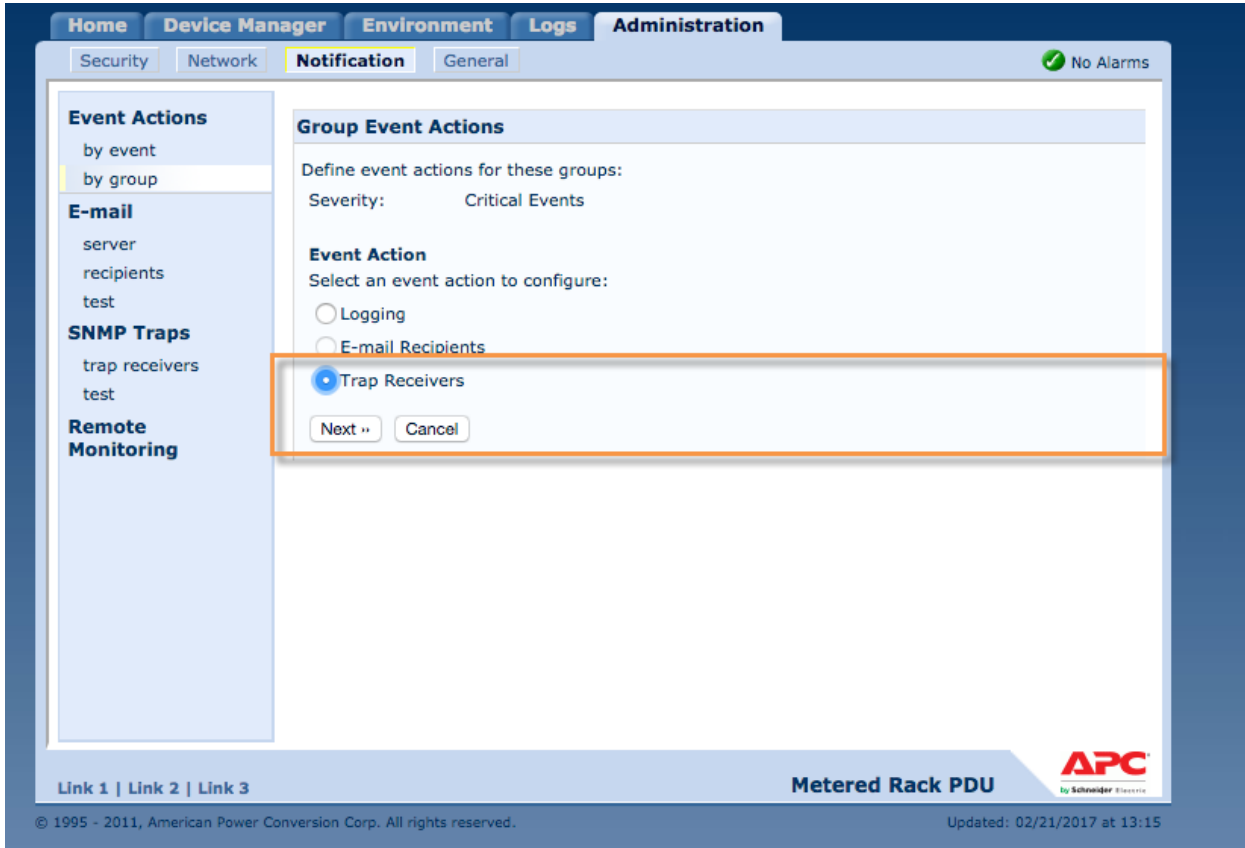
- Events by Severity:
  - All Critical Events
  - All Warning Events
  - All Informational Events
- Events by Category:
 

<b>Device</b>	<b>System</b>
<input type="checkbox"/> Communications	<input type="checkbox"/> Mass Configuration
<input type="checkbox"/> Device	<input type="checkbox"/> Security
<input type="checkbox"/> Phase Load	
<input type="checkbox"/> Bank Load	
<input type="checkbox"/> Outlet Load	
<input type="checkbox"/> Outlet Control	
<input type="checkbox"/> Sensor	

Buttons for 'Next >>' and 'Cancel' are located at the bottom of the configuration area. The footer includes 'Link 1 | Link 2 | Link 3', 'Metered Rack PDU', the APC logo, and copyright information: '© 1995 - 2011, American Power Conversion Corp. All rights reserved.' and 'Updated: 02/21/2017 at 13:12'.

3. Click Next>> to proceed.
4. On the Group Event Actions page, select Trap Receivers under Event Actions.

*Note: You must have at least one trap receiver configured to select this option.*



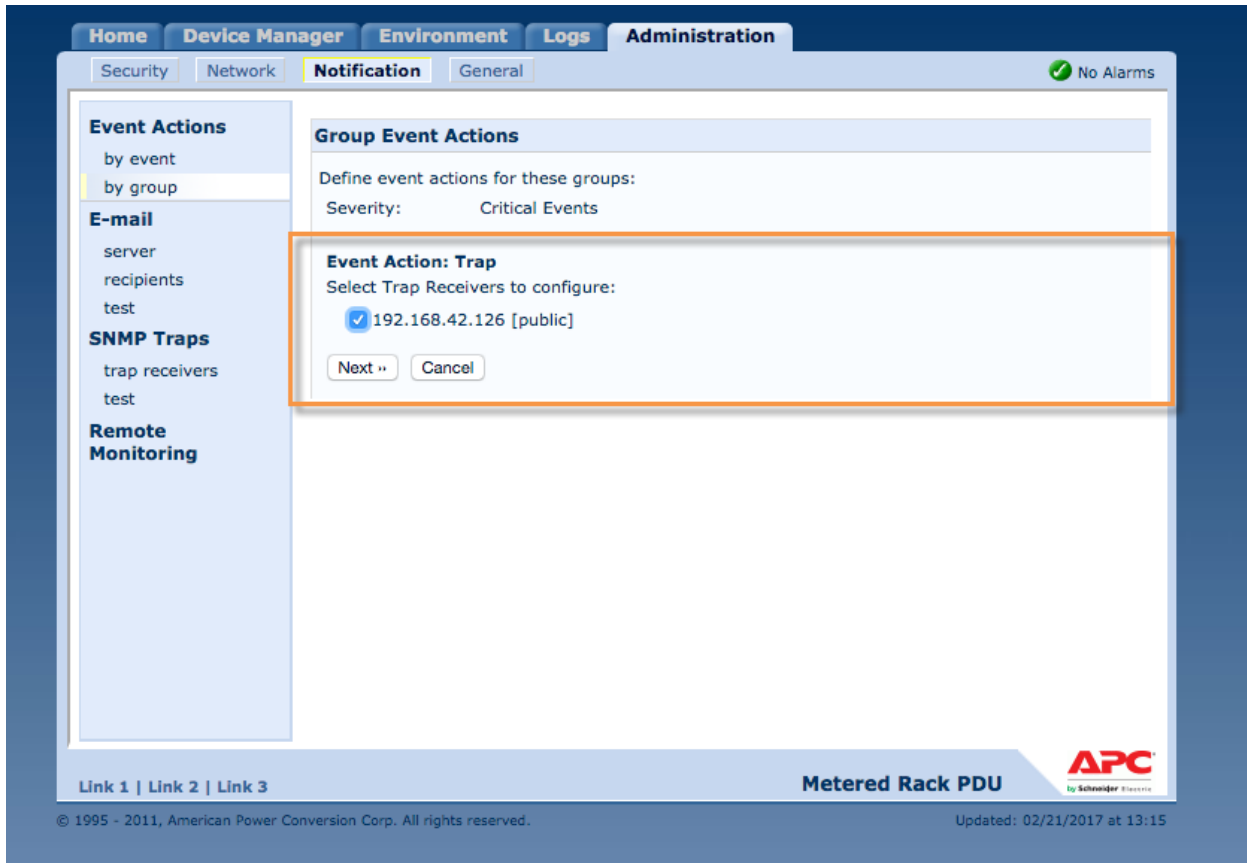
The screenshot shows the Sunbird web interface for configuring Group Event Actions. The navigation menu includes Home, Device Manager, Environment, Logs, and Administration. The Administration section is expanded to show Security, Network, Notification, and General tabs. The Notification tab is active, and a 'No Alarms' status is shown in the top right corner. On the left, a sidebar lists various monitoring categories: Event Actions (by event, by group), E-mail (server, recipients, test), SNMP Traps (trap receivers, test), and Remote Monitoring. The main content area is titled 'Group Event Actions' and contains the following information:

- Define event actions for these groups:
- Severity: Critical Events
- Event Action: Select an event action to configure:
  - Logging
  - E-mail Recipients
  - Trap Receivers
- Buttons: Next >> and Cancel

At the bottom of the interface, there are links for Link 1, Link 2, and Link 3, the APC logo, and the text 'Metered Rack PDU'. The footer contains the copyright information: © 1995 - 2011, American Power Conversion Corp. All rights reserved., and the update date: Updated: 02/21/2017 at 13:15.

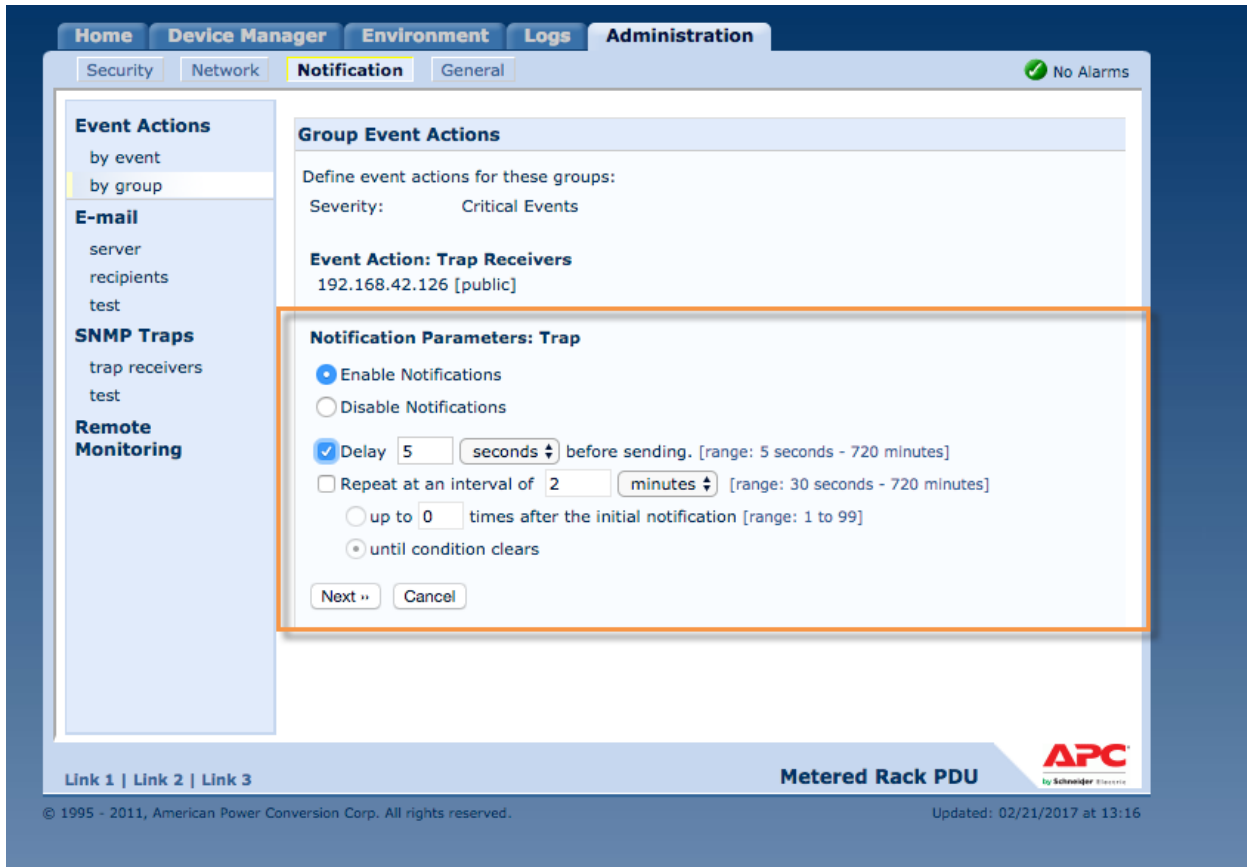
5. Click Next>> to proceed.

6. Under Event Action: Trap, choose a trap receiver to configure its notification parameters for the selected group of events.



The screenshot displays the Sunbird Administration interface. The top navigation bar includes tabs for Home, Device Manager, Environment, Logs, and Administration. The Administration tab is active, and the Notification sub-tab is selected. A green checkmark and 'No Alarms' status are visible in the top right corner. The left sidebar contains a navigation menu with categories: Event Actions (by event, by group), E-mail (server, recipients, test), SNMP Traps (trap receivers, test), and Remote Monitoring. The main content area shows the 'Group Event Actions' configuration. Under 'Define event actions for these groups:', the severity is set to 'Critical Events'. The 'Event Action: Trap' section is highlighted with an orange border, showing 'Select Trap Receivers to configure:' with a checked checkbox for '192.168.42.126 [public]'. Below this are 'Next >>' and 'Cancel' buttons. The footer contains 'Link 1 | Link 2 | Link 3', 'Metered Rack PDU', the APC logo, and copyright information: '© 1995 - 2011, American Power Conversion Corp. All rights reserved.' and 'Updated: 02/21/2017 at 13:15'.

7. Under Notification Parameters: Trap, select Enable Notifications.



The screenshot shows the Sunbird Administration interface. The 'Notification' tab is active, and the 'Notification Parameters: Trap' section is highlighted with an orange border. The configuration includes:

- Enable Notifications:**  (checked)
- Disable Notifications:**  (unchecked)
- Delay:** 5 seconds before sending. [range: 5 seconds - 720 minutes]
- Repeat at an interval of:** 2 minutes [range: 30 seconds - 720 minutes]
  - up to 0 times after the initial notification [range: 1 to 99]
  - until condition clears

Buttons for 'Next »' and 'Cancel' are visible at the bottom of the configuration panel.

Set the following parameters:

Event Parameter	Description	Configuration for Power IQ
Delay x time before sending	<p>If the event persists for the specified time, a notification is sent.</p> <p>If the condition clears before the time expires, no notification is sent.</p>	<p>Set parameter checkbox to checked.</p> <p>Set parameter to 5 seconds for critical threshold event notifications.</p> <p>Set parameter to 0 seconds for warning threshold event notifications.</p>
Repeat at an interval of x time	The notification is sent at the specified interval.	Set parameter checkbox to unchecked to disable repeating.
Up to x times	During an active event, the notification repeats	Disabled when repeating is disabled. No con-



Event Parameter	Description	Configuration for Power IQ
	for this number of times.	figuration required.
Until condition clears	The notification is sent repeatedly until the condition clears or is resolved.	Disabled when repeating is disabled. No configuration required.

8. Click Next>> to proceed.

9. Select whether to leave the newly configured event action enabled for this group of events or to disable the action.



# Chapter 8: User Configuration

You can add both LDAP and locally authenticated users. All user permissions are authorized locally.



## Change the Administrator Username and Password

Administrators can change the default admin account username and password. It is important to change the default admin account password as soon as possible. This helps prevent unauthorized administrator access to Power IQ.

The password must follow the requirements selected in Settings > Password Requirements. See [Configuring Password Requirements](#).

To change the admin user name:

1. Select the Settings tab > User Accounts (Under the Authorization and Authentication section). A list of all the user accounts created for the system will display.
2. Click the admin user to view the user information for the admin account.
3. Click Edit for the admin user.
4. In the Login field, type the desired user name.
5. Click Save.

Dashboards Data Centers Events Facility Items IT Devices PUE Analytics Reports **Settings**

### User Information for admin

Cancel Save Reset Change Password Manage Event Notifications

<b>Login:</b>	<input type="text" value="admin"/>
<b>First Name:</b>	<input type="text" value="System"/>
<b>Last Name:</b>	<input type="text" value="Administrator"/>
<b>Email:</b>	<input type="text" value="admin@localhost"/>
<b>Created:</b>	07/18/17 06:49:01 PM UTC
<b>Last Updated:</b>	07/18/17 06:49:01 PM UTC
<b>Description:</b>	<input type="text" value="The superuser for this system. This account cannot be deleted."/>

---

*Note: Even if the default admin username has been changed, the password will still work.*




---

To change the admin password:

1. Select the Settings tab > User Accounts (Under the Authorization and Authentication section). A list of all the user accounts created for the system will display.
2. Click the admin user to view the user information for the admin account.
3. Click the Change Password link.
4. In the Change Password dialog, type the desired password.
5. Click the OK button.



### User Information for admin

 [Edit](#)  [Change Password](#)  [Manage Event Notifications](#)

<b>Login:</b>	admin
<b>First Name:</b>	System
<b>Last Name:</b>	Administrator
<b>Email:</b>	admin@localhost
<b>Created:</b>	07/18/17 06:49:01 PM UTC
<b>Last Updated:</b>	07/18/17 06:49:01 PM UTC
<b>Description:</b>	The superuser for this system. This account cannot be deleted.

---

*Note: If you are logged in as the admin, you can also change your password by clicking on the admin username link in the top right corner to access the user information for the admin account, and then clicking the Change Password link.*

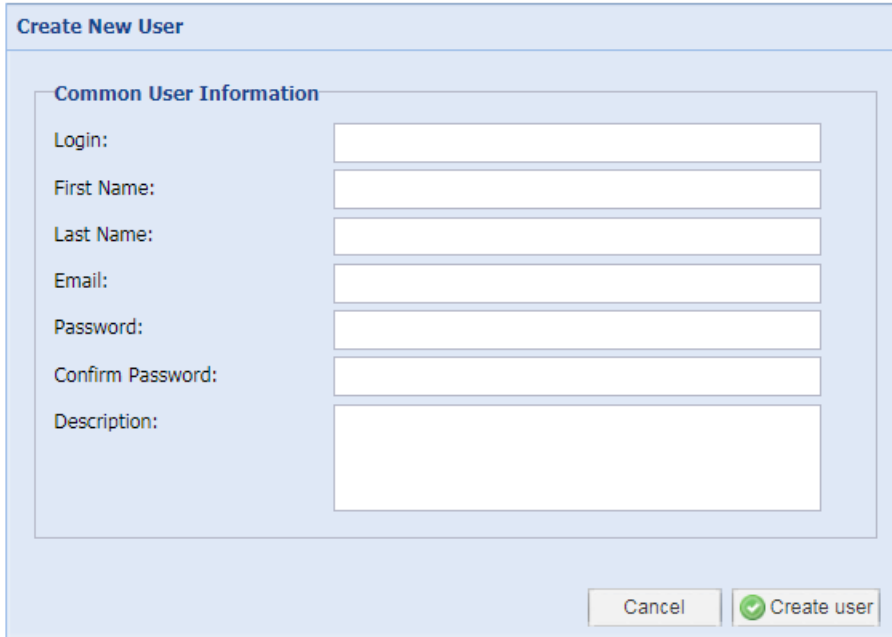
---



## Adding, Editing, and Deleting Users

### Add a User

1. In the Settings tab, in the Authorization and Authentication panel, click the User Accounts link.
2. Click the Add User link. A blank user information page opens.
3. Enter the Common User Information.
4. Enter a username with at least 3 characters, but not more than 40 characters. Required.
5. Enter the user's first name, last name, and email address.
6. **Required** Password and Confirm Password: Enter a password for this user. Default password strength requires at least 8 characters, including one numerical character, one uppercase character, one lowercase character, and one of the following special characters: ~!@#\$%^&\*()\_+{|}:<?/.,';[=-` "). See [Configuring Password Requirements](#).
7. In the Description field, enter comments about the user. Optional.
8. Click the Create User button to create the user.



**Create New User**

**Common User Information**

Login:

First Name:

Last Name:

Email:

Password:

Confirm Password:

Description:

Cancel

### Edit a User

1. In the Settings tab, in the Authorization and Authentication panel, click the User Accounts link.
2. In the User Accounts panel, click the blue username login link for the user you want to edit.
3. In the User Information panel, click the Edit button. The panel will display the fields that can be edited.
4. Edit the information as needed.
  - Login: 3 characters minimum. 40 characters maximum.
  - First Name: 1 character minimum.
  - Last Name: 1 character minimum.



- Email: Must contain a correctly formatted email address.
  - Description: Optional
5. Make any changes to the roles and groups assigned to the user. For more information, see *Assigning Roles for User Permissions* on page 341.
  6. Click the Save button to save your changes.

**User Information for admin**

Cancel
 Save
 Reset
 

 Change Password
 Manage Event Notifications

<b>Login:</b>	<input type="text" value="admin"/>
<b>First Name:</b>	<input type="text" value="System"/>
<b>Last Name:</b>	<input type="text" value="Administrator"/>
<b>Email:</b>	<input type="text" value="owen.clark@sunbirdcim.com"/>
<b>Created:</b>	11/21/11 08:41:43 AM EST
<b>Last Updated:</b>	11/27/17 04:05:23 PM EST
<b>Description:</b>	<input style="width: 100%; height: 40px;" type="text" value="The superuser for this system. This account cannot be deleted."/>

**User Roles**

Select a role to add... ▾
 Add
 Remove
 Empty

	Name ▾	Label	Source
<input type="checkbox"/>	Site Administrator	Power IQ system settings and administrator for...	User: admin
<input type="checkbox"/>	Site Administrator	Power IQ system settings and administrator for...	Group: <a href="#">Site Administrator</a>
<input type="checkbox"/>	View Tag Groups	View tags and tag groups.	Group: <a href="#">All Users</a>

Displaying 1 - 3 of 3

**User Groups**

Select a group to add... ▾
 Add
 Remove
 Empty

	Name ▾
<input type="checkbox"/>	<a href="#">All Users</a>
<input type="checkbox"/>	<a href="#">Site Administrators</a>

Displaying 1 - 2 of 2

## Delete One or Multiple User(s)

1. In the Settings tab, in the Authorization and Authentication panel, click the User Accounts link.
2. In the User Accounts panel, click the checkbox next to the user you want to delete. You can check multiple checkboxes to select multiple users.

3. Click the Remove Users link.

User accounts					
Add User		Find LDAP Users	Remove users	Clear LDAP DN	
✓	Login	First Name	Last Name	Email	LDAP DN
✓	aarons	Aaron	Schrab	Aaron.Schrab@SunbirdDCIM.com	uid=aarons,ou=People,dc=oculan,dc=com
✓	admin	System	Administrator	owen.clark@sunbirdcim.com	
✓	billy			bill.youngblood@raritan.com	uid=billy,ou=People,dc=oculan,dc=com
✓	chris	Chris	Trovato	Chris.Trovato@raritan.com	
✓	dametriousp	Dametrious	Peyton	dametriousp.heyton@raritan.com	uid=dametriousp,ou=People,dc=oculan,dc=...
✓	davidr	David	Robinson	david.robinson@sunbirdcim.com	uid=davidr,ou=People,dc=oculan,dc=com
✓	ethanm	Ethan	Michaels	ethan.michaels@sunbirdcim.com	uid=ethanm,ou=People,dc=oculan,dc=com
✓	hankg	Hank	Gonzalez	henry.gonzalez@sunbirdcim.com	
✓	harrieta	Harriet	Ashcroft	Harriet.Ashcroft@raritan.com	uid=harrieta,ou=People,dc=oculan,dc=com
✓	james	James	Daly	James.Daly@raritan.com	

4. A confirmation popup will appear with the following message: "Remove these users? All data, roles, scheduled tasks and public shared dashboards and reports, possibly used by other users, for these Power IQ users will be deleted."

✕
**Confirm**

Remove these users? All data, roles, scheduled tasks and public shared dashboards and reports, possibly used by other users, for these Power IQ users will be deleted.

Cancel
Delete Users

5. Click the Delete Users button in the popup to delete the selected users or click the Cancel button to abort.
6. Upon successful deletion, the User Accounts list will refresh with the deleted users removed.



## Configuring the LDAP Server Settings

The LDAP server settings enable Power IQ to connect to your LDAP server.

*Note: Power IQ version 7.2.0 introduced support for One Time Passwords via LDAP. Prior releases required issuing 2 requests to authenticate a user, one to authenticate and one to gather the user's details. As a result the second request failed if the user was flagged with a One Time Password. In Power IQ 7.2.0 and beyond a single request is issued which will both authenticate the user as well as gathering the user's details.*

### Gather Active Directory and LDAP Server Configuration Information

You need the information listed below in order to configure Active Directory and/or LDAP servers in Power IQ. You should gather this information before beginning the add server process in Power IQ..

Two worksheets are provided below: one to help you gather Active Directory information and another to help you gather the LDAP information. Use the worksheet that applies to your needs.

If you are not familiar with this information, ask your LDAP administrator to help you gather it.

For additional information please see the [Power IQ LDAP Feature](#) video demonstration.

### Microsoft® Active Directory Server Information

Server Domain (for Active Directory), or server hostname or IP address:

Port encryption type:	<input type="checkbox"/>	TLS	<input type="checkbox"/>	SSL	<input type="checkbox"/>	No Encryption
-----------------------	--------------------------	-----	--------------------------	-----	--------------------------	---------------

Port - encrypted defaults to Port 636, no encryption defaults to Port 389, but the port can be changed.	Other (if applicable):
---	------------------------

The Bind type of the server:	<input type="checkbox"/>	Standard Bind	<input type="checkbox"/>	Configure Anonymous Bind
------------------------------	--------------------------	---------------	--------------------------	--------------------------

The Base DN (this is where the search for users starts):

Base DN Login Name Attribute:	<input type="checkbox"/>	sAMAccountName (default)	<input type="checkbox"/>	Other (if applicable):
-------------------------------	--------------------------	--------------------------	--------------------------	------------------------



## Microsoft® Active Directory Server Information

Search Filter (if applicable):					
Search scope object filters (if applicable, choose one):	<input type="checkbox"/>	The Base DN and one level below the Base DN. ("One" is the option in GUI.)	<input type="checkbox"/>	The Base DN and the entire subtree below. ("Subtree" is the option in the GUI)	
Search credentials (choose one):	<input type="checkbox"/>	No search credentials; user credentials provided at login are used	<input type="checkbox"/>	Anonymous	<input type="checkbox"/>
Admin DN and Admin password, if search scope requires Admin credentials.		Admin Credentials:		Admin Password:	
Group search DN (if applicable):					
Group ID attribute, such as name (if applicable):	<input type="checkbox"/>	sAMAccountName (default)	<input type="checkbox"/>	Other:	
Group member attribute (if applicable):	<input type="checkbox"/>	Member (default)	<input type="checkbox"/>	Other:	



### Microsoft® Active Directory Server Information

Group search filter:	<input type="checkbox"/>	(objectClass=group) (default)	<input type="checkbox"/>	Other:	
----------------------	--------------------------	-------------------------------	--------------------------	--------	--

### LDAP Server Information

Server Hostname or IP Address:						
Port Encryption Type:	<input type="checkbox"/>	TLS	<input type="checkbox"/>	SSL	<input type="checkbox"/>	No Encryption
Port - encrypted defaults to Port 636, no encryption defaults to Port 389, but the port can be changed.			Other (if applicable):			
The Bind Type of the server:	<input type="checkbox"/>	Anonymous Bind	<input type="checkbox"/>	Standard Bind		
The Bind Base DN (this is where the search for users starts):						
Login Name Attribute:	<input type="checkbox"/>	uid (default)	<input type="checkbox"/>	Other:		
Search Filter (if applicable):						
Search Scope (if applicable):	<input type="checkbox"/>	The Base DN and one level below the Base DN. ("One" is the option in GUI.)	<input type="checkbox"/>	The Base DN and the entire subtree below. ("Subtree" is the option in the GUI)		
Search Credentials (choose one):	<input type="checkbox"/>	No search credentials; user credentials provided at login are used	<input type="checkbox"/>	Anonymous	<input type="checkbox"/>	Admin credentials



## LDAP Server Information

Admin DN and Admin password, if search requires Admin credentials:		Admin Credentials:		Admin Password:	
Group search DN (if applicable):					
Group ID attribute:	<input type="checkbox"/>	gidNumber (default)		Other:	
Group member attribute (if applicable):	<input type="checkbox"/>	memberUid (default)		Other:	
Group search filter:	<input type="checkbox"/>	(objectClass=posixGroup) (default)		Other:	

### Add a Remote Server

1. Click Add Server on the LDAP Servers page.



## LDAP Servers

LDAP is Enabled

[Add Server](#)[Search](#)[Common Settings](#)

Rows: 1-1 of 1 Columns: 6

Order	Host	Port	Type	Active
1	<a href="#">ldap.raleigh.raritan.com</a>	389	LDAP Server	true

The Add LDAP Servers page opens.



**Sunbird® Power IQ®**   [Dashboards](#)   [Data Centers](#)   [Events](#)   [Facility Items](#)   [IT Devices](#)   [Sensors](#)   [PUE](#)   [Analytics](#)   [Reports](#)   **[Settings](#)**

**Edit LDAP Server**

**General**

Type: LDAP Server

Order: 1

Active:

**Connection**

Domain: \_\_\_\_\_

Use Host:

Hostname/IP-Address: ldap.raleigh.raritan.com

Encryption:  None    SSL/TLS    StartTLS

Port: 389

Check Server Certificate:

[Manage certificates](#)

**Bind**

Base DN: ou=people,dc=oculan,dc=com

Login Name Attribute: \_\_\_\_\_

Suggested Value: uid

Search Filter: objectClass=posixAccount

Suggested Value: (objectClass=\*inetOrgPerson)

Search Scope: Subtree

Follow Referrals:

Search Credentials: no search

Admin DN: \_\_\_\_\_

Admin Password: \_\_\_\_\_

**Groups**

Use Groups For Authorization:

Use Group Search DN:

Group Search DN: \_\_\_\_\_

Group ID Attribute: \_\_\_\_\_

Suggested Value: gidNumber

Group Member Attribute: \_\_\_\_\_

Suggested Value: memberUid

Group Search Filter: \_\_\_\_\_

Suggested Value: (objectClass=posixGroup)

Group Search Scope: \_\_\_\_\_

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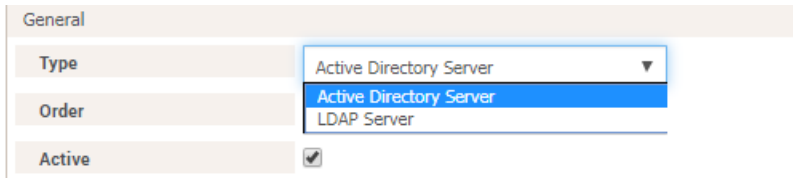
Complete the fields in each section that apply to your specific needs. Use the configuration information you gathered earlier to complete each section.

*Note: Configuration settings vary slightly between Active Directory and LDAP.*

## Active Directory Server Configuration in Power IQ

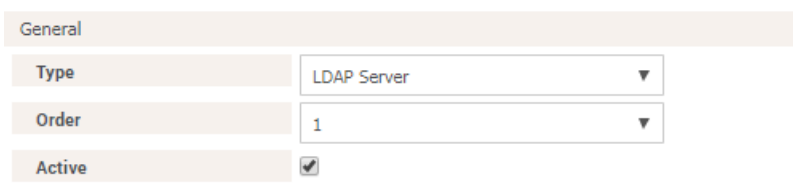
### General Information

1. Select Active Directory Server as the server type.



General	
Type	Active Directory Server
Order	Active Directory Server
Active	<input checked="" type="checkbox"/>

2. Select the order in which the server will be listed in the LDAP Servers table. This dictates the order in which Power IQ communicates with the servers when multiple servers are configured.
3. Select the Active checkbox to enable the server, or leave it deselected and return to activate it at a later time. It must be active in order to be in use.



General	
Type	LDAP Server
Order	1
Active	<input checked="" type="checkbox"/>

The information you enter in the remaining sections is specific to the server type you are configuring: either Active Directory or LDAP.

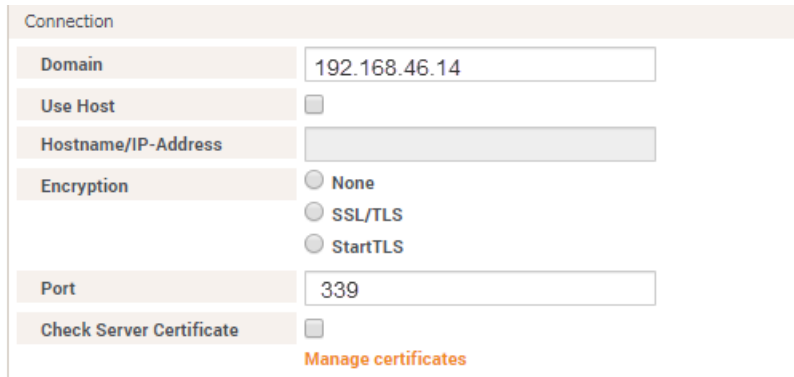
For this reason, Active Directory and LDAP settings are broken out into two sections on this page: Active Directory Server Configuration in Power IQ and LDAP Server Configuration in Power IQ

Scroll down the page to view LDAP setting instructions.

## Connection Information

4. Domain - applies if Active Directory only. The domain name of the server.
5. Use Host - select if you want to use a specific hostname or IP Address to access the Active Directory server.
6. Hostname/IP Address - enter the Active Directory server's hostname or IP address if Use Host is selected.
7. Use TLS/SSL - select if using TLS/SSL encryption.
8. Port - the default is Port 389 if TLS/SSL encryption is not enabled, and Port 636 is the default if TLS/SSL encryption is enabled. The port number can be edited to a different value, if necessary.





Connection

Domain: 192.168.46.14

Use Host:

Hostname/IP-Address:

Encryption:  None,  SSL/TLS,  StartTLS

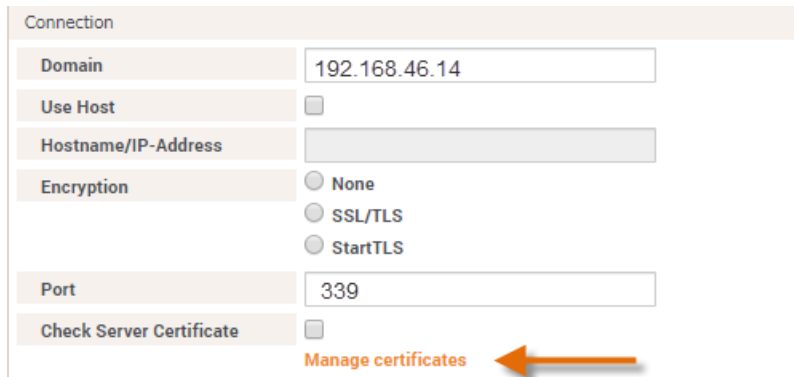
Port: 339

Check Server Certificate:

[Manage certificates](#)

### (Optional) Manage Certificates

9. If you need to validate certificates, select Check Server Certificate.
10. Next, click the Manage Certificates link to open the Trusted Certificates page.



Connection

Domain: 192.168.46.14

Use Host:

Hostname/IP-Address:

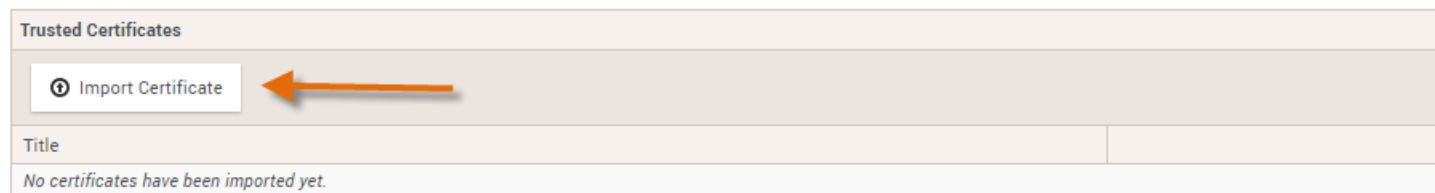
Encryption:  None,  SSL/TLS,  StartTLS

Port: 339

Check Server Certificate:

[Manage certificates](#)

11. Click Import Certificate to open the Import Trusted Certificate page.



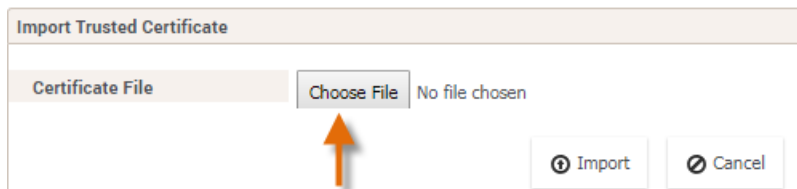
Trusted Certificates

[Import Certificate](#)

Title

*No certificates have been imported yet.*

12. Click on the "Choose File" text box to open your browser to locate the certificate, then click Import to import the certificate.



Import Trusted Certificate

Certificate File:  Choose File No file chosen

You can use the Back button in your browser to return to the Add LDAP Server page.



## Bind Information

The information entered here identifies where searches are performed to locate users on the server.

13. Base DN - specify a Base DN (directory level/entry) under which the authentication search query will begin. Power IQ can do a recursive search downward from this Base DN..

For example, depending on the scope of the search, if the Base DN is dc=sunbird,dc=com, the search query for the user entry will be made over the whole directory structure.

If the Base DN is cn=Administrators,cn=Users,dc=sunbird,dc=com, the search query will begin in the Administrators sub-directory (entry).

14. Login Name Attribute - the login name that corresponds to the server type. The default for Active Directory is sAMAccountName.
15. Search Filter - enter a user's attributes in this field if you want the search query to be restricted to only those entries that meet the criteria. The default for Active Directory is (objectClass=user).
16. Search Scope - level of the server directory to look for users; either the Base DN and one level below the Base DN, or the Base DN and the entire subtree below.
17. Follow Referrals - select this option to allow the Power IQ LDAP client to follow referrals provided by the LDAP server if referral objects are encountered.
18. Search Credentials:
  - Leave "no search" to use the credentials provided by the user on log in.
  - Select "anonymous" if no credentials are required.

Bind	
Base DN	<input type="text"/>
Login Name Attribute	<input type="text"/>
	Suggested Value: sAMAccountName
Search Filter	<input type="text"/>
	Suggested Value: (objectClass=user)
Search Scope	Subtree ▼
Follow Referrals	<input checked="" type="checkbox"/>
Search Credentials	anonymous ▼
Admin DN	no search anonymous use admin credentials
Admin Password	<input type="password"/>

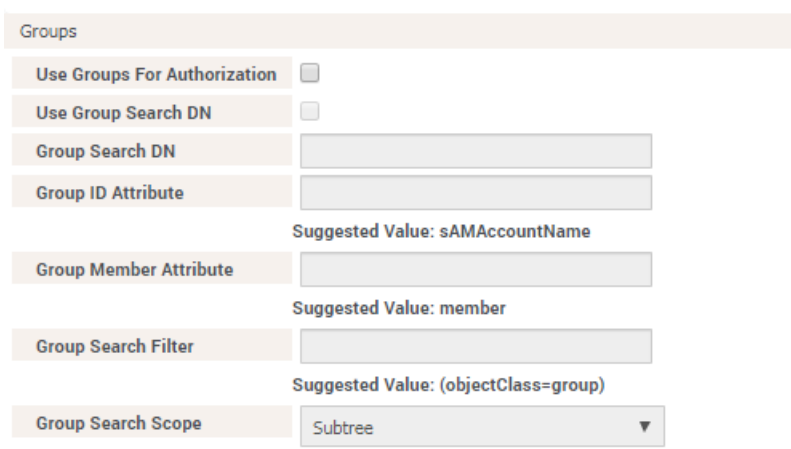
- Select "use admin credentials" and enter the admin user credentials in the Admin DN and Admin Password fields. The admin credentials will be used for the service account when conducting searches.

## Groups Information

19. User Groups for Authorization and Common Setting – 'Sync Group Members' will be used to enable the ability to automatically add and manage users from imported user groups.



20. Use Group Search DN - select to specify the group DN to search. Select this option if the group DN search is different than the search used for users.
21. Group Search DN - this is where the search for the user group will begin in the directory.
22. Group ID Attribute - the default for Active Directory is sAMAccountName.
23. Group Member Attribute - the default for Active Directory is member.
24. Group Search Filter - the default for Active Directory is (objectClass=group).
25. Group Search Scope - level of the server directory to look for groups; either the Base DN and one level below the Base DN, or the Base DN and the entire subtree.



Groups

Use Groups For Authorization

Use Group Search DN

Group Search DN

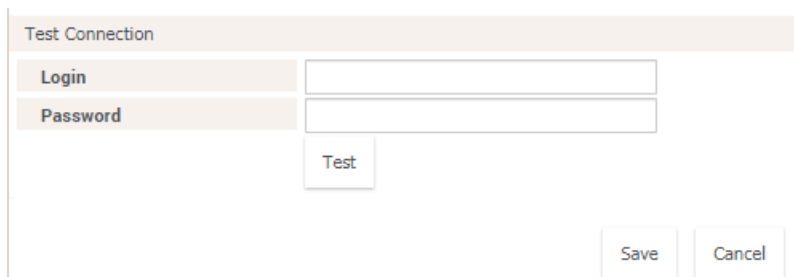
Group ID Attribute   
Suggested Value: sAMAccountName

Group Member Attribute   
Suggested Value: member

Group Search Filter   
Suggested Value: (objectClass=group)

Group Search Scope

26. Optional Test Connection is to test with an account. If you have a known, valid test account to use to test the server setup, you can test from here without having to try to login with that account.



Test Connection

Login

Password

27. Click Save to save the settings and add the server.

Once added, the server is listed on the Add LDAP Server page.



LDAP Servers			
<input checked="" type="checkbox"/> LDAP is enabled			
<a href="#">Add Server</a> <a href="#">Search</a> <a href="#">Common Settings</a>			
Order	Host	Port	Type
1	ldap.raleigh.raritan.com	389	LDAP Server
2	10.34.0.107	389	Active Directory Server

## LDAP Server Configuration in Power IQ

### General Information

1. Select LDAP Server as the type.
2. Select the order in which the server will be listed on the LDAP Servers table. This dictates the order in which Power IQ communicates with the servers when multiple servers are configured.
3. Select the Active checkbox to enable the server, or leave it deselected and return to activate it at a later time. It must be active in order to be in use.

General	
Type	LDAP Server ▼
Order	1 ▼
Active	<input checked="" type="checkbox"/>

The following steps describe LDAP settings you configure. Scroll up to view Active Directory settings if you are configuring an Active Directory server.

### Connection Information

4. Domain - does not apply to LDAP.
5. Use Host - select to use a specific hostname or IP address to access the LDAP server.
6. Hostname/IP Address - enter the LDAP server's hostname or IP address when Use Host is selected.
7. Use TLS/SSL - select if using TLS/SSL encryption.
8. Port - the default is Port 389 if TLS/SSL encryption is not enabled, and Port 636 is the default if TLS/SSL encryption is enabled. The port number can be edited to a different value, if necessary.



Connection	
Domain	<input type="text" value="192.168.46.14"/>
Use Host	<input type="checkbox"/>
Hostname/IP-Address	<input type="text"/>
Encryption	<input type="radio"/> None <input type="radio"/> SSL/TLS <input type="radio"/> StartTLS
Port	<input type="text"/>
Check Server Certificate	<input type="checkbox"/>

[Manage certificates](#)

### (Optional) Manage Certificates

9. If you need to validate certificates, select Check Server Certificate.
10. Next, click Manage Certificates to open the Trusted Certificates page.

Connection	
Domain	<input type="text" value="192.168.46.14"/>
Use Host	<input type="checkbox"/>
Hostname/IP-Address	<input type="text"/>
Encryption	<input type="radio"/> None <input type="radio"/> SSL/TLS <input type="radio"/> StartTLS
Port	<input type="text" value="339"/>
Check Server Certificate	<input type="checkbox"/>

[Manage certificates](#) ←

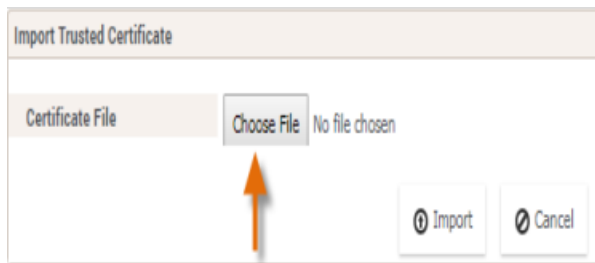
11. Click Import Certificate to open the Import Trusted Certificate page.

Trusted Certificates	
<a href="#">Import Certificate</a> ←	
Title	
<i>No certificates have been imported yet.</i>	

12. Click on the "Choose File" text box to open your browser to locate the certificate, then click Import to import the cer-



tificate.



You can use the Back button in your browser to return to the Add LDAP Server page.

## Bind Information

The information entered here identifies where searches are performed to locate users on the server.

13. Base DN - specify a Base DN (directory level/entry) under which the authentication search query will begin. Power IQ can do a recursive search downward from this Base DN.

For example, depending on the scope of the search, if the Base DN is `dc=sunbird,dc=com`, the search query for the user entry will be made over the whole directory structure.

If the Base DN is `cn=Administrators,cn=Users,dc=sunbird,dc=com`, the search query will begin in the Administrators sub-directory (entry).

14. Login Name Attribute - login name that corresponds to the server type. The default is the user ID.
15. Search Filter - enter a user's attributes in this field so the search query will be restricted to only those entries that meet this criterion. The default is `(objectClass=inetOrgPerson)`.
16. Search Scope - level of the server directory to look for users; either the Base DN and one level below the Base DN, or the Base DN and the entire subtree below.
17. Follow Referrals - select this option to allow the Power IQ LDAP client to follow referrals provided by the LDAP server if referral objects are encountered.
18. Search Credentials - leave "no search" selected if no search is required.
  - Select "anonymous" if no credentials are required.
  - Select "use admin credentials" and enter the Admin DN username and Admin Password. These credentials will be used for the service account when conducting searches.



Bind	
Base DN	<input type="text"/>
Login Name Attribute	<input type="text"/>
	Suggested Value: uid
Search Filter	<input type="text"/>
	Suggested Value: (objectClass=inetOrgPerson)
Search Scope	Subtree ▼
Follow Referrals	<input checked="" type="checkbox"/>
Search Credentials	anonymous ▼
	no search
	<b>anonymous</b>
	use admin credentials
Admin DN	<input type="text"/>
Admin Password	<input type="password"/>

## Groups Information

19. User Groups for Authorization and Common Setting – ‘Sync Group Members’ are used to enable automatically adding and managing users from imported user groups.
20. Use Group Search DN - select to specify the group DN to search. Select this option if the group DN search is different than the search used for users.
21. Group Search DN - this where the search for user groups will begin in the directory.
22. Group ID Attribute - the default is gidNumber.
23. Group Member Attribute - the default is memberUid.
24. Group Search Filter - the default is(objectClass=posixGroup).
25. Group Search Scope - level of the server directory to look for groups; either the Base DN and one level below the Base DN, or the Base DN and the entire subtree.

Groups	
Use Groups For Authorization	<input type="checkbox"/>
Use Group Search DN	<input type="checkbox"/>
Group Search DN	<input type="text"/>
Group ID Attribute	<input type="text"/>
	Suggested Value: gidNumber
Group Member Attribute	<input type="text"/>
	Suggested Value: memberUid
Group Search Filter	<input type="text"/>
	Suggested Value: (objectClass=posixGroup)
Group Search Scope	Subtree ▼



- Optional Test Connection is to test with an account. If you have a known, valid test account to use to test the server setup, you can test from here without having to try to login with that account.

**Test Connection**

**Login**

**Password**

- Click Save to save the settings and add the server.

Once added, the server is listed on the Add LDAP Server page.

LDAP Servers			
<input checked="" type="checkbox"/> <b>LDAP is enabled</b> <input type="button" value="Add Server"/> <input type="button" value="Search"/> <input type="button" value="Common Settings"/>			
Order	Host	Port	Type
1	ldap.raleigh.raritan.com	389	LDAP Server
2	10.34.0.107	389	Active Directory Server

## Search for Remote Users and/or User Groups and Add Them to Power IQ

- On the Add LDAP Server page, click Search.

LDAP Servers			
<input checked="" type="checkbox"/> <b>LDAP is enabled</b> <input type="button" value="Add Server"/> <input style="border: 2px solid orange;" type="button" value="Search"/> <input type="button" value="Common Settings"/>			
Order	Host	Port	Type
1	ldap.raleigh.raritan.com	389	LDAP Server
2	10.34.0.107	389	Active Directory Server

The Search for LDAP Users and Groups page opens.

- Select the server you want to search.

The remaining server information is completed based on the server you selected earlier, or you can edit the information by entering a new server to search.

- Select the type of search - Users or Groups, depending on how the server is configured in Power IQ.
- Select the Follow Referrals checkbox, if desired.



5. Search Scope is prepopulated based on the scope you defined when adding the server.

You can change the scope of the search, if desired.

This is the level of the server directory to look for users or groups. You can search just the Base DN by selecting "Base", search the Base DN and one level below the Base DN by selecting "One", or search the Base DN and the entire subtree by selecting "Subtree".

**Search for LDAP Users and Groups**

<b>Authenticate</b>	
Server	10.34.0.107 ▼
* Search Credentials	stored admin credentials ▼
<b>Search</b>	
Type	Users ▼
Base DN	CN=Users,DC=dct,DC=somerset,DC=com
Search Filter	(&(objectclass=user)(memberOf=CN=dcTG
Search Scope	Subtree ▼
Follow Referrals	<input checked="" type="checkbox"/>

Search Cancel

6. Click Search to locate users or user groups on the server.

7. A list of results is displayed once found. You can now add users and/or groups to Power IQ from those found.

To add users or groups found in an LDAP search, select the checkbox next to each user and/or user group in the list, then click Add.

In order to search and add user groups, the 'Use Groups for Authorization' option must be enabled on the Server page.

When searching for and adding user groups, one or more groups can be selected at a time. The users will not be automatically added unless the Common Settings – 'Sync Group Members' is enabled.

Rows: 1-17 of 170   Columns: 7

<input type="checkbox"/>	Login	First Name	Last Name	Email	DN	
<input type="checkbox"/>	bin	undefined	undefined	undefined	uid=bin,ou=People,dc=oc	<a href="#">Add this user</a>
<input type="checkbox"/>	daemon	undefined	undefined	undefined	uid=daemon,ou=People,dc=oc	<a href="#">Add this user</a>
<input type="checkbox"/>	adm	undefined	undefined	undefined	uid=adm,ou=People,dc=oc	<a href="#">Add this user</a>
<input type="checkbox"/>	lp	undefined	undefined	undefined	uid=lp,ou=People,dc=oc	<a href="#">Add this user</a>
<input type="checkbox"/>	sync	undefined	undefined	undefined	uid=sync,ou=People,dc=oc	<a href="#">Add this user</a>
<input type="checkbox"/>	shutdown	undefined	undefined	undefined	uid=shutdown,ou=People,dc=oc	<a href="#">Add this user</a>
<input type="checkbox"/>	halt	undefined	undefined	undefined	uid=halt,ou=People,dc=oc	<a href="#">Add this user</a>
<input type="checkbox"/>	mail	undefined	undefined	undefined	uid=mail,ou=People,dc=oc	<a href="#">Add this user</a>
<input type="checkbox"/>	news	undefined	undefined	undefined	uid=news,ou=People,dc=oc	<a href="#">Add this user</a>
<input type="checkbox"/>	uucp	undefined	undefined	undefined	uid=uucp,ou=People,dc=oc	<a href="#">Add this user</a>
<input type="checkbox"/>	operator	undefined	undefined	undefined	uid=operator,ou=People,dc=oc	<a href="#">Add this user</a>
<input type="checkbox"/>	games	undefined	undefined	undefined	uid=games,ou=People,dc=oc	<a href="#">Add this user</a>
<input type="checkbox"/>	gopher	undefined	undefined	undefined	uid=gopher,ou=People,dc=oc	<a href="#">Add this user</a>
<input type="checkbox"/>	ftp	undefined	undefined	undefined	uid=ftp,ou=People,dc=oc	<a href="#">Add this user</a>
<input type="checkbox"/>	mysql	undefined	undefined	undefined	uid=mysql,ou=People,dc=oc	<a href="#">Add this user</a>
<input type="checkbox"/>	nscd	undefined	undefined	undefined	uid=nscd,ou=People,dc=oc	<a href="#">Add this user</a>
<input type="checkbox"/>	rpcuser	undefined	undefined	undefined	uid=rpcuser,ou=People,dc=oc	<a href="#">Add this user</a>

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When searching for and adding user groups, clicking on a user group causes the group members to be listed below the user group grid. One or more group members can be selected to be added.



Found LDAP Groups			
<input type="button" value="Add"/>	<input type="button" value="New Search"/>		
<input type="checkbox"/>	Group ID	Name	DN
<input type="checkbox"/>	dcTGK	dcTGK	CN=dcTGK,CN=Users,DC=dct.DC... Exists as LDAP group

Group Members of dcTGK						
<input type="button" value="Add"/>	<input type="button" value="New Search"/>					
<input type="checkbox"/>	Login	First Name	Last Name	Email	DN	
<input type="checkbox"/>	gk101.user@test.com	gk101First	gk101Last	gk101@sunbirdcim.com	CN=gk101.user@test.com,CN=U...	Exists as LDAP user
<input type="checkbox"/>	gk104	gk104First	gk104Last	gk104@sunbirdcim.com	CN=gk104First gk104Last,CN=...	Exists as LDAP user
<input type="checkbox"/>	henryg	henry	Gonzalez	henryg@sunbirdcim.com	CN=henry Gonzalez,CN=Users,...	Exists as LDAP user
<input type="checkbox"/>	funny.user_myemail	funny	user		CN=funny.user@myemail.com,C...	Exists as LDAP user
<input type="checkbox"/>	test.user	test	user	testuser@test.com	CN=test user,CN=Users,DC=dc...	Exists as LDAP user

Successfully added users/user groups are listed as "Exists as LDAP user" and the checkbox next to the name is removed. Once added, individual users are granted distinct permissions and authenticated on a per user basis.

Users in user groups are granted common access to specific features or functionality.

Any changes you make to a user or user group on the server are reflected in Power IQ. For example, if you delete a user from a user group, they are no longer able to access the features they previously could in Power IQ.

### Edit User Information and Configure Power IQ Login Credentials

This information can be edited and configured now or at a later time.

- To edit user information or login credentials, navigate to Settings > User Accounts.



**User Accounts**
 Activities ▾

**User accounts**
[Add Local User](#)   [Find LDAP Users](#)   [Deactivate Users](#)   [Activate Users](#)   [Remove Users](#)

✓	Login	First Name	Last Name	Email	LDAP DN
✓	admin	System	Administrator	admin@localhost	
✓	billy			bill.youngblood@raritan.com	uid=billy,ou=People,dc=oculan
✓	chris	Chris	Trovato	Chris.Trovato@raritan.com	
✓	cschulze	Chris	Schulze	chris.schulze@sunbirdcim.com	uid=cschulze,ou=People,dc=oculan
✓	dametriousp	Dametrious	Peyton	dametriousp@raritan.com	uid=dametriousp,ou=People,dc=oculan
✓	davidr	David	Robinson	david.robinson@sunbirdcim.com	uid=davidr,ou=People,dc=oculan
✓	ethanm	Ethan	Michaels	ethan.michaels@sunbirdcim.com	uid=ethanm,ou=People,dc=oculan
✓	garye	gary	elango	gary.elango@sunbirdcim.com	
✓	hankg	Hank	Gonzalez	henry.gonzalez@sunbirdcim.com	
✓	harrieta	Harriet	Ashcroft	Harriet.Ashcroft@raritan.com	uid=harrieta,ou=People,dc=oculan
✓	james	James	Daly	James.Daly@raritan.com	
✓	jamesc	James	Cerwinski	James.Cerwinski@raritan.com	uid=jamesc,ou=People,dc=oculan
✓	jasons	Jason	Sylvia	jason.sylvia@raritan.com	uid=jasons,ou=People,dc=oculan

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You can easily identify users added via LDAP since the LDAP DN field is populated in their row.

9. Click on a user's name to open their User Information page.
10. Click Edit on the User Information page.
11. All editable fields are activated.



Sunbird® Power IQ®   Dashboards   Data Centers   Events   Facility Items   IT Devices   Sensors   PUE   Analytics   Reports   **Settings**

**Details for billy**   Activities ▾

**User Information for billy**

[Edit](#)   [Change Password](#)   [Manage Event Notifications](#)

Login: billy

First Name: !

Last Name: !

Email: bill.youngblood@raritan.com

LDAP DN: uid=billy,ou=People,dc=oculan,dc=com

Created: 08/07/13 02:50:23 PM EDT

Last Updated: 10/02/15 02:19:33 PM EDT

Description:

**User Roles**

Select a role to add...   [+ Add](#)   [- Remove](#)   [Empty](#)

Name	Label	Source
<input type="checkbox"/> Site Administrator	Power IQ system settings and administrat...	Group: System Test

Page 1 of 1   [Refresh](#)   Displaying 1 - 1 of 1

**User Groups**

Select a group to add...   [+ Add](#)   [- Remove](#)   [Empty](#)

Name
<input type="checkbox"/> All Users
<input type="checkbox"/> System Test

Page 1 of 1   [Refresh](#)   Displaying 1 - 2 of 2

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12. Login is required and must contain the username. 3 characters minimum. 40 characters maximum.

---

*Important: If authentication is required by your email system, the Power IQ username must be the same as the user's email account username\*. If the usernames do not match, emails cannot be successfully sent from Power IQ.*

---

For example, if the username assigned to an email account is jqpublic, the Power IQ username must be jqpublic.

If authentication is not required by your system, usernames do not have to match.

13. Required Mail is required and must contain a correctly formatted email address.

---

*Note: Account username refers to the username assigned to the email account; it does not refer to the name portion of the user's email address. Typically, the username and name portion of an email are the same, but this may not be the case.*

---

## Configure Common Server Settings

Power IQ allows you to configure common settings that control the number of users and/or user groups returned in a search. This feature also allows you to enable LDAP syncing. LDAP syncing controls the interval between when Power IQ and the LDAP server are synchronized.

There are several times when group synchronization will occur. Note that in each of these scenarios both the "Sync Group Members" option found on the Common Settings page and the "Use Groups for Authorization" option found on the Settings page for each individual server must be enabled. If either of these options is not enabled, group synchronization will not occur.

Group Synchronization occurs:

- During periodic sync as determined by the Sync Interval defined in Common Settings
- When performing a manual sync by clicking the "Sync Now" button in Common Settings
- When a new user that does not exist in Power IQ but does exist in LDAP/AD logs into Power IQ for the first time

When an existing Power IQ user logs in, his groups are not automatically synchronized. Groups for existing users will be synchronized during the next manual or periodic sync. The user information for existing users (Name, Email) however is updated each time the user logs into Power IQ.

1. Click Common Settings on the Add LDAP Servers dialog opens.

**LDAP Servers**

**LDAP is enabled**   Add Server   Search   **Common Settings**

Order	Host	Port	Type	Active
1	ldap.raleigh.raritan.com	389	LDAP Server	false
2	10.34.0.107	389	Active Directory Server	true

The Editing Common LDAP Settings page opens.

2. Select Enabled to enable the Power IQ LDAP client
3. Select the Max Search Results from the drop-down.
4. Select the Enable LDAP Sync checkbox to enable LDAP server syncing.
5. When "Sync Group Members" and "Use Groups for Authorization" are enabled, users will be added to Power IQ automatically or removed from Power IQ once the user groups are imported into Power IQ.
6. Select the Synch Interval from the drop-down. Updates will be made whenever a user logs in or the specified sync interval whichever comes first.
7. To sync immediately, click Save and then click Sync Now.





- Click Save to save the settings. You can use the Back button in your browser to return to the Add LDAP Server page.

**Editing Common LDAP Settings**

---

General

**Enabled**

**Max Search Results**

---

Sync

**Enable LDAP Sync**

**Sync Group Members**

**Sync Interval**

Note: You need to save the settings to make them apply to the sync button.

- 

## Enable or Disable LDAP in Power IQ

This enables or disables LDAP support in dcTrack. It does not enable or disable a specific LDAP server.

- If LDAP is disabled, click the "LDAP is disabled" button to enable it.

**LDAP Servers**

**LDAP is enabled**

Order	Host	Port	Type	
1	ldap.raleigh.raritan.com	389	LDAP Server	fa
2	10.34.0.107	389	Active Directory Server	tr

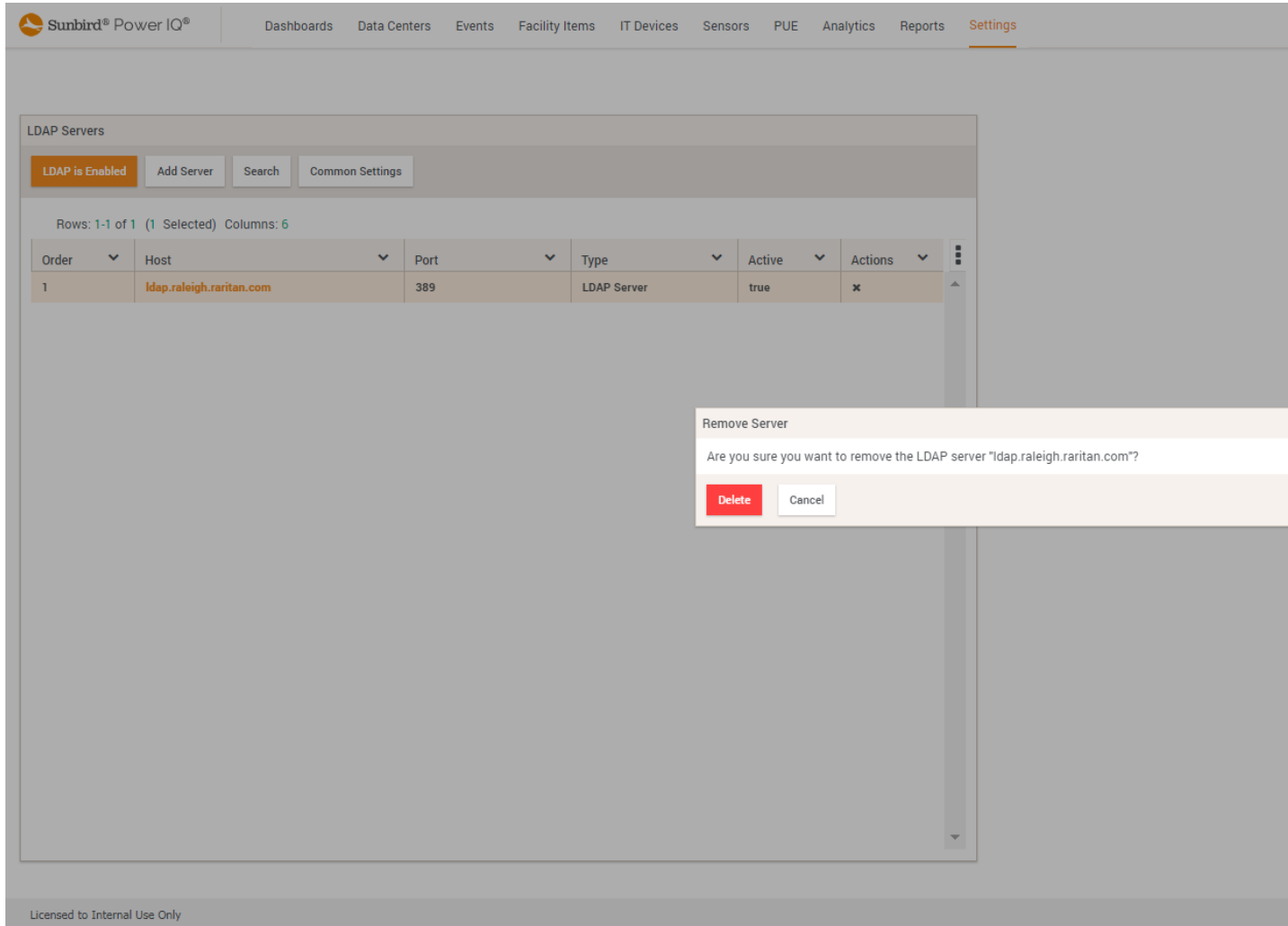
- Once enabled, the button changes to "LDAP is enabled". Click the button again to disable LDAP.

## Delete an LDAP Server

- Click the Xlink in the row of the LDAP server you want to delete.



2. Click OK when prompted to delete.



The screenshot shows the Sunbird Power IQ interface. The top navigation bar includes "Dashboards", "Data Centers", "Events", "Facility Items", "IT Devices", "Sensors", "PUE", "Analytics", "Reports", and "Settings". The "LDAP Servers" section is active, showing a table with one server entry. A modal dialog titled "Remove Server" is displayed, asking for confirmation to delete the server "ldap.raleigh.raritan.com".

LDAP Servers

LDAP is Enabled Add Server Search Common Settings

Rows: 1-1 of 1 (1 Selected) Columns: 6

Order	Host	Port	Type	Active	Actions
1	ldap.raleigh.raritan.com	389	LDAP Server	true	x

Remove Server

Are you sure you want to remove the LDAP server "ldap.raleigh.raritan.com"?

Delete Cancel

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# Adding, Editing, and Deleting User Groups

## Default User Groups

There are two default user groups, All Users and Site Administrators.

The All Users group contains every user you add to Power IQ, and has the View role assigned to it.

The Site Administrators group contains the Admin user, and has the Site Administrator role assigned to it. The Site Administrator role allows users to do all tasks in Power IQ.

You can change the roles assigned to both groups.



## Limiting View Permissions

By default in Power IQ, all users are assigned to a group called All Users. You cannot remove users from this group.

The All Users group includes the View role by default. If you wanted to limit the viewing permissions of your users, you must remove the View role from the All Users group.

Your users will need to be assigned view permissions in some other way. There are several ways to do this.

Make sure each user is in a group with the View role assigned at the appropriate EDM node.

Make sure each user is in a group with another role assigned that includes View permissions, such as Operator.

Assign the View role, or another role that includes View permissions, such as Operator, directly to the user.



# Assigning Roles for User Permissions

## Power IQ Role Definitions

Assign these roles to users or user groups to allow the permissions for operations within Power IQ.

You can assign any role to apply globally, meaning access to perform the tasks will be granted for every object in Power IQ.

### Example

A user assigned a global Power Control role can perform power control on any PDU or IT device, no matter where it is in the enterprise data model.

See *Assign Roles to a User Group* on page 346 and *Assign Roles to a User* on page 344.

Or, you can assign the Administrator, Operator, View, and Power Control roles to apply only to a certain object in your enterprise data model, such as a rack. See *Assign Roles within a Data Center* on page 348. When these roles are assigned to the user or user group directly at the EDM-node-level via the Data Centers tab, the permission allowed will be limited to the selected enterprise data object, and all levels beneath it.

Role	Tasks	Applies To
<p>Site Administrator</p> <p>The Site Administrators group is assigned this role by default, and contains the Admin user.</p> <p>"Super user"</p>	<p>Every task in Power IQ.</p> <p>Full permissions to Settings tab.</p> <p>Full permissions to Dashboards tab.</p> <p>Full permissions to create Tags in the Reports tab, and to tag nodes in the EDM.</p> <p>Full permissions of View, Power Control, Door Control, Create Reports and Dashboards, and Event Manager.</p>	<p>Power IQ</p> <p>Global only.</p>
<p>Administrator</p>	<p>Administrator role includes the permissions of View, Power Control, Create Reports and Dashboards, and Event Manager.</p> <p>Full permissions to Dashboards tab.</p> <p>Permission to tag nodes in the EDM.</p> <p>Excludes the Settings tab, other than personal user profile settings.</p>	<p>Global, when applied in Settings &gt; Authorization &amp; Authentication &gt; User Accounts page.</p> <p>Selected EDM node and down, when applied in Data Centers tab. NOTE: Applying Administrator in the Data Centers tab also excludes permission to view the Analytics tab and the Events tab.</p>
<p>Operator</p>	<p>Operator role includes the permissions</p>	<p>Global, when applied in Settings &gt; Authorization &amp;</p>



Role	Tasks	Applies To
	<p>of View and Door Control.</p> <p>View permissions to Dashboards tab reports; upload drawing permission for Floor Maps in Dashboards tab.</p> <p>Excludes creating reports in Dashboards tab.</p> <p>Permission to tag nodes in the EDM.</p> <p>Excludes the Settings tab other than personal user profile settings, Power Control, Door Control, Create Reports and Dashboards, and Event Manager.</p>	<p>Authentication &gt; User Accounts page.</p> <p>Selected EDM node and down, when applied in Data Centers tab</p>
View	<p>View role has permission to:</p> <p>View EDM in the Data Centers tab.</p> <p>View EDM nodes in Floor Maps.</p> <p>View data from EDM nodes in Reports tab.</p> <p>View door smart pages.</p> <p>View all other tabs in Power IQ with the exception of the Events tab</p> <p>View personal user profile settings in the Settings tab.</p>	<p>Global, when applied in Settings &gt; Authorization &amp; Authentication &gt; User Accounts page.</p> <p>Selected EDM node and down, when applied in Data Centers tab</p>
Power Control	<p>Power Control role has permission to:</p> <p>Power control.</p> <p>Create device groups.</p> <p>View devices, device groups, PDUs, Data Centers tab, and Dashboards tab.</p>	<p>Global, when applied in Settings &gt; Authorization &amp; Authentication &gt; User Accounts page.</p> <p>Selected EDM node and down, when applied in Data Centers tab</p> <p>See <i>Permissions for Power Control on a Device Group</i> on page 349 for details on this task.</p>
Door Control	<p>Door Control role has permission to:</p> <p>Lock/Unlock doors.</p>	<p>Global, when applied in Settings &gt; Authorization &amp; Authentication &gt; User Accounts page.</p> <p>Selected EDM node and down, when applied in Data Centers tab.</p> <p>Individual doors.</p>
View Tag Groups	<p>View Tag Groups role has permission to:</p>	<p>Global, when applied in Settings &gt; Authorization &amp; Authentication &gt; User Accounts page.</p>



Role	Tasks	Applies To
	View Tags and Tag Groups.	Selected EDM node and down, when applied in Data Centers tab.
Create Analytics	Create Analytics role has permission to: Create reports and charts in the Analytics tab.	Global only, applied in Settings > Authorization & Authentication > User Accounts page. The information a user can include or view in a report or chart is based on View permissions. A user with this role also needs the View role, or another role that includes View permission.
Create Dashboards	Create Dashboards role has permission to: Create dashboards in the Dashboards tab.	Global only, applied in Settings > Authorization & Authentication > User Accounts page. The information a user can include or view in a dashboard is based on View permissions. A user with this role also needs the View role, or another role that includes View permission.
Create Event Notifications	Create Event Notifications role has permission to: View the Manage Event Notifications screen. Create event notification filters.	Global only, applied in Settings > Authorization & Authentication > User Accounts page. A user with this role also needs the Event Manager role to view the Events tab.
Event Manager	Event Manager role has permission to: View the Events tab. View and clear events. View events in the Smart views. View Floor Maps in the Dashboard.	Global only, applied in Settings > Authorization & Authentication > User Accounts page.
Keypad PIN	"Keypad PIN" role has the permission to create or change their own Keypad PIN code.	Global only, applied in Settings > Authorization & Authentication > User Accounts page.



## Assign Roles to a User

Roles assigned to groups or users in the Settings tab give permissions that apply to all Data Centers, PDUs and Devices in Power IQ. These are sometimes referred to as "global" roles.

You can also assign the Administrator, Operator, Power Control, and View roles to a user or user group, but limit the role to only a specific level of a data center. To limit the permission, assign the role in the Data Centers tab, in the Permissions section of the data center level the role should cover. See [Assign Roles within a Data Center](#).

You must be assigned the Site Administrator role to assign roles.

1. In the Settings tab, click User Accounts. Select a user then click Edit.
2. In the User Roles section, select roles in the drop-down list, then click Add to assign the permission to the user. Roles assigned to the user appear in the list.

Users can perform the tasks allowed by the roles assigned.





## Remove Roles from a User

1. Click Settings.
2. Click User Accounts.
3. Select a user and click Edit.
4. In the User Roles list, select a role, then click Remove. The user can no longer perform the tasks allowed by the role.



## Assign Roles to a User Group

Roles assigned to users or user groups in the Settings tab give permissions that apply to all Data Centers, PDUs and Devices in Power IQ.

You can also assign the Administrator, Operator, Power Control, and View roles to a user or user group, but limit the role to only a specific level of a data center. To limit the permission, assign the role in the Data Centers tab, in the Permissions section of the data center level the role should cover. See [Assign Roles within a Data Center](#).

You must be assigned the Site Administrator role to assign roles.

1. In the Settings tab, click User Groups.
2. Select a user group, then click Edit.
3. In the Group Roles section, select roles in the drop-down list, then click Add to assign the permission to the group. Roles assigned to the group appear in the list.
4. Users can perform the tasks allowed by the roles assigned to the group.



## Remove Roles from a User Group

1. In the Settings tab, click User Groups.
2. Select a user group then click Edit.
3. Select a role, then click Remove. Users in the group can no longer perform the tasks allowed by the role.

OR

1. In the Settings tab, click User Groups.
2. Select a user group then click Edit.
3. In the Group Roles section, click Empty.

## Assign Roles within a Data Center

You can control what individual users or user groups can see and do in Power IQ at each level in each data center. Permissions extend to levels nested below the selected level.

You can also assign global permissions for users and user groups for all levels of all data centers in Power IQ, and to PDUs not mapped into a data center. See [Assign Roles to a User](#) and [Assign Roles to a User Group](#).

Permissions are included in different roles that you assign.

You must be assigned the Site Administrator role to assign roles.

1. In the Data Centers tab, select a data center level, such as a rack. The details page opens. At the Rack and PDU levels, the Smart Rack or Smart PDU view opens. See [Smart Rack View](#) and [Smart PDU View](#)
2. Permissions are accessed differently for Racks and PDUs than all other enterprise data model levels.
  - For Data Centers, Rooms, Aisles, and Rows, use the Permissions section in the Data Centers tab to view or assign roles.
  - For Racks, click [Configure Rack Details](#) in the Smart Rack view to open a dialog that contains permissions settings.
  - For PDUs, click [Configure PDU Details](#) in the Smart PDU view to open a dialog that contains permissions settings.
3. Click [Add Role to > Add User Role](#) or [Add Role to > Add Group Role](#). Adding a Group Role will give permissions selected to all users in the group. Then, select the user or group who needs permission to this object. level of the data center.
4. Select the role to allow in the Roles list. Click OK.



## Permissions for Power Control on a Device Group

To perform power control operations on a device group, your permissions must satisfy one of the following.

- You have the global power control role.

**OR**

- You are the creator of the device group AND you have the power control role assigned within the Data Centers tab for every device in the device group.



# Chapter 9: Dashboard

The Power IQ dashboard allows each user to customize collections of charts and widgets in a single view. You can create multiple versions of your dashboard and select which one to view, or start a slideshow for all or selected dashboards.

The default dashboard configuration includes two rows. The top row includes a health chart that shows overall PDU health. The second row is a device chart that shows average active power over the past 24 hours.

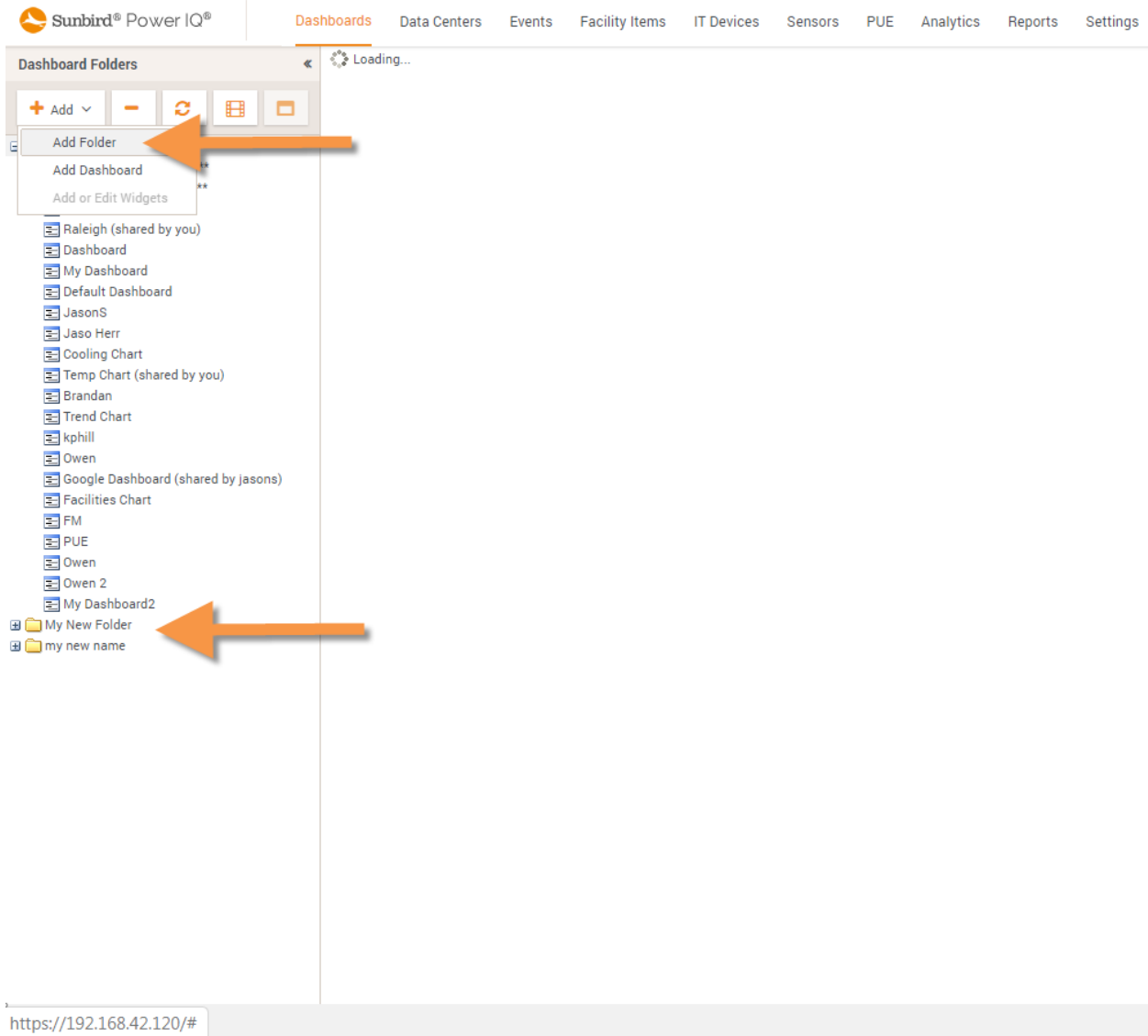
You must have the Create Dashboards role to edit the dashboard.



# Manage Dashboards

## Add a Dashboard Folder

1. In the Dashboards tab, click the "+ Add" button
2. Select "Add Folder"



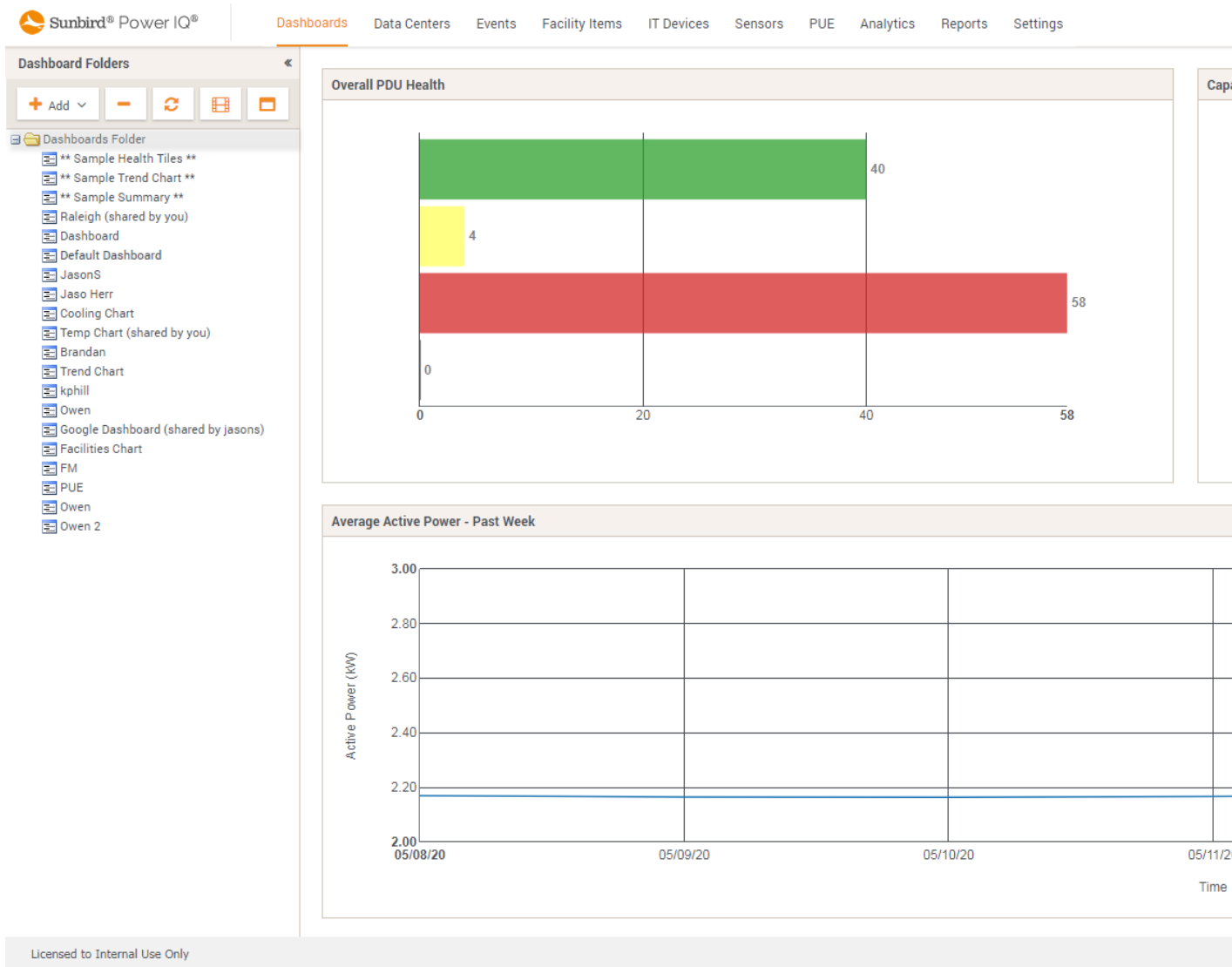
3. Click "My Folder" and backspace to delete the default name and replace with a the name of your choice

## Adding a Dashboard

You can configure more than one version of the dashboard so that each has different widgets, charts or layouts.

If any dashboard version is not needed anymore, you can remove it, but you can only remove the dashboards that you created.

1. In the Dashboards tab, click the folder you want to create the dashboard in



The screenshot shows the Sunbird Power IQ® Dashboards interface. On the left, a 'Dashboard Folders' sidebar contains a list of folders and charts, including 'Sample Health Tiles', 'Sample Trend Chart', 'Sample Summary', and various user-specific dashboards like 'Raleigh', 'JasonS', and 'Owen 2'. The main area displays two charts:

- Overall PDU Health:** A horizontal bar chart with three bars. The top bar is green and labeled '40'. The middle bar is yellow and labeled '4'. The bottom bar is red and labeled '58'. The x-axis ranges from 0 to 58.
- Average Active Power - Past Week:** A line chart showing 'Active Power (kW)' on the y-axis (ranging from 2.00 to 3.00) against 'Time' on the x-axis (ranging from 05/08/20 to 05/11/20). The chart shows a flat blue line at approximately 2.15 kW.

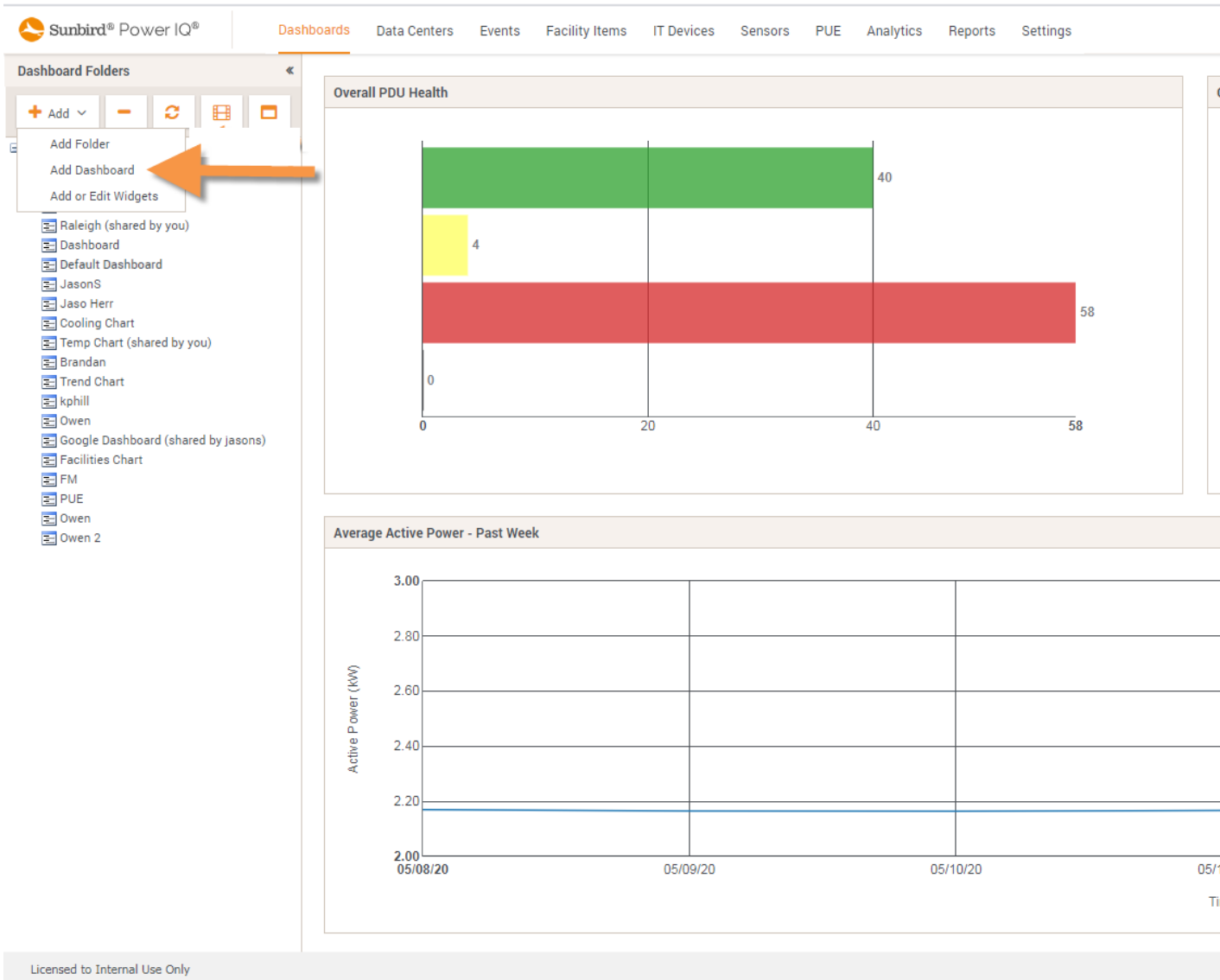
At the bottom of the interface, it says 'Licensed to Internal Use Only'.

2. Click the "+ Add" button





### 3. Select "Add Dashboard"



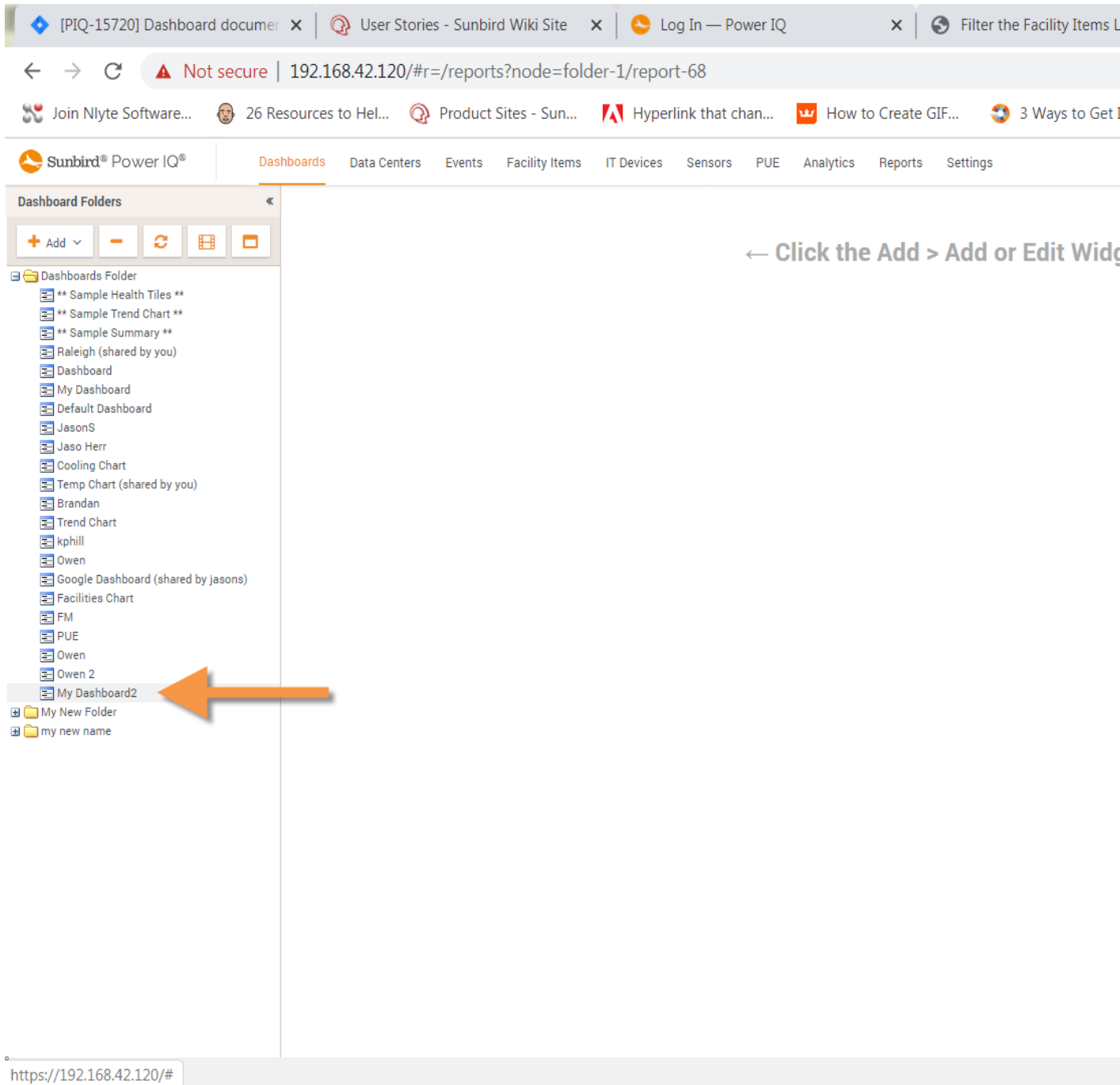
The screenshot displays the Sunbird Power IQ interface. At the top, there is a navigation bar with the Sunbird logo and the text "Sunbird® Power IQ®". Below this, a menu bar contains several options: Dashboards, Data Centers, Events, Facility Items, IT Devices, Sensors, PUE, Analytics, Reports, and Settings. The "Dashboards" option is currently selected and highlighted in orange.

On the left side, there is a "Dashboard Folders" panel. It features a toolbar with icons for adding, removing, refreshing, and viewing widgets. A dropdown menu is open, showing the following options: "Add Folder", "Add Dashboard" (highlighted with an orange arrow), and "Add or Edit Widgets". Below the menu, a list of dashboard folders is visible, including "Raleigh (shared by you)", "Dashboard", "Default Dashboard", "JasonS", "Jaso Herr", "Cooling Chart", "Temp Chart (shared by you)", "Brandon", "Trend Chart", "kphill", "Owen", "Google Dashboard (shared by Jasons)", "Facilities Chart", "FM", "PUE", "Owen", and "Owen 2".

The main content area displays two charts. The top chart is titled "Overall PDU Health" and is a horizontal stacked bar chart. The x-axis represents a percentage from 0 to 58. The bar is composed of three segments: a green segment from 0 to 40 (labeled "40"), a yellow segment from 40 to 44 (labeled "4"), and a red segment from 44 to 58 (labeled "58"). The bottom chart is titled "Average Active Power - Past Week" and is a line chart. The y-axis is labeled "Active Power (kW)" and ranges from 2.00 to 3.00. The x-axis shows dates from 05/08/20 to 05/10/20. The chart shows a flat line at approximately 2.15 kW.

At the bottom of the interface, there is a footer that reads "Licensed to Internal Use Only".

- Click "My Dashboard" and backspace to delete the default name and replace with a the name of your choice



The screenshot shows a web browser window with the Sunbird Power IQ interface. The address bar shows the URL `192.168.42.120/#r=/reports?node=folder-1/report-68`. The navigation menu includes "Dashboards", "Data Centers", "Events", "Facility Items", "IT Devices", "Sensors", "PUE", "Analytics", "Reports", and "Settings". The "Dashboards" section is active, displaying a "Dashboard Folders" panel. This panel has a toolbar with an "Add" button and other icons. Below the toolbar is a list of dashboard folders, including "Sample Health Tiles", "Sample Trend Chart", "Sample Summary", "Raleigh", "Dashboard", "My Dashboard", "Default Dashboard", "JasonS", "Jaso Herr", "Cooling Chart", "Temp Chart", "Brandon", "Trend Chart", "kphill", "Owen", "Google Dashboard", "Facilities Chart", "FM", "PUE", "Owen", "Owen 2", "My Dashboard2", "My New Folder", and "my new name". An orange arrow points to "My Dashboard2". To the right of the list, there is a text prompt: "← Click the Add > Add or Edit Widgets". The browser's address bar at the bottom shows `https://192.168.42.120/#`.

- With the dashboard selected, click the "+ Add" button
- Select "Add or Edit Widgets"
- Select one of the four "layout" options. This determines the number of rows you will have in the dashboard

8. Select your desired "Dashboard Height" option
  - "Fit to Screen" - All rows will be visible on the screen. This is a good option if you are projecting the dashboard on a large screen in your network operations center for all to see
  - "2x Screen", "3x Screen", "4x Screen" - For these options your dashboard will be "x" times larger than your screen size and provide a scroll bar for scrolling. This is a good option when placing multiple widgets (charts, gauges, floorplans etc.) on a single dashboard
9. Drag and Drop the widgets into the desired position
10. Click "Save" to save your settings

This will present your dashboard. You will now need to mouse-over each widget and select the widgets settings icon which is three horizontal bars often called a hamburger icon. The settings icon is only visible when your mouse is hovering over the widget.

## Sharing Dashboards

1. Select the dashboard folder that contains one or more of the dashboards you want to share with all users who have permission to view dashboards.
2. Click the "Share" checkbox in the row of the reports you want to share. This will share the folder and all the selected dashboards. The actual data other users see will depend on their permissions. For example: a Power IQ has two data centers – Paris and London. Paris has a load of 300 KW and London has a load of 400KW. a user will only see the data for London if their permission is limited to London hence see a load of 400KW on the total power load gauge.

## Hiding a Shared Dashboard

1. Select the dashboard folder that contains one or more shared dashboards you want to hide.
2. Uncheck the "Visible" checkbox in the row of the reports you want to hide. This will hide the dashboard. If you hide all dashboards in the shared folder then it will delete the folder and dashboards from your dashboards tab.

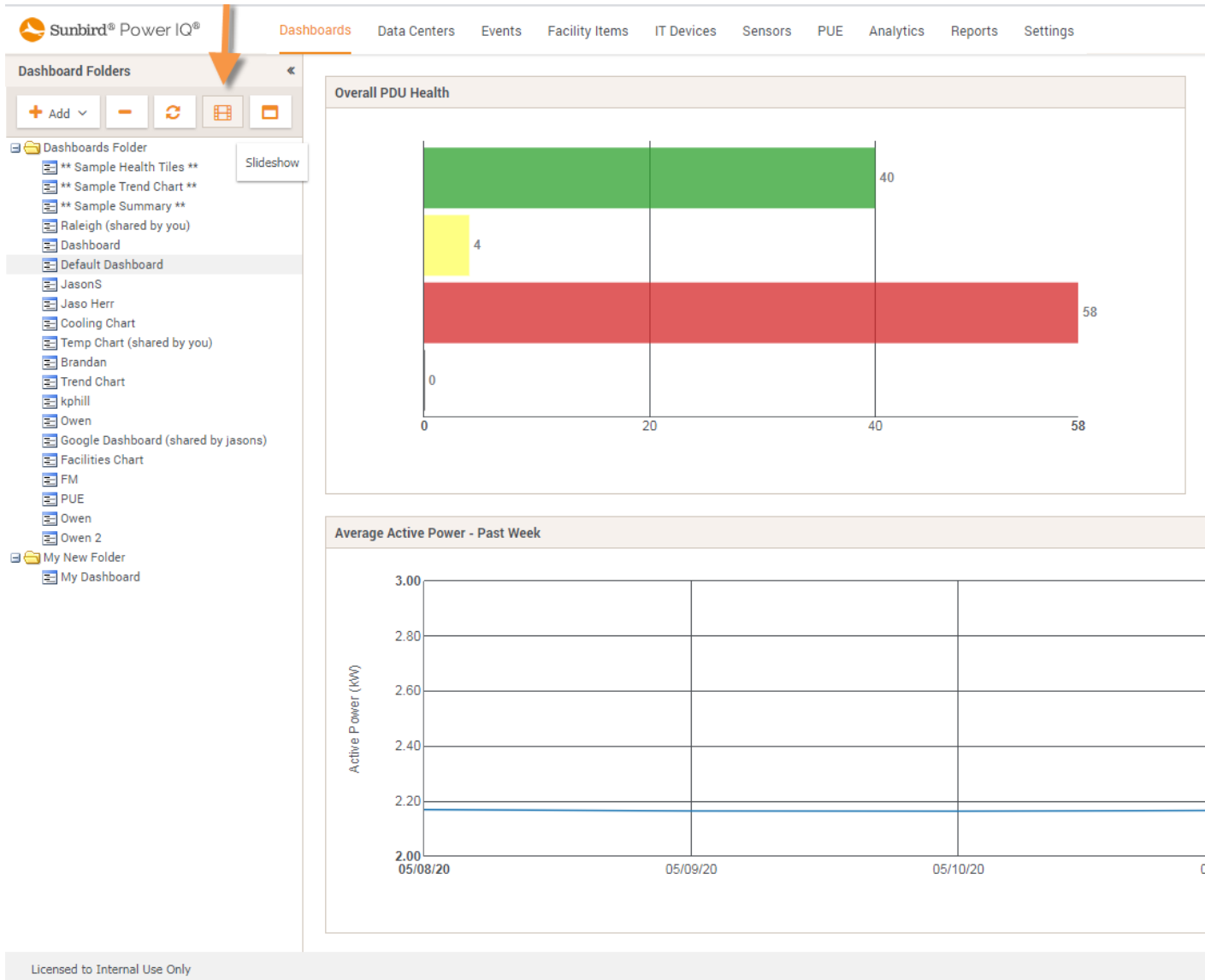
## Deleting Dashboard Folders and Dashboards

1. Select the dashboard folder and or a dashboard you want to delete.
2. Click the "-" button

## Dashboard Slide Show Mode



1. Click the slideshow button that is above your dashboard folder structure.



The screenshot shows the Sunbird Power IQ interface. On the left, the 'Dashboard Folders' pane is visible, containing a list of dashboard folders. An orange arrow points to the 'Slideshow' button located above the folder list. The main content area displays two charts:

**Overall PDU Health**

Category	Value
Green (Healthy)	40
Yellow (Warning)	4
Red (Critical)	58

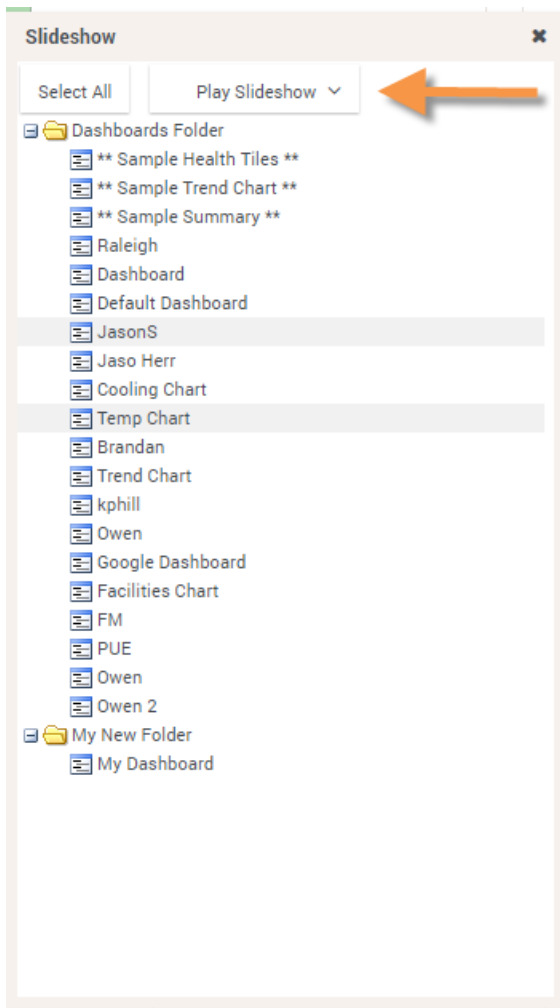
**Average Active Power - Past Week**

Date	Active Power (kW)
05/08/20	~2.18
05/09/20	~2.18
05/10/20	~2.18

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2. Select the dashboards(click on the dashboard name) you want to be in slideshow mode. Hold the Ctrl key to select multiple dashboards.
3. Click the "Play Slideshow" button and select from the dropdown the time period you want each dashboard to display for.





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*Note that the data on each dashboard will refresh with each display or 30 seconds whichever interval is shorter.*

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4. Click "Exit Full Screen" to stop the slide show.

For additional information see the video on [New Dashboard Features](#)



## Configuring Widgets

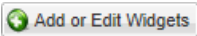
Widgets are the configurable tools and charts you can add to the dashboard layout.

### Active Events Widget

The active events widget displays the 10 highest severity, active events in a list.

You must have the Event Manager role assigned to view events. See [Assign Roles to a User](#).

The list refreshes automatically every 30 seconds.

1. Click the  button in the upper right corner of the Dashboards tab. The Dashboard Configuration dialog appears.
2. Drag and drop the Active Events widget icon into a row. See [Manage Dashboards](#) for details.



3. Click Save. The widget is added to the dashboard.
4. Click an event link to open the event details page, where you can clear the event. See [Clearing Events](#).

See [Enable or Disable Event Notifications](#) for details on receiving email notifications of events.

### Device Chart Widget


The device chart widget displays a default setting of average active power over the past 24 hours.

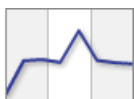
You can configure the device chart to display power measurements for different parts of the data center. Devices must be mapped to rack PDU outlets or circuits in the EDM before the data can be charted. See [Creating Your EDM](#).

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*Note: Use the Facilities Chart widget to display power measurements for your facility items. See [Facilities Chart Widget](#).*

---

1. Click the  button in the upper right corner of the Dashboards tab. The Dashboard Configuration dialog appears.
2. Drag and drop the Device Chart widget icon into a row. See [Manage Dashboards](#) for details. See [Device Chart Settings](#) for details on configuring this chart.



3. Click Save. The widget is added to the dashboard.

To use the device chart widget:

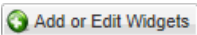
- Click the export icon  to export all data in the chart to a .CSV file.

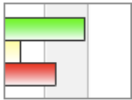
The chart will automatically refresh at each polling interval. Click the refresh icon to refresh the chart manually.


## PDU Health Chart Widget

The default PDU health chart widget shows overall health of all PDUs in the system.

You can configure the chart to show overall health, which includes connectivity and active events, or active events only, or connectivity only. You can also set the chart to include all PDUs in the system, or just the PDUs in a specific level of a data center. The chart refreshes automatically every minute.

1. Click the  button in the upper right corner of the Dashboards tab. The Dashboard Configuration dialog appears.
2. Drag and drop the PDU health chart widget icon into a row. See [Manage Dashboards](#) for details.



3. Click the Settings icon .
4. Enter a name for the chart in the Title field in the Basics section.
5. In the Data From field, select All to include all PDUs in the system in the chart. Select Data Center or other section of the data center to filter the next field's selections. For example, select Racks to filter the Contained In field to include the racks in your system.
6. In the Contained In field, select the location of the PDUs you want to include in the Health chart.
7. In the Options section, select the health measurement.
8. Select Overall Health to view a health chart that combines connectivity and active events to create an overall health status of the selected PDUs.
9. Select Event Health Only to exclude connectivity from the health status.
10. Select Connectivity Health Only to exclude active events from the health status.
11. Click Save.

See [Overall PDU Health](#) for details on how health status is determined.

12. Click a color-coded bar in the graphic to view the list of PDUs with the selected health status.

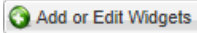
The chart will automatically refresh to show the new health status based on any new and cleared events. Click the refresh icon to refresh the chart manually.

## Capacity Forecast Chart Widget


The capacity forecast chart widget tracks maximum active power of a data center. Based on the capacity settings, the chart displays how many days of supply remain before your data center reaches capacity, or it will indicate that you have adequate capacity.



You must have configured the enterprise data model and have a minimum of 2 days of daily rollup of KW data. 30 days of daily rollup data is recommended for more accurate forecasts. The capacity field must be set for the data center node selected. Power capacity is set in KW with granularity of 2 decimal places, such as 5.04 KW. You can configure the capacity for different locations in your data center as part of your enterprise data model configuration. See [Enterprise Relationships](#) (see [Enterprise Relationships and the EDM](#)). To set individual capacities, see [Set a Capacity](#).

1. Click the  button in the upper right corner of the Dashboards tab. The Dashboard Configuration dialog appears.
2. Drag and drop the Capacity Forecast Chart widget icon into a row. See [Manage Dashboards](#) for details.



3. Click the Settings icon .
4. Enter a name in the Title field.
5. In the Show field, click the browse button, then select the data center node whose capacity you want to show in the chart. Expand or collapse the nodes by clicking the plus and minus signs. The name of the node selected displays in the field at the bottom on the dialog. Click Select Node.
6. In the Period field, select the time period to include in the forecast.
7. Click Save. The widget is added to the dashboard.
  - The blue line shows the observed data.
  - The purple line is the linear trend line.
  - The red line following the trend line shows the projected data.
  - The chart legend will indicate "Adequate Capacity" when the trend does not cross the capacity line for the time period. If the trend line crosses the capacity line, the chart legend will indicate the number of days of supply remaining until capacity is reached: "Projected X days of capacity remaining."

## Set a Capacity

Capacity in kilowatts can be set with up to 2 decimal places.

Capacity for Racks can only be set in the Data Centers tab. Capacity for data center, room, aisle, and row can be set either in the Data Center tab, or by importing the enterprise data model .CSV file. See [Importing EDM Object Mappings](#).

1. In the Data Centers tab, select a data center level, such as a room. The details page opens.
2. Enter the capacity in the Capacity (kW) field. On the Data Center level, first expand the Ratings and Settings section to find the Capacity field.

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*Note: For the Rack level, choose Actions > Edit Details in the Rack smart view to find the Capacity field. See [Set Rack Capacity and Override Threshold Percentages](#).*

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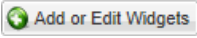
3. Click Save.






## Capacity Gauge Widget

The capacity gauge widget shows how much power a selected node of your data center has consumed over a specified time period. The gauge shows a tick mark for minimum, maximum and average power consumed during the time period. The dial points to the real time active power reading.

1. Click the  button in the upper right corner of the Dashboards tab. The Dashboard Configuration dialog appears.
2. Drag and drop the Capacity Gauge widget icon into a row. See [Manage Dashboards](#) for details.



3. Click the Settings icon .
4. Enter a name in the Title field.
5. In the Show field, click the browse button, then select the data center node whose power consumption you want to show in the dial. Expand or collapse the nodes by clicking the plus and minus signs. The name of the node selected displays in the field at the bottom on the dialog. Click Select Node.
6. In the Period field, select the time period of power consumption to include in the dial.
7. Click Save. The widget is added to the dashboard.

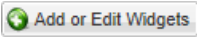
## Image Widget

The image widget displays an image that you upload on the dashboard.


The maximum images size is 800 pixels high by 800 pixels wide. The maximum file size is 2MB for dashboard images. Images uploaded for logo usage can be up to 512KB.

Uploading a new image to an image widget removes the previously uploaded image.

For details on adding a logo to every page in Power IQ, see [Display a Logo on Every Page](#).

1. Click the  button in the upper right corner of the Dashboards tab. The Dashboard Configuration dialog appears.
2. Drag and drop the Image widget icon into a row. See [Manage Dashboards](#) for details.

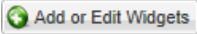


3. Click the Settings icon .
4. Click the Browse button, select the image and click Open.
5. Click Save. The widget is added to the dashboard.



## Dashboard Heading Widget

The dashboard heading widget allows you to add and format text on the dashboard. Position the report heading widget above or next to other widgets to use it as a heading.

1. Click the  button in the upper right corner of the Dashboards tab. The Dashboard Configuration dialog appears.
2. Drag and drop the Dashboard Heading widget icon into a row. See [Manage Dashboards](#) for details.

**Title**

3. In the Text field, enter the text you would like to display in the dashboard. Maximum title length is 64 characters.
4. Select the font type in the Font field.
5. Select the font size in the Size drop-down list.
6. Select the text color in the Color drop-down list.
7. In the Align field, select Left, Center or Right to specify how text will be oriented in the widget space on the dashboard.
8. Select the Bold or Italic checkboxes to format the text.
9. Click Save. The widget is added to the dashboard.
10. Once added to the dashboard, you can edit the text only, without changing style or layout, directly from the dashboard.
11. In the Dashboards tab, double click heading text and edit in the text box that appears. Press Enter to save changes.

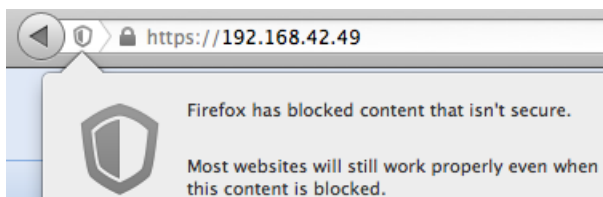
## HTML Widget

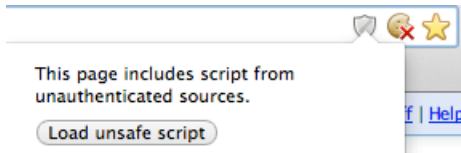
The HTML widget enables you to add your custom HTML portlet to the dashboard. Use this widget to add a weather tool, maps, a video camera, or anything you can code using HTML.

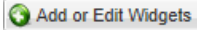
HTML portlets may have security implications. You must allow them before you can add an HTML widget to the Dashboards tab. See [Allow HTML Widgets on Dashboard](#).

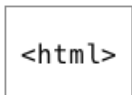
In Internet Explorer, you must accept a security warning the first time you view a dashboard containing an HTML widget.

*Note: If your HTML widget contains active content, newer versions of Firefox and Chrome may block the content. Click the shield icon in the address bar to allow the content.*






1. Click the  button in the upper right corner of the Dashboards tab. The Dashboard Configuration dialog appears.
2. Drag and drop the HTML widget icon into a row. See [Manage Dashboards](#) for details.



If you don't see the HTML widget icon, you must allow HTML portlets. See [Allow HTML Widgets on Dashboard](#).

3. Click the Settings icon .
4. Enter your HTML code in the HTML field.
5. Click Save. The widget is added to the dashboard.

## Configuring an HTML Widget to Display a Webcam Connected to a PDU

1. On the PDU, ensure that you have created a user with permissions to view the webcam.
2. In Power IQ, add the following code to an HTML widget (adapt hostname, username and password as needed):
 

```
<iframe width="100%" height="100%" frameborder="0" style="border:0" src="https://my-pdu.-domain.example/webcam/livepreview/livepreview.html?user=webcam&password=webcam"></iframe>
```
3. In case there are multiple webcams connected to a PDU, you can select one by appending an URL parameter like webcam=1\_3 (copy the ID from the webcam's URL in the web GUI).

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*Note: If you see unexpected changes in your dashboard after adding an HTML widget, you can reset it by disabling HTML portlets in the Settings tab. See [Allow HTML Widgets on Dashboard](#).*

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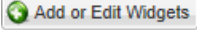
## Cooling Chart Widget

Cooling charts enable you to compare your data center's sensor readings against industry recommendations.



American Society of Heating, Refrigerating and Air-Conditioning® (ASHRAE) is an industry consortium that provides guidelines for energy efficient data center operations.

ASHRAE recommends certain safe and energy-efficient operating temperatures and humidity levels. This data displays on the psychrometric chart in Power IQ. ASHRAE offers two different sets of recommendations, one from 2004, and one from 2008. The 2008 recommendations allow for slightly higher temperatures. When viewed on the chart, ASHRAE refers to these recommended regions of data as "envelopes."

In Power IQ, you configure the chart to display your data center's humidity and temperature readings on the same psychrometric chart as ASHRAE's recommendations. You can also specify smaller sections within a data center, such as a room or rack. This allows you to determine how your readings compare to an ASHRAE recommendation. You can also specify your own custom target operating zones. See [Create a Custom Region](#).

1. Click the  button in the upper right corner of the Dashboards tab. The Dashboard Configuration dialog appears.
2. Drag and drop the cooling chart widget icon into a row. See [Manage Details](#) for details.



3. Click the Settings icon .
4. In the Show field, click the browse button to select a node from your enterprise data model. You can select any level, up to and including the data center. Potential energy savings is calculated only when a data center is selected.
5. In the Sensor Position field, select Inlet, Outlet, or Outside Air. Inlet specifies a "cold aisle" chart, and uses data from inlet located sensors. Outlet specifies a "hot aisle" chart, and uses data from outlet located sensors. Outside air uses data from outside located sensors. See [Specify Inlet, Outlet, or Outside Air Location for Environmental Sensors](#).
6. Select the region to display on the chart. See [ASHRAE® Envelope Descriptions](#) for details of each region.
7. All regions display in blue on the chart. Custom regions have default settings you can change. Select Custom, then select the Min Temperature and Max Temperature and the Min Humidity and Max Humidity.
8. Select Zoom In or Zoom Out to specify a more or less detailed view of the chart to display.
9. Enter a name for the chart, or check the Auto Name checkbox to accept the system name. The system name for a cooling chart contains the level of the enterprise data model, such as data center, and the sensor location information.
10. Click Save. The widget is added to the dashboard.
11. Hover your mouse over the sensor data points to view details. See [Viewing Sensor Data Point Details](#).
12. Click the export icon  to export sensor data in the chart to a .CSV file. See [Exporting Sensor Data](#).
13. The chart will automatically refresh at each polling interval. Click the refresh icon to refresh the chart manually.
14. To calculate savings, see [Calculate Potential Cooling Energy Savings](#).

## Requirements for Cooling Charts

Cooling charts use data from the humidity and temperature sensors in your data center.

You must have at least 1 temperature sensor and at least 1 humidity sensor connected to use Cooling charts.

## ASHRAE Envelope Descriptions

ASHRAE® operating envelopes comprise the following settings.

- X-Axis: Temperature
- Y-Axis: Humidity Ratio, with the relative humidity percentage calculated along curves on the chart



The area inside the region created by plotting the thresholds for these data points are recommended by ASHRAE to be safe and energy-efficient zones of operation for a data center.

There are two ASHRAE envelopes available for display in Power IQ, based on recommendations issued by ASHRAE in 2004 and in 2008.

You can also create a custom region to display on the chart, in addition to ASHRAE regions. See [Create a Custom Region](#).

ASHRAE 2004 Envelope:

The ASHRAE 2004 recommended operating envelope is a rectangular area with the following coordinates.

- 20 Celsius (68 F), 40% RH
- 20 Celsius (68 F), 55% RH
- 25 Celsius (77 F), 40% RH
- 25 Celsius (77 F), 55% RH

ASHRAE 2008 Envelope:

The ASHRAE 2008 recommended operating envelope is a pentagon-shaped area with the following coordinates.

- 18 Celsius (64.4 F), 42% RH
- 18 Celsius (64.4 F), 60% RH
- 22.7 Celsius (73 F), 60% RH
- 27 Celsius (80.6 F), 49% RH
- 27 Celsius (80.6 F), 25%RH

## Cooling Chart Details - How Your Sensor Data is Charted

By default, Power IQ considers all environmental sensors to be inlet located. You can specify a sensor as outlet, inlet, or outside air located in the PDU details page. See [Specify Inlet, Outlet, or Outside Air Location for Environmental Sensors](#).

For each sensor data point, the cooling chart will display the details of the associated humidity and temperature sensors. See [Viewing Sensor Data Point Details](#).

Each data point requires two coordinates: temperature and humidity. For each temperature measurement, Power IQ correlates the corresponding humidity value. If the same sensor does not support both humidity and temperature readings, then the nearest humidity sensor is used to correlate temperature measurement with humidity measurement. The determination of the nearest humidity sensor is based on the Power IQ Enterprise Data Model hierarchy.

### Example

Floor -> Room -> Aisle -> Row ->Rack

## Viewing Sensor Data Point Details

On a cooling chart, the data points for your sensors display as green points.

You can verify whether the points are inside the recommended region you chose to display. The cooling chart allows you to view the details of each data point, and access the associated PDU details page.



---

*Note: If more than one sensor has the same reading, the points will appear stacked, so that 2 points appear to be 1. Hover the mouse over the point to view the details of each stacked point. Export the sensor data to view the details of each point in a text file. See [Exporting Sensor Data](#).*

---

1. In the Dashboards tab, locate your cooling chart. Hover the mouse over a green data point.  
The sensor data point details display in a pop-up.
  2. Humidity Sensor Reading
  3. Humidity Sensor Location - (EDM Hierarchy Rack location)
  4. Temperature Sensor Reading
  5. Temperature Sensor Location - (EDM Hierarchy Rack location)
6. Click the green data point. The Sensor List For Data Point dialog appears.
7. Click a row of data to open the PDU details page for the PDU where the sensor is located. Pop-up blockers may prevent this page from opening.

## Exporting Sensor Data

To view pairs of sensor readings in a CSV file, export the data. The exported file contains a column called In Region, and a list of points. Points inside the region are listed as TRUE. Points outside the region are listed as FALSE.

## Calculate Potential Cooling Energy Savings

Power IQ calculates the estimated cost savings you may experience by raising the temperature of your data center to a higher temperature while remaining within the guidelines of a selected ASHRAE® or custom region.

The potential cooling energy savings displays at the bottom of a cooling chart automatically when a data center is selected as the EDM node included.

Potential cooling energy savings can only be calculated at the data center level, not at lower levels, such as room, or rack.

All temperature sensor data points must be below the upper temperature limit for the region selected, or the calculation will show as 0%. The calculation works by showing you a potential estimated savings based on raising your highest temperature to the maximum allowed by the selected region.

Industry estimates show that you could save 3.9% for each 1 degree Fahrenheit that you raise the data center temperature; or 7% for each 1 degree Celsius that you raise the data center temperature. Your actual savings will vary. You can adjust the savings percentage used in the calculation.

1. In the Data Centers tab, select the data center node.
2. In the Ratings and Settings section, enter the percentage to use in the calculation in the Savings % per degrees C field.



The Savings % is set to a default: 7% for Celsius readings. Readings for Fahrenheit are calculated based on the Celsius percentage, and estimated at 3.9%.

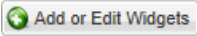
3. Click Save. Go back to the cooling chart in the Dashboard to view updated potential cooling energy savings.

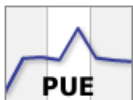
## PUE Trend Chart Widget


The PUE trend chart allows you to see how your data center's PUE has changed over a time period you select. Either daily or monthly calculations may be used. The length of the trend depends on how much data Power IQ has collected, as well as your selection.

Monthly data comes from a rollup conducted on the first of each month, using the previous month's data. Monthly data charts will update after each rollup. Monthly adjustments will affect this chart. See [List PUE Calculations and Adjustments](#). Note that daily values cannot include adjustments. A daily chart may be significantly different than a monthly chart when monthly adjustments are used.

You must configure your system before PUE is calculated. See [Requirements for PUE](#).

1. Click the  button in the upper right corner of the Dashboards tab. The Dashboard Configuration dialog appears.
2. Drag and drop the PUE trend chart widget icon into a row. See [Manage Details](#) for details.



3. Click the Settings icon .
4. In the Granularity field, select the data you want plotted in the chart, either Monthly or Daily .
5. In the Time Selection section, select Period or Range.
6. Select Period to show constantly updated measurement.
7. Select Range to show measurements from a custom Start Date and End Date. Select the start and end dates using the calendar dialogs.
8. Enter a name for the chart, or check the Auto Name checkbox to accept the system name.
9. Select the Include Legend checkbox to display a legend with the data center names included on the chart.
10. To select or deselect any data center, click the Data Centers tab, and select or deselect any checkbox of a data center.
11. Click Save. The widget is added to the dashboard.

## Set PUE Thresholds

An ideal PUE is 1.0. You can set warning and critical thresholds for your data center, and Power IQ uses those values to help visualize your PUE in the dashboard. See [Latest PUE Reading Gauge Widget](#) for details on the widget that displays this data.

PUE is calculated only at the data center level.

**▲ Ratings and settings**

Capacity (kW):	25.5
Peak rate (\$/kWh):	0.1
Off-peak rate (\$/kWh):	0.06
Peak begin:	07:00 ▼
Peak end:	19:00 ▼
CO2 factor:	0.6
PUE Warning Threshold:	2
PUE Critical Threshold:	3
Cooling factor:	1
Savings % per °C:	7

1. In the Data Centers tab, click a data center node.
2. In the Ratings and Settings section, set the threshold values for PUE Warning Threshold and PUE Critical Threshold.



3. Click Save. See [Latest PUE Reading Gauge Widget](#) for details on configuring the widget that uses these values.

## Latest PUE Reading Gauge Widget

The latest PUE reading gauge allows you to see where your data center's PUE falls in the threshold range you have configured. You can set a warning and critical threshold level for each data center. Warning and critical threshold levels are displayed as yellow and red in the gauge. See [Setting PUE Thresholds](#).

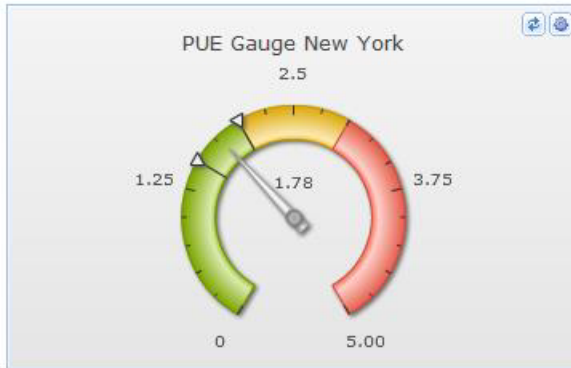
The gauge also shows the minimum PUE calculation and the maximum PUE calculation for a time period you specify. This data displays as tick marks, and may overlap.

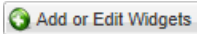
Either daily or monthly calculations may be used. The latest PUE calculation is used. For daily gauges, the previous day is used. For monthly gauges, the previous full month is used. Monthly data comes from a rollup conducted on the first of each month, using the previous month's data. Monthly gauges will update after each rollup.

You must configure your system before PUE is calculated. See [Requirements for PUE](#).








1. Click the  button in the upper right corner of the Dashboards tab. The Dashboard Configuration dialog appears.
2. Drag and drop the latest PUE reading gauge widget icon into a row. See [Manage Details](#) for details.



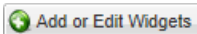
3. Click the Settings icon .
4. Enter a Title for the gauge.
5. Select the Data Center whose PUE you want to display.
6. In the Granularity field, select the calculation you want to display, either Monthly or Daily .
7. In the Min/Max Period field, select the time period to include in the gauge calculation. The gauge displays the minimum and maximum of PUE values over the time period selected. The values are indicated with tick marks.
8. Click Save. The widget is added to the dashboard.

## Facilities Chart Widget

The facilities chart widget enables you to display active power or energy readings for one or more facility items, such as a CRAC, floor PDU, floor UPS, power panel, or standalone meter, in your data center.

Rack PDUs are excluded from this chart.

Facilities items must be mapped in the EDM before the data can be charted. See [Creating Your EDM](#).

1. Click the  button in the upper right corner of the Dashboards tab. The Dashboard Configuration dialog appears.
2. Drag and drop the Facilities Chart widget icon into a row. See [Manage Details](#) for details.



3. Configure the settings.
4. Measurement: Active Power or Energy
5. Time Range: Period or Custom
6. Period shows preconfigured time options, such as Past hour, Past week, Past month, and so on. Select the time period from the drop-down list. See [What's the difference between "Past" and "Last" time periods?](#)
7. Custom show measurements between the Start Date and End Date chosen in the calendar dialogs.
  - Granularity: Monthly, Daily, Hourly, Poll Interval
  - Monthly, Daily, and Hourly show 1 data point per month/day/hour for the time period the chart includes. The time period must be longer than the granularity.
8. Poll Interval shows 1 data point per poll interval for the time period the chart includes. The Poll Interval must be set to 5 minutes or longer to use Poll Interval granularity.
  - Statistic: Minimum, Maximum, or Average readings for each data point.
  - Title: Automatic or Custom. Automatic chart title is Statistic + Measurement + Time Range. For example, Average Active Power - Past 24 Hours.
  - Lines: Show one line per data source, or Sum all data sources into one line. A data source is one facility item selected in the Data Sources table.
9. In the Data Sources table, click Add, then select the facility items to include. Use Control-Click to select multiple objects. Click Select Nodes. The table displays your selections.
10. Click Save. The widget is added to the dashboard.

## Floor Map Widget

The floor map widget uses a drawing of your data center, combined with information from your EDM and events, to create a color-coded health map of your data center.

The floor map widget supports the display of information regarding racks and facility items.

Power IQ supports the following facility items:

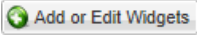
- CRAC
- Floor PDU
- Floor UPS
- Power panel
- Standalone meter

Objects represented in the drawing must be mapped in the EDM before they can display health in the floor map. See [Creating Your EDM](#).

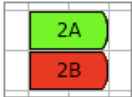
Make sure your data center drawing is a .DWG file that follows the requirements. See [Floor Map Drawing Files](#).

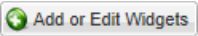
Object names in the drawing must be unique and match the object names in the EDM.



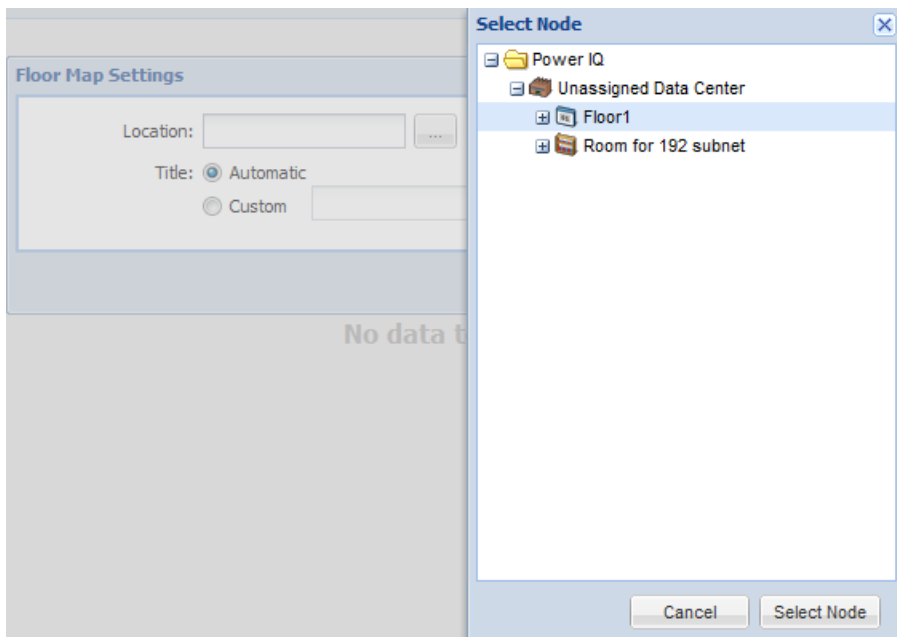
1. Click the  button in the upper right corner of the Dashboards tab. The Dashboard Configuration dialog appears.
2. Drag and drop the Floor Map widget icon into a row. See [Manage Details](#) for details.

*Tip: Floor Maps may look better as the only widget in a dashboard. You can create multiple dashboards.*

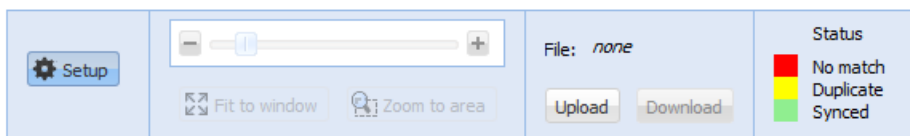


3. Once the layout is saved, the blank floor map displays. Click the  icon in the upper right corner of the widget to open the Floor Map Settings. Choose the location in the EDM for the floor map drawing you want to use. Click Select Node.

You can create one floor map per Data Center, Floor, or Room. If a drawing has already been associated with a node, it will appear automatically when the location is chosen.



4. In the Title field, select Automatic, or select Custom and add a name for the floor map. Click Save.
5. Click Setup to toggle to the setup options, then click Upload.



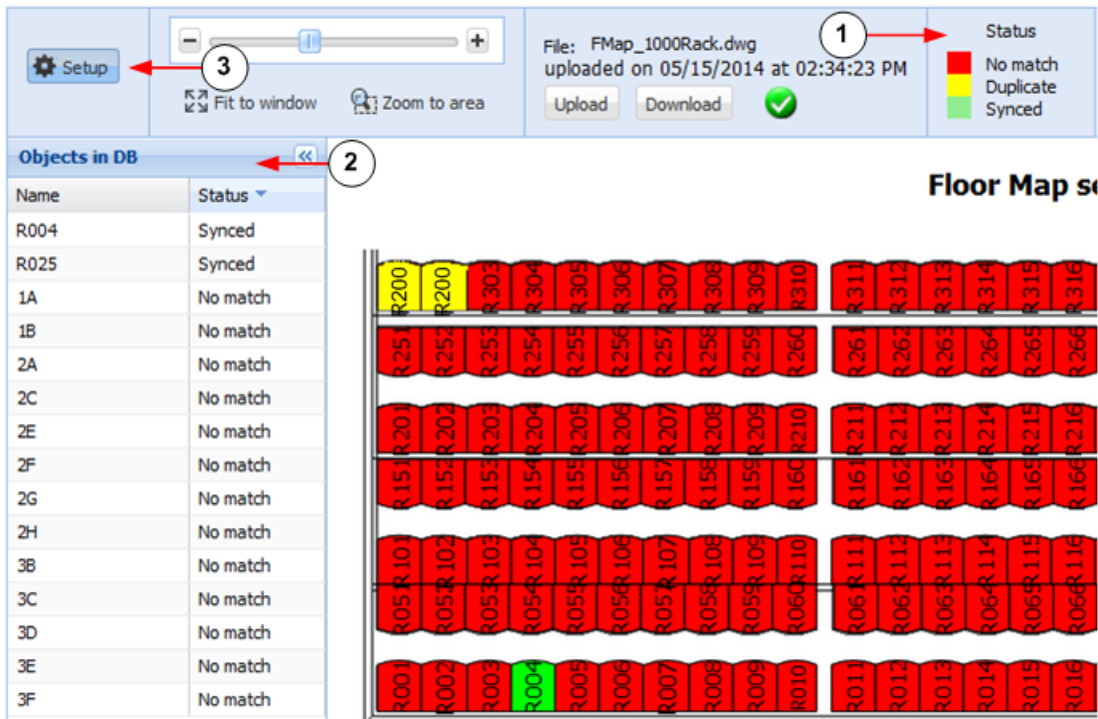
6. Click Browse, select the .dwg file, and click Upload. A success message displays when the drawing loads. The drawing displays with color-coded objects, indicating whether each object name has synced to the EDM. See [Syncing Floor Map Drawing with EDM](#).



## Syncing the Floor Map Drawing with EDM

In Setup mode, check the color-coding of each object in your floor map drawing to make sure it is synced to the EDM.

- GREEN: Objects in drawing that uniquely match an object in the EDM.
- YELLOW: Objects in drawing that have duplicate names, or that cannot be matched to a unique object in EDM
- RED: Objects in drawing not found in EDM.



The screenshot shows the 'Setup' mode interface. At the top, there is a 'Setup' button (labeled 3), a file upload section for 'FMap\_1000Rack.dwg' (labeled 1), and a status legend. The legend indicates: Red for 'No match', Yellow for 'Duplicate', and Green for 'Synced'. Below the legend is a table titled 'Objects in DB' (labeled 2) with columns for 'Name' and 'Status'. The table lists objects from R004 to 3F. To the right of the table is a floor map drawing showing racks color-coded according to the table: R004 is green, R0200 and R200 are yellow, and all other racks are red.

Name	Status
R004	Synced
R025	Synced
1A	No match
1B	No match
2A	No match
2C	No match
2E	No match
2F	No match
2G	No match
2H	No match
3B	No match
3C	No match
3D	No match
3E	No match
3F	No match

1. Status legend
2. Objects in DB list: This list contains all objects found in the EDM for the location selected. The status reports whether the object was found in the drawing, and aligns with the colors and statuses in the legend.  
Click a drawing object or a list object to highlight the matching object, if any.
3. The Setup button toggles to show Setup mode, or View mode. This is Setup mode. You can upload or download the drawing and check sync status. To view Health, Rack Inspector, and click through to smart views, toggle to View mode.

## Using the Floor Map

In View mode, racks and facility items are color coded based on event severity. If a facility item, the rack itself, or any PDUs or sensors contained in the rack have warning or critical active events, the facility item or rack is shown as warning or



critical level.

- GREEN: Normal. No warning or critical events.
- YELLOW: Warning. Warning level events reported.
- RED: Critical. Critical level events reported.
- GRAY: No Data. Object not found in EDM, or you do not have permission to view this object.



**Health Map — San Jose**

**Legend**

- Critical
- Warning
- Normal
- No data

**Inspecting 1A**

**Rack 1A**

Power(kW): 0.967 of 0.800

Sensors

Temp Rack Top 77°F

Active events

05/02/14 11:14:47 Active power over critic

**Rack PDU 192.168.43.224**

IP: 192.168.43.224

Active Power (W): 55

Apparent Power(VA): 106

Inlet Current (A): 0.7 / 0.1 / 0.1

Circuit Breakers (A)

Circuit Breaker 1: 0.0 of 20.0

Circuit Breaker 2: 0.4 of 19.6

Circuit Breaker 3: 0.0 of 20.0

Circuit Breaker 4: 0.0 of 20.0

Circuit Breaker 5: 0.0 of 20.0

Circuit Breaker 6: 0.0 of 20.0

Active events

none

1. Status legend
2. Rack Inspector: Select an object in the floor map to view readings and active events.  
Click the rack, facility item or PDU link in the Rack Inspector to go to the smart view.
3. The selected object has a blue outline.
4. The Setup button toggles to show Setup mode, or View mode. This is View mode. You can view Health, Rack Inspector, and click through to smart views. To upload or download the drawing and check sync status, toggle to Setup mode.

## Floor Map Data Refresh Rates

Rack threshold events appear and clear at the polling interval. See [Rack Thresholds](#).

The drawing and the Rack Inspector refresh at 30-second intervals.

## Floor Map User Permissions

User permissions required to upload a drawing to a floor map:

- Administrator, Site Administrator, or Operator

User permissions required to view a floor map:

- View permissions to objects represented in the map. If user does not have View permission for a rack, for example, the rack appears gray in the drawing, and none of its data is included.
- Events Manager

## Facilities Chart Widget

The facilities chart widget enables you to display active power or energy readings for one or more facility items, such as a CRAC, floor PDU, floor UPS, power panel, or standalone meter, in your data center.

Rack PDUs are excluded from this chart.

Facility items must be mapped in the EDM before the data can be charted. See [Creating Your EDM](#).

1. Click the Add or Edit Widgets button in the upper right corner of the Dashboards tab. The Dashboard Configuration dialog appears.
2. Drag and drop the Facilities Chart widget icon into a row. See [Manage Dashboards](#) for details.
  1. Configure the settings.
    2. Measurement: Active Power or Energy
    3. Time Range: Period or Custom
    4. Period shows preconfigured time options, such as Past hour, Past week, Past month, and so on. Select the time period from the drop-down list. See [What's the difference between "Past" and "Last" time periods?](#)
    5. Custom show measurements between the Start Date and End Date chosen in the calendar dialogs.
      - Granularity: Monthly, Daily, Hourly, Poll Interval.
      - Monthly, Daily, and Hourly show one data point per month/day/hour for the time period the chart includes. The time period must be longer than the granularity.

---

*Note: "Past Hour" graphs in facilities charts require a granularity of "Poll Interval" to produce a plot.*

---

6. Poll Interval shows one data point per poll interval for the time period the chart includes. The Poll Interval must be set to 5 minutes or longer to use Poll Interval granularity.
  - Statistic: Minimum, Maximum, or Average readings for each data point.
  - Title: Automatic or Custom. Automatic chart title is Statistic + Measurement + Time Range. For example, Average Active Power - Past 24 Hours.
  - Lines: Show one line per data source, or Sum all data sources into one line. A data source is one facility item selected in the Data Sources table.
7. In the Data Sources table, click Add, then select the facility items to include. Use Control-Click to select multiple objects. Click Select Nodes. The table displays your selections.
8. Click Save. The widget is added to the dashboard.



## How Does Power IQ Calculate the Sum of a Data Center Node?

Power IQ uses a formula for charting a whole data center node, such as a Room, that prevents duplication of data.

The sum of a node is the sum of the inlets of all rack PDUs under the node, plus the sum of all non-duplicate Circuits in all Power Panels, Floor PDUs, and UPSs contained by the node. See [Floor PDUs, Power Panels, UPS, Standalone Meters in the Data Center Browser](#)

If a node contains a rack that contains an IT device mapped to a floor PDU outside that node, the IT device is not part of the sum of that node.

An HVAC system's power is part of the sum of the power for charts drawn for the physical location it serves, as position in the Data Center browser. See [CRACs in the Data Center Browser](#).



# Chapter 10: Security and Encryption

## Installing an HTTPS Certificate

A PEM file upload is required to replace the current certificate and private key. The PEM file needs to contain both an RSA private key and an X509 certificate.

*Note: Power IQ does not provide a Certificate Signing Request (CSR). OpenSSL or any other utility can be used to generate CSR. Power IQ does not use encrypted private keys. You must remove the password from the Private key before it can be used. To remove the encryption from the key, issue a command like: "openssl rsa -in server.key -out server2.key". Use "server2.key" when using openssl utility.*

*It is not required to provide root certificate of CA signing Power IQ certificate signing request (CSR).*

### Step 1: Generate a private key

This example procedure is for generating a private key using OpenSSL on a Linux server.

This command creates an RSA key with Triple DES 1024 byte encryption.

```
openssl genrsa -des3 -out server.key 1024
```

Remember the key password from this command.

Generate a Certificate Signing Request. Be prepared to complete the following information:

- private key password
- two character country code
- full state or province name
- city name
- company name
- organizational unit or leave it blank
- servers common name or fully qualified domain name
- admin email address
- other attributes can be left blank

#### 1. Create the request.

```
openssl req -new -key server.key -out server.csr
```

#### 2. Display the CSR request.

```
cat server.csr
```





3. Copy the CSR request and send it to the certificate authority to be signed. Make sure to copy everything between the first "-----" and the last "-----".
4. Submit CSR to certificate authority and receive signed X.509 certificate.
5. Modify the server key to remove the password.

```
cp server.key server.key.secureopenssl rsa -in server.key.secure -out server.key
```

**Warning: The server.key file must be kept private and secure. If this key file is compromised, the certificate should be removed and then reissued.**

6. Create PEM file.
7. The PEM file should contain both the RSA private key without password and the X.509 certificate.
8. Concatenate the unprotected private key to the signed X.509 certificate file from the top level certificate authority.
9. Use this file in the upload in Step 2.

Step 2: Upload the PEM file to Power IQ:

You may want to manually load the certificate in your browser first to prevent issues while everything loads and refreshes in Power IQ. If you see any issues, such as bad labels or a partially loaded UI, refresh your browser to resolve.

1. In the Settings tab, click HTTPS Certificate in the Security and Encryption section.
2. If uploaded, the currently HTTPS certificate displays. To replace it or add a new certificate, click Browse and select the PEM file.
3. Click Upload.



## Restricting Web and Shell Access Based on IP Address

To increase security, Power IQ can be configured to restrict web interface and SSH access by IP address.

- When trusted hosts are specified, Power IQ blocks attempts to connect from addresses not specified.
- When no hosts are specified, ports 22, 80, 443, 5432 are open to all hosts.

1. In the Settings tab, click IP based Access Control in the Security and Encryption section.

The global options will override any options that allow access to the SSH and ODBC service.

- Allow ICMP ping responses
- Block all SSH access
- Block all ODBC access: See [ODBC Access](#).

2. Identify the hosts to allow access to in the Trusted Hosts fields.

You can enter an IP address, or a subnet using CIDR notation such as 192.168.45.0/24.

3. For each address, select how it is permitted to access Power IQ.
4. Select the Enable SSH to allow SSH access checkbox.
5. Select the Enable HTTP/HTTPS checkbox to enable access through the web interface.
6. Select Enable ODBC to allow third party access.
7. Click Save.



## Configuring Password Requirements

To specify password strength for Power IQ users, select from a list of password requirements. Users that are locally authenticated will be required to use passwords that comply with the settings. For example, you may require that all passwords contain a number and are longer than 8 characters.

Password requirements apply to locally authenticated users only. If LDAP is enabled, the password requirements selected are not followed.

Changes to the password requirements apply only to future new and changed passwords. Users whose passwords were created before the password requirement change will not be forced to change passwords to comply with the requirements.

1. In the Settings tab, click Password Requirements in the Security and Encryption section.
2. In the Minimum Password Length field, select the minimum number of characters a password must include.
3. In the Maximum Password Length field, select the maximum number of characters a password may include.
4. Select the checkboxes for each requirement you want included in locally-authenticated user passwords.
  - a lowercase character: Password must contain any lowercase letter.
  - an uppercase character: Password must contain any capital letter.
  - a numeric character: Password must contain a number.
  - a special character: Password must contain any special character, including: ~!@#%&^\*()\_+{| :< > ? / , . ; [ = \ `
5. Click Save.



## Encrypting Data Backup Files

Power IQ encrypts data backup files using a GnuPG/PGP public key that you generate.

You can generate PGP Encryption Keys using free tools. Go to <https://www.gnupg.org> and look for a binary for your operating system on the Downloads page.

---

*Important! Make sure to save both the public and private keys that you generate. You need the public key for backup file encryption and the private key for backup file decryption. See [Decrypt Backup Files Before Restoring](#)*

---

1. In the Settings tab, click Data Backup Encryption in the Security and Encryption section.
2. Select the Encrypt Backups checkbox.
3. Click Browse, then select and upload a GnuPG/PGP Public Key to Power IQ.
4. Click Save.



## Enabling Single Sign On for Raritan Products

You can launch the web interface of a Raritan PX1 or PX2 PDUs or a Raritan EMX by clicking the Launch link on the PDU details page. When single sign on is not enabled, users must then login manually.

Enable single sign on to allow users to automatically authenticate with their Power IQ credentials.

Users must have identical credentials on Power IQ and on the target Raritan product, and be logged in to Power IQ with those credentials for single sign on to succeed. Single sign on must be enabled in Settings > Single Sign On.

See [Launch the Web Interface for a Raritan PX PDU](#).

1. In the Settings tab, click Single Sign on in the Security and Encryption section.
2. Select the "Enable single sign on to Raritan PDUs" checkbox to enable, or deselect the checkbox to disable single sign on.
3. Click Save.



## Enabling the WS API

To get started with the WS API, the API needs to be enabled through the Settings Tab. It is disabled by default.

1. In the Settings tab, click Other Security Settings in the Security and Encryption section.
2. In the Web API Settings, select the Enable Web API checkbox, then click Save.



## Enabling the Web API User Account

The Web API user account is a locally authenticated user that can be used for Web API scripts that require user credentials. The username is "web\_api." The password for the account can be configured.

The Web API account is configurable only on the Settings > Other Security Settings page. The Web API user is always authenticated locally, even when LDAP is enabled.

The Web API account is assigned the administrator role. This role assignment cannot be changed.

1. In the Settings tab, click Other Security Settings in the Security and Encryption section.
2. In the Web API Settings, select the "Enable web API user web\_api" checkbox.
3. In the Web API user password field and the Confirm password field, enter a password.

The password must follow the requirements selected in Settings > Password Requirements. See [Configuring Password Requirements](#).

4. Click Save SOAP Web API Settings.



## Change Web User Session Timeouts

You can set Power IQ to log out any web users who have been inactive for a certain period of time.

1. In the Settings tab, click Other Security Settings in the Security and Encryption section.
2. In the User Session Timeout box, select a time from the "Log users out" list. The time indicates how long users can remain idle on the Power IQ web interface before being logged out. Select Never to disable this feature.
3. Click Save Timeout.





## Configuring the Authorization Warning Message

The authorization warning message displays on the Power IQ login page. You can change the default message.

**Warning: Do not use html scripts in the message. Some scripts could cause the system to lock you out.**

1. In the Settings tab, click Other Security Settings in the Security and Encryption section.
2. In the Authorization Warning message section, enter the message you want to display on the login page.
  - Header: Text entered in this field displays on the login page in a bold font, as the heading to the message
  - Body: Text entered in this field displays in a normal font, as the main content of the message.
3. Click Save. Log out of Power IQ to return to the login page and view the message.



## Configuring Enterprise Power IQ Settings

Enterprise Power IQ must use the password configured to communicate with a local Power IQ installation.

1. In the Settings tab, click Other Security Settings in the Security and Encryption section.
2. Enter the password that will be required in Enterprise Power IQ to communication with this local Power IQ.
3. Enter the password again to confirm.
4. Click Save Enterprise Power IQ Settings.



# Chapter 11: Data Management

This section provides information on the configuration and management of data and data storage, including data rollup retention policies, backups, and EDM relationships.



## Data Backups

Power IQ creates a daily system configuration backup file.

You can download the files to another location. [Downloading System Configuration Backup Files](#).

To automatically download daily backup files, setup a remote storage location. See [Configuring Remote Storage of Archive Files](#).

You can also create a new system configuration backup file at any time, and/or schedule a recurring time a daily backup will occur. See [Create a System Configuration Backup File](#).

If needed, you can use a backup file to restore your Power IQ to an earlier, backed-up configuration. See [Restoring System Configuration Backups](#).



## Downloading System Configuration Backup Files

The configuration of your Power IQ is backed up and archived once each day. Administrators should copy these backup files to an external server for redundancy purposes. Saving a backup of your Power IQ system configuration file is critical for safeguarding your Power IQ configuration and data and recovering from human error.

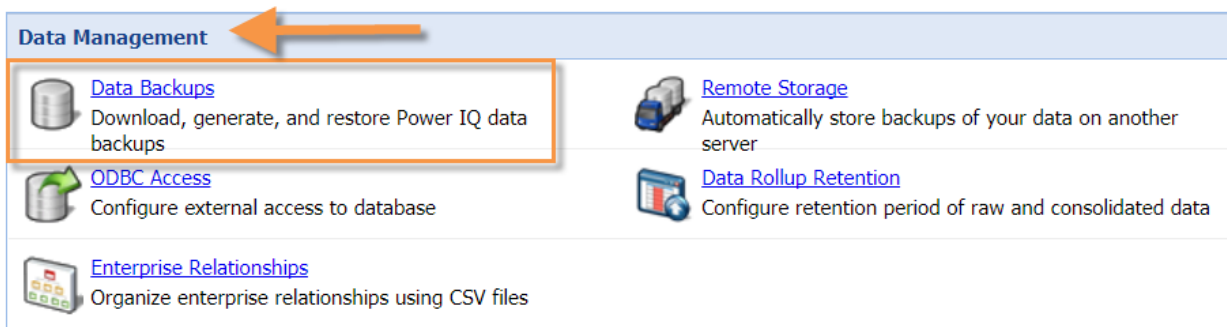
**Note: Back Up Your System Before You Upgrade!** Before you upgrade to a new Power IQ release, we strongly recommend that you generate a backup of your Power IQ system configuration and save it to another location, such as your hard drive or an external server. We also strongly recommend that you set up remote storage for backup files to automatically push all daily backups to a remote storage location.

The backup files are saved in the .DAT file format.

Each backup file is date- and time-stamped and includes the Power IQ build version and the file size.

To download a system configuration backup file:

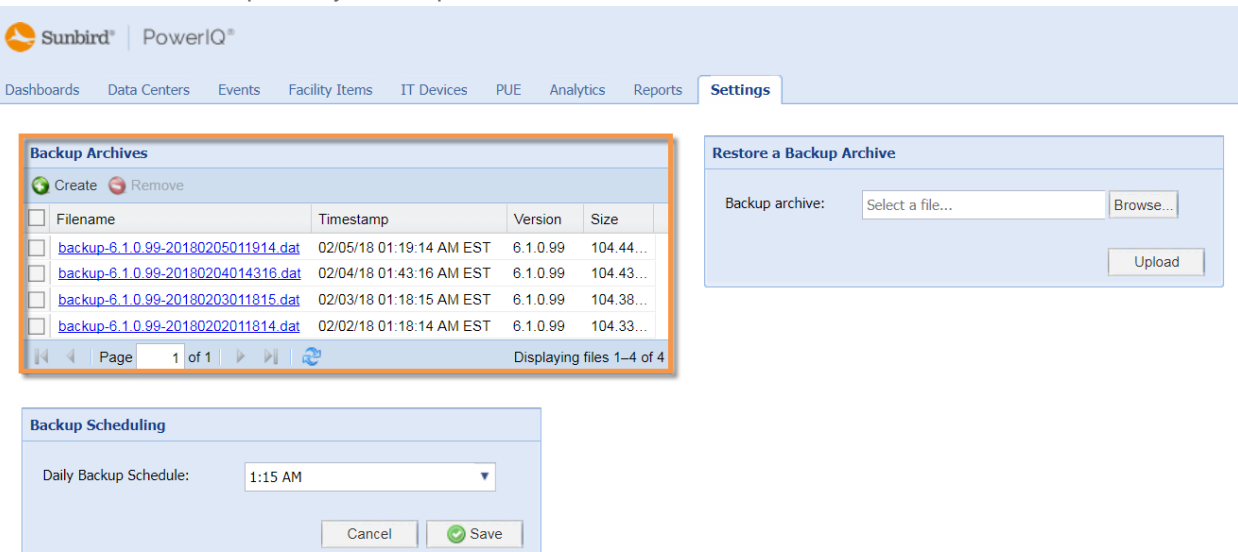
1. In the Settings tab, click the Data Backups link in the Data Management section.



**Data Management**

- [Data Backups](#)  
Download, generate, and restore Power IQ data backups
- [Remote Storage](#)  
Automatically store backups of your data on another server
- [ODBC Access](#)  
Configure external access to database
- [Data Rollup Retention](#)  
Configure retention period of raw and consolidated data
- [Enterprise Relationships](#)  
Organize enterprise relationships using CSV files

2. The Data Backups page opens. In the Backup Archives section on the Data Backups page, click the file name link to download the backup file to your computer.



Sunbird® | PowerIQ®

Dashboards   Data Centers   Events   Facility Items   IT Devices   PUE   Analytics   Reports   **Settings**

**Backup Archives**

Create Remove

Filename	Timestamp	Version	Size
<a href="#">backup-6.1.0.99-20180205011914.dat</a>	02/05/18 01:19:14 AM EST	6.1.0.99	104.44...
<a href="#">backup-6.1.0.99-20180204014316.dat</a>	02/04/18 01:43:16 AM EST	6.1.0.99	104.43...
<a href="#">backup-6.1.0.99-20180203011815.dat</a>	02/03/18 01:18:15 AM EST	6.1.0.99	104.38...
<a href="#">backup-6.1.0.99-20180202011814.dat</a>	02/02/18 01:18:14 AM EST	6.1.0.99	104.33...

Page 1 of 1   Displaying files 1-4 of 4

**Restore a Backup Archive**

Backup archive:

**Backup Scheduling**

Daily Backup Schedule:

---

*Note: You can also manually create an archive of the system configuration by clicking [Create at any time](#). For more information, see [Creating a System Configuration Backup File on the facing page](#).*

---

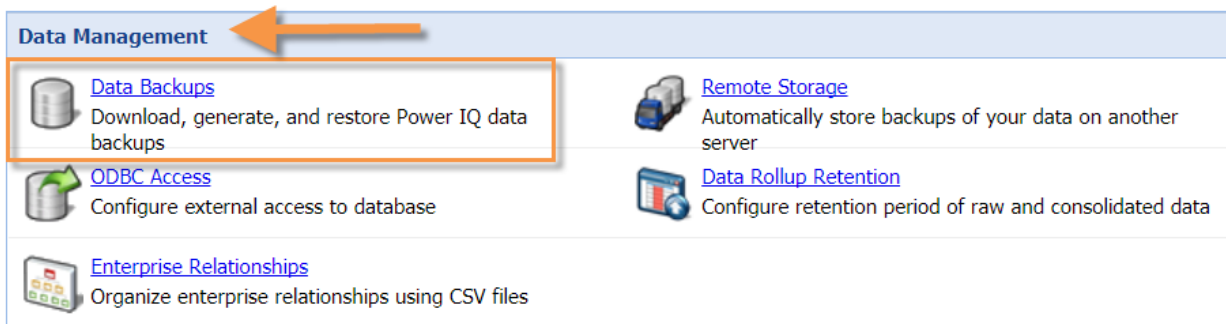


## Creating a System Configuration Backup File

Power IQ creates a daily backup file. You can create a new backup file at any time and/or schedule a recurring time a daily backup will occur. By default, the daily backup is scheduled to occur at 1:15 PM EDT.

**Note: Back Up Your System Before You Upgrade!** Before you upgrade to a new Power IQ release, we strongly recommend that you generate a backup of your Power IQ system configuration and save it to another location, such as your hard drive or an external server. We also strongly recommend that you set up remote storage for backup files to automatically push all daily backups to a remote storage location.

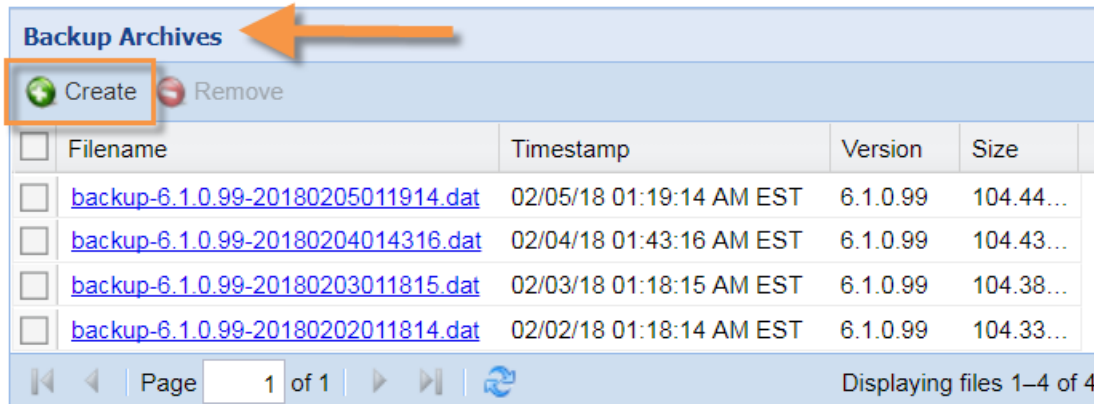
1. In the Settings tab, click Data Backups in the Data Management section.



**Data Management**

- [Data Backups](#)  
Download, generate, and restore Power IQ data backups
- [Remote Storage](#)  
Automatically store backups of your data on another server
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- [Enterprise Relationships](#)  
Organize enterprise relationships using CSV files

2. In the Backup Archives section on the Data Backups page, click the Create button.



**Backup Archives**

[Create](#) [Remove](#)

<input type="checkbox"/>	Filename	Timestamp	Version	Size
<input type="checkbox"/>	<a href="#">backup-6.1.0.99-20180205011914.dat</a>	02/05/18 01:19:14 AM EST	6.1.0.99	104.44...
<input type="checkbox"/>	<a href="#">backup-6.1.0.99-20180204014316.dat</a>	02/04/18 01:43:16 AM EST	6.1.0.99	104.43...
<input type="checkbox"/>	<a href="#">backup-6.1.0.99-20180203011815.dat</a>	02/03/18 01:18:15 AM EST	6.1.0.99	104.38...
<input type="checkbox"/>	<a href="#">backup-6.1.0.99-20180202011814.dat</a>	02/02/18 01:18:14 AM EST	6.1.0.99	104.33...

Page 1 of 1 | Displaying files 1-4 of 4

3. The backup archive creation process will begin immediately after you click the Create button. A Creating backup archive bar will display. Note that the time required to create the backup archive may vary based on the size of your database.

4. **Optional.** If needed, you can set a time at which to schedule the backup to occur. Select a time from the Daily Backup Schedule drop-down in the Back Scheduling section of the page.

**Backup Scheduling**

Daily Backup Schedule:

1:15 AM	▼
12:00 AM	▲
12:15 AM	
12:30 AM	
12:45 AM	
1:00 AM	
1:15 AM	
1:30 AM	
1:45 AM	
2:00 AM	
2:15 AM	
2:30 AM	
2:45 AM	
3:00 AM	
3:15 AM	
3:30 AM	
3:45 AM	▼

5. The file is created immediately or at the scheduled time, and added at the top of the list in the Backup Archives section. An MD5 file is also created for verification.





## Decrypt Backup Files Before Restoring

You must decrypt encrypted backup files before they can be used to restore a Power IQ system.

Use the openssl Linux command to decrypt a X509/MIME encrypted backup file.

### Example

```
[root@localhost ~]# openssl smime -decrypt -in /root/backup-3.1.0.30-20111118010513.dat -inkey user-private-key -inform DER -recip user-public-key >unencrypted-backup.dat
```

To decrypt a PGP encrypted backup file:

Use the gpg Linux commands to decrypt a PGP encrypted backup file.

### Example

```
[root@dhcp-209 ~]# gpg --import PGP_private_key2.txtgpg: directory `/root/.gnupg' createdgpg: new configuration file `/root/.gnupg/gpg.conf' createdgpg: WARNING: options in `/root/.gnupg/gpg.conf' are not yet active during this runpgg: keyring `/root/.gnupg/secring.gpg' createdgpg: keyring
```

### Example

```
`/root/.gnupg/pubring.gpg' createdgpg: key 41965311: secret key importedgpg: /root/.gnupg/trustdb.gpg: trustdb createdgpg: key 41965311: public key "username@email.com" importedgpg: Total number processed: 1gpg: imported: 1 (RSA: 1)gpg: secret keys read: 1gpg: secret keys imported: 1
```

```
[root@dhcp-209 ~]# gpg --decrypt --output /root/unencrypted.dat /root/backup-4.0.2.8-20130220153455.dat
```

You need a passphrase to unlock the secret key foruser: "username@email.com"1024-bit RSA key, ID 41965311, created 2013-02-19

```
can't connect to `/root/.gnupg/S.gpg-agent': No such file or directorygpg-agent [9705]: directory `/root/.gnupg/private-keys-v1.d' createdgpg: encrypted with 1024-bit RSA key, ID 41965311, created 2013-02-19"username@email.com"gpg: WARNING: message was not integrity protected
```

## Restoring System Configuration Backups

If your system configuration backup file is encrypted, see [Decrypt Backup Files Before Restoring](#).

Restoring a system configuration backup file returns Power IQ's configuration to the settings captured when the backup was made.

---

*Note: If you restore a backup containing an SSL security certificate that is different from the one currently installed on the system, the progress bar for "Restoring the system and restarting..." will not complete. This happens because the browser will not accept any messages from Power IQ until you establish a secure connection using the restored certificate. Start a new browser session and you can log into the system once the former certificate has been restored.*

---

1. Navigate to Settings > Data Management > Data Backup section.
2. In the Restore a Backup Archive section, click Browse, then select a backup file.



**Sunbird® Power IQ®**

Search Settings... 🔍

- About
- Appliance Administration ^
- Data Management ▾
  - Data Backups**
  - Remote Storage
  - ODBC Access
  - Data Rollup Retention
  - Enterprise Relationships
- Authorization and Authentication ^
- Security and Encryption ^

### Backup Archives

[+ Create](#)   [- Remove](#)

<input type="checkbox"/>	Filename	Timestamp	Version	Size
<input type="checkbox"/>	backup-8.0.0.57-20201110201502...	11/11/20 01:15:02 AM U...	8.0.0.57	220.45...

Page  of 1
 

 Displaying files 1–1 of 1

### Restore a Backup Archive

Backup archive:

### Backup Scheduling

Daily Backup Schedule:  ▾

⚠ Power IQ is integrated with dcTrack. [Refer to this guide before making changes in Power IQ.](#) Licensed to Bianor

3. Click Upload.
4. The Power IQ data and configuration settings are restored to the backup's configuration settings, and the server is rebooted.

---

*Note: Database versions prior to 7.0 can not be applied directly on Power IQ version 8.0.0. If you are running an earlier Power IQ version you must first upgrade to at least version 7.0 and then to 8.0.*

---

## System Configuration Backup File Retention

Power IQ retains backup for four days. A file older than four days is deleted automatically, unless it is the only stored backup file. One backup file is always kept, regardless of age.



## Configuring Remote Storage of Archive Files

You can configure a remote storage server to automatically store your archive files in the Power IQ Settings tab.

All files that are not being actively written to are automatically stored on the configured server. Sensor reading archives are often being actively written to, so their storage may be approximately one day delayed.

Supported remote storage service types include: Amazon Web Services, SCP, SFTP, and FTP. You can also discontinue remote storage by selecting the None option.

---

*Note: To configure an SFTP or SCP server, you will need a host key. For information on retrieving the host key, see the on page 399 section below.*

---

Two file types are eligible for automatic remote storage:

- System configuration archives (system configuration backup files, including daily automatic backups and manually created backups).

---

*Note: When using an SCP remote storage service, only automatic backups are moved. Manually created backups are not affected.*

---

- Sensor reading archive files

### To configure remote storage in Power IQ:

1. In the Settings tab, click the Remote Storage link in the Data Management section.



### Appliance Information

**Power IQ Version:**

6.1.0-99

**Device Time:**

02/05/18 08:21:18 AM EST

**License:**

There are 9890 remaining licensing units out of 10000 installed for Internal Use Only

**Appliance ID:**

8c38e24d-5d0a-414d-9472-0137d8f7681b

[Get Support](#) »

### Appliance Administration


[Power IQ Settings](#)

Configure Power IQ's polling, power control, and notification settings


[Audit Log](#)

View and download the system audit log


[Software Upgrades](#)

Apply software patches to update this appliance


[Product Licensing](#)

License management and information


[Server Settings](#)

Configure system log destinations, HTTP proxies, and SMTP server settings


[Application Settings](#)

Configure Power IQ's default locale, time settings, and other options


[Dynamic Plugins](#)

Configure and manage dynamic PDU plugins

### Data Management


[Data Backups](#)

Download, generate, and restore Power IQ data backups


[Remote Storage](#)

Automatically store backups of your data on another server


[ODBC Access](#)

Configure external access to database

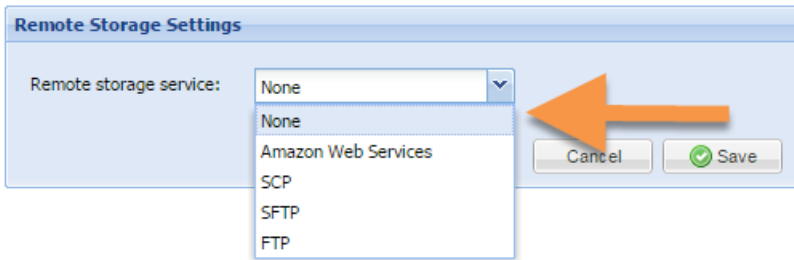

[Data Rollup Retention](#)

Configure retention period of raw and consolidated data



[Enterprise Relationships](#)

Organize enterprise relationships using CSV files

2. Select the remote storage service type:
  - None: Option to stop automatic remote storage
  - Amazon Web Services
  - SCP
  - SFTP
  - FTP

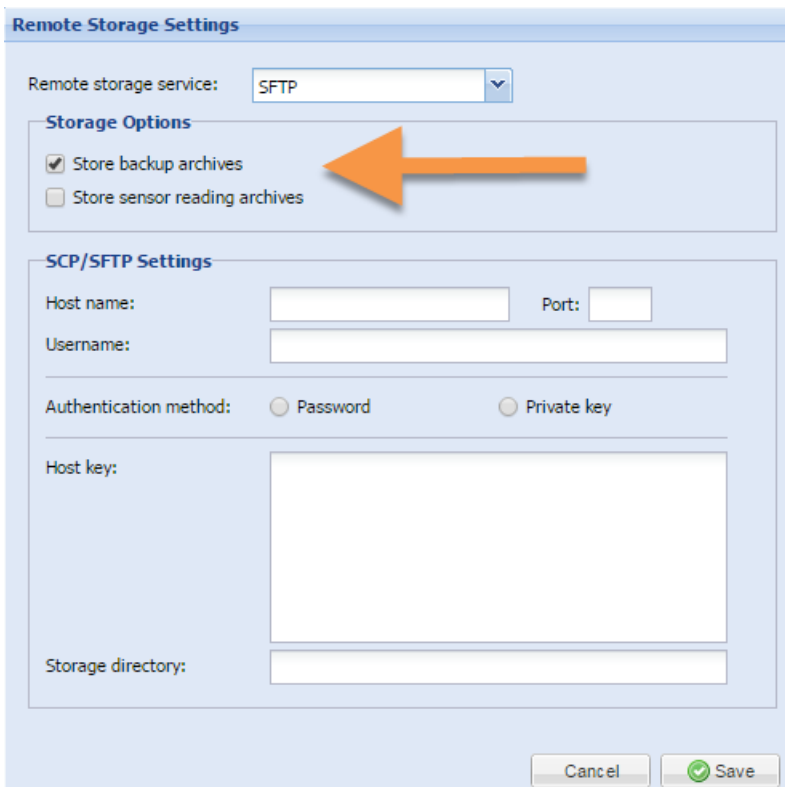


Remote Storage Settings


Remote storage service: None 

- None
- Amazon Web Services
- SCP
- SFTP
- FTP

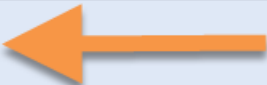
3. Select the checkboxes for the file types you want to automatically store on a remote server.
  - Store backup archives
  - Store sensor reading archives



Remote Storage Settings

Remote storage service: SFTP 

**Storage Options**

Store backup archives 

Store sensor reading archives

**SCP/SFTP Settings**

Host name:  Port:

Username:

Authentication method:  Password  Private key

Host key:

Storage directory:

4. Complete the authentication and location information for your selected remote server.

---

*Note: The authentication and location information will vary based on your selected remote storage service.*

---

5. Click Save.



## How to Retrieve the Host Key for an SFTP or SCP Server

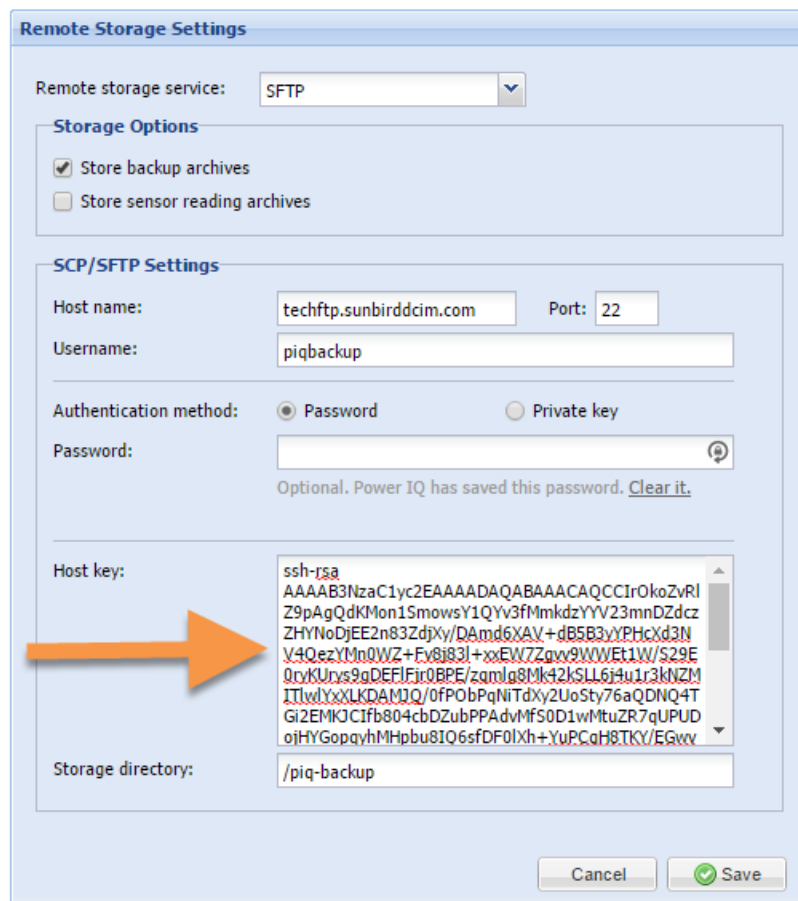
To configure remote storage using an SFTP or SCP server, you will need to provide a host key during the authentication and location information step outlined above. To do so, you can use the `ssh-keyscan` utility.

1. From a Linux box, run this command to get the host key:

```
ssh-keyscan -p 22 -t rsa techftp.sunbirdcim.com 2>/dev/null | awk '{print $2,$3}'
```

*Note: If you are copying and pasting from the example above, make sure to change the bolded text—the port (22) and host server (`techftp.sunbirdcim.com`)—to reflect your own environment.*

2. Copy the lines returned into the Host Key box under SCP/SFTP Settings under Remote Storage Settings in Power IQ (Step 4 in the previous section).



**Remote Storage Settings**

Remote storage service: **SFTP**

**Storage Options**

Store backup archives  
 Store sensor reading archives

**SCP/SFTP Settings**

Host name: **techftp.sunbirdcim.com** Port: **22**

Username: **piqbackup**

Authentication method:  Password  Private key

Password:  Optional. Power IQ has saved this password. [Clear it.](#)

Host key: `ssh-rsa  
AAAAB3NzaC1yc2EAAAADAQABAAQCCIRoKozvRI  
Z9pAgQdKMon1SmowsY1QYv3fMmkdzYYV23mnDZdcz  
ZHYNoDjEE2n83ZdjXy/DAmD6XAV+dB5B3yYPhcXd3N  
V4QezYm0WZ+Ev6j83l+xxEW7qW9WWEt1W/S29E  
QrvKUnys9aDEFJfr0BPE/zqmla8Mk42kSLL6j4u1r3KNZM  
ITlwYxxLKDAMIQ/0fPObPqNiTdxY2UoSty76aQDNQ4T  
Gi2EMKjCifb804cbDZubPPAdvMfS0D1wMtuZR7qUPUD  
ojHYGopqyhMHpbu8IQ6sfDF0lXh+YuPCqH8TKY/EGWv`

Storage directory: **/piq-backup**

3. Click Save.





## More Information on ssh-keyscan

The syntax for the command is as follows:

```
ssh-keyscan -p [PORT] -t [TYPE] [HOST] 2>/dev/null| awk '{print $2,$3}'
```

With the following options:

Tag	Description
-p [PORT]	Port to connect to on the host
-t [TYPE]	Specifies the type of the key to fetch from the host. Use <b>rsa</b> as in the example above.

The host is the server IP address or host name, such as techftp.sunbirdcim.com.



## Configuring Remote Access to Database

Power IQ's ODBC interface allows ODBC compliant applications access to the power data of managed devices. For example, an ODBC compliant reporting application like Crystal Reports can access Power IQ data to create customized reports.

See [ODBC Access](#) for details on configuration and queries.



## Configuring Data Rollup Retention

Power IQ performs periodic roll-ups. During a roll-up, the values over that period are averaged and stored along with the minimum and maximum values that were measured. As time passes, the stored roll-up data itself is rolled up into larger sets of data. Raw data measurements are rolled up every hour, and 24 hourly roll-ups are rolled up every day, and so on. Data does not have to be purged immediately after a roll-up occurs.

### Example

Raw data is rolled up every hour but a set of raw data can still be made available five hours later. You can configure how long Power IQ retains each level of data.

Ideally, you should adjust the data retention periods before adding facility items to Power IQ management. You should also revisit these settings after adding a large number of facility items.

---

*Note: Power IQ collects a lot of data. Keeping this data for long periods of time consumes large amounts of storage space and may affect performance. If you need long term access to the raw poll data, you should download daily sensor readings regularly. See [Downloading Daily Sensor Readings](#).*

---

Before making any changes to this configuration, enter your settings in the data storage calculator to ensure adequate database capacity. Improper configuration may result in data loss. Access the data storage calculator by clicking the link on the Settings > Data Rollup Retention page in Power IQ.

1. In the Settings tab, click Data Rollup Retention, in the Data Management section.
2. In the Data Retention Configuration for SQL Standard Tables panel, start with the "Retain raw data" row. Use the drop-down lists in that row to select how long Power IQ should keep this raw data.
3. In the Retain hourly averages of data row, configure how long hourly roll-ups are stored.
4. In the Retain daily averages of data row, configure how long daily roll-ups should be stored.
5. In the Retain monthly averages of data row, configure how long monthly roll-ups should be stored by Power IQ.

On this page, in the Data Retention Configuration for SQL Archive Tables panel, you can also enable and configure the retention of archived data. For more information, see [Configuring Data Rollup Retention](#).

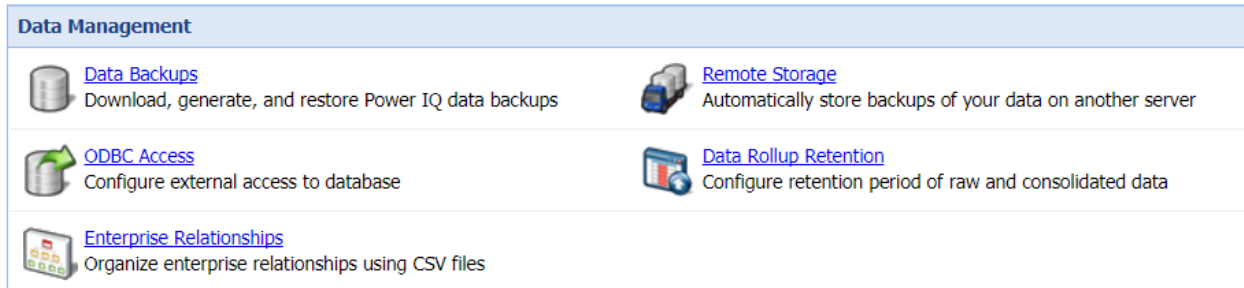


## Enabling and Configuring the Data Archive (BETA)

Power IQ allows users to store and analyze archived data so that users can retain the raw data for a long time period while minimizing system performance impact. This feature is useful in cases where users need to audit a past event on a specific facility item or rack.

To use the data archive feature, you first must enable it through the Power IQ Settings.

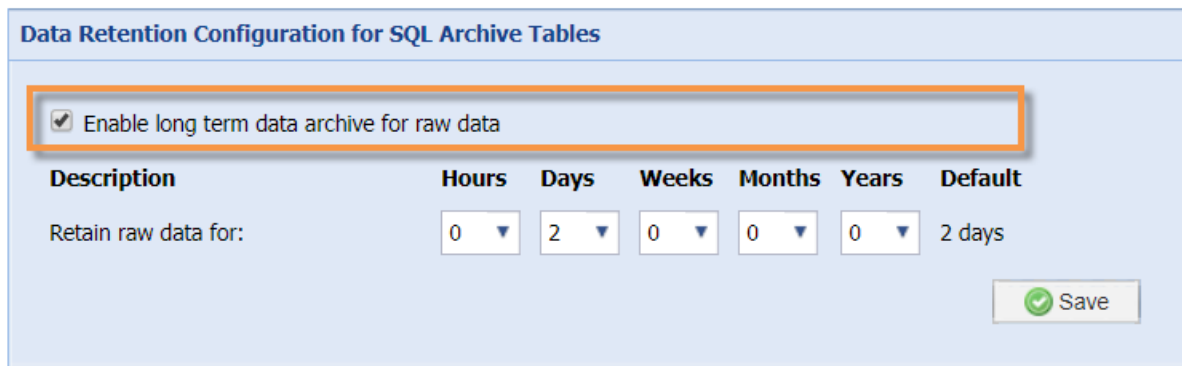
1. Under Settings > Data Management, select Data Rollup Retention



**Data Management**

- [Data Backups](#)  
Download, generate, and restore Power IQ data backups
- [Remote Storage](#)  
Automatically store backups of your data on another server
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Configure external access to database
- [Data Rollup Retention](#)  
Configure retention period of raw and consolidated data
- [Enterprise Relationships](#)  
Organize enterprise relationships using CSV files

2. In the Data Retention Configuration for SQL Archive Tables panel, check the Enable long-term data archive for raw data checkbox.



**Data Retention Configuration for SQL Archive Tables**

Enable long term data archive for raw data

Description	Hours	Days	Weeks	Months	Years	Default
Retain raw data for:	0	2	0	0	0	2 days

3. You can also specify the duration to retain the raw data. The default is two days. Optional.
4. Click the Save button to save your changes. A “Data archival configuration updated successfully” message will display once your changes have been saved.

You can now use the data archive feature. For more information on how to chart archived data using a device chart, see *Charting Archive Data Using the Device Chart (BETA)* on page 594.

---

*Note: Archive data is included in backups and restores. As a result, systems with large archives may take longer to back up and restore.*

---

*Note: Power IQ will delete data from the archive tables in accordance with the retention policies specified under Power IQ Settings > Data Management > Data Rollup Retention. Additionally, raw data is moved to the archive only when the retention policy for the SQL Standard Tables has expired. For more information on setting the standard retention policies, see *Configuring Data Rollup Retention on the previous page.**

---

## Enterprise Relationships and the EDM

One of Power IQ's advanced features is the ability to model the IT equipment infrastructure within your data center. Power IQ can model something as simple as a single rack, or as large as a building with multiple server rooms.

In Power IQ, this hierarchical representation of your data center is called the enterprise data model, or EDM. The EDM shows the relationships between objects in your data center and enables Power IQ to:

- Display a representation of your equipment in the Data Centers tab.
- Generate charts in the Analytics tab.
- Generate charts and gauges on the Dashboard.
- Calculate PUE.



## What is an Enterprise Data Model (EDM) Object?

An object is an item that is a part of your data center.

The objects are mapped by relationships of parent and child, creating a hierarchy.

Higher-level objects contain and organize lower-level objects. For example, a Rack is an object that contains Devices, a Row is an object that can contain Racks, and an Aisle is an object that can contain Rows. See [Object Types and their Hierarchy](#).

The lowest-level objects are called Devices. Devices are items such as servers, KVM drawers, network switches, or other equipment commonly installed in server racks. Generally speaking, these are items you provide power to.

There are a couple of special exceptions. You can map circuits and outlets as part of your EDM, but these objects don't show in the main hierarchy in the Data Centers tab. Since their associations are to your IT devices, circuits display in the device details pages, and outlets display in both the device details pages, and rack PDU smart pages.



## What are Mappings and Relationships?

All objects, except for the Data Center, must have a larger object as a parent. Generally speaking, a parent object is a larger object that contains a smaller object.

The Data Center object is the largest object. It has no parent object.

This ability to identify an object's parent is a single mapping. Mapping each object to its parent describes a model of equipment and how it is organized to Power IQ.

Your model does not have to include every level, as long as it follows the rules for parent-child relationships. See [Object Types and their Hierarchy](#).



## Object Types and Their Hierarchy

From the top of the hierarchy to the bottom:

- Region
- Country
- Territory
- City
- DATA\_CENTER: The data center object type. This object has no parent.
- FLOOR: The floor object type. This object can only have a DATA\_CENTER as a parent.
- ROOM: The room object type. This object can have a DATA\_CENTER or FLOOR as a parent.
- AISLE: The aisle object type. This object can have a DATA\_CENTER, FLOOR, or ROOM as a parent.
- ROW: The row object type. This object can have a DATA\_CENTER, FLOOR, ROOM, or AISLE as a parent.
- RACK: The rack object type. This object can have a DATA\_CENTER, FLOOR, ROOM, AISLE, or ROW as a parent.
- DEVICE: The IT Device object type. This object can only have a RACK as a parent.
- DOOR: The door object type. This object can have a DATA CENTER, FLOOR, ROOM, AISLE, ROW, or RACK as a parent.

These objects represent PDUs and sensors:

- PDU: The PDU object type. This object represents all types of PDUs in Power IQ, including Rack PDUs, Rack Transfer Switches, CRACs, Floor PDUs, Floor UPS, Power Panels, and Standalone Meters. This object can have a DATA\_CENTER, FLOOR, ROOM, AISLE, ROW, or RACK as a parent.
- SENSOR: The sensor object type. This object can have a DATA\_CENTER, FLOOR, ROOM, AISLE, ROW, or RACK as a parent.

For more information on EDM levels please see the [New EDM Levels](#) video.





## Requirements for Creating EDM

All PDUs included in your EDM must already be added to Power IQ. See [Adding PDUs to Power IQ Management](#).



## Creating Your EDM

There are several ways to create your EDM:

- Import a CSV file containing the EDM object mappings. See [Importing EDM Object Mappings](#).
- Add items manually in the Data Centers tab, using drag-and-drop to arrange the hierarchy. See [Creating an EDM Manually](#).
- Generate a default EDM. A default EDM gives you a starting point for customization using the other methods, and enables you to start using dashboard charts immediately. See [Generate a Default EDM](#).



## Creating an EDM Manually

The Data Centers tab has menu options to add each EDM object manually, and associate PDUs and sensors. Once objects are added, drag and drop them to arrange the hierarchy that represents your data center. See [Object Types and their Hierarchy](#) for details on each object and how it can be used in the EDM.

---

*Note: If you want to move an EDM item within the hierarchy it needs to be selected first. Just left-clicking and dragging will not work (Left Click - Release - Left Click Drag - Release).*

---

See [Importing EDM Object Mappings](#) for an alternative to creating the EDM manually.

Prerequisite: PDUs must be added to Power IQ before creating an EDM. See [Adding PDUs to Power IQ Management](#).

You can add Region, Country, Territory, City, Data Center, Floor, Room, Aisle, Row, Rack, and IT Device objects.

1. Click Add, then select the object and name it when it appears in the tab.
2. To associate PDUs in the EDM, you must add them to Power IQ first. Use the Facility Item Association menu option to find PDUs that are not yet in the EDM, and place them in the hierarchy. Power IQ automatically adds your sensors to the EDM when you associate their PDUs. And, Power IQ moves your sensors when they have the same parent as the PDU. See [Automatically Associate Sensors in the EDM](#).

---

*Note: Only PDUs and sensors that are unassociated will appear as options. PDUs include facility items.*

---

To associate outlets and circuits with IT devices:

- Outlets and circuits can be associated with IT Device objects only. See [Associate a Circuit or Outlet with an IT Device](#).



## Automatically Associate Sensors in the EDM

Power IQ automatically associates your sensors into the EDM. See [Enterprise Relationships and the EDM](#).

Every five minutes, Power IQ checks for sensors that are not part of the EDM. If the sensor's PDU is in the EDM, Power IQ adds the sensor to the PDU's parent object, usually a rack. Click Refresh in the Data Centers tab to view the updated EDM.

When you associate a PDU in the EDM, Power IQ adds the sensors to the PDU's parent object.

When you remove a PDU from the EDM, Power IQ unassociates sensors that are associated with the PDU's parent object. But, any sensor that were associated to other EDM objects stay where they are.

When you move a PDU in the EDM, Power IQ moves the sensors that had the same parent to the new parent. But, any sensors that were associated to other EDM objects stay where they are.

---

*Note: Because unassociated sensors attached to an associated PDU will be re-associated every five minutes, you cannot remove a sensor from the EDM if its PDU is in the EDM.*

















---

You can also associate sensors manually and by import. See [Create an EDM Manually](#) and [Import EDM Object Mappings](#).



## Icons for EDM Objects

The following icons are used to represent each object in the EDM.

Icon	Object
	Data Center
	Floor
	Room
	Aisle
	Row
	Rack
	IT Device
	Rack PDU
	Sensor
	Door
	CRAC
	Floor PDU
	Floor UPS
	Power Panel
	Standalone Meter
	Rack Transfer Switch



## Importing EDM Object Mappings

One method to create or add to an EDM is to import the objects and their mappings. These mappings are imported as one or more Comma Separated Value (CSV) files. Additional CSV files append to the EDM, except when objects are duplicated in the CSV files. In the case of duplicates, the last uploaded object updates the previous entries.

If an EDM already exists, you can export it as a single CSV file. This file can then be edited to make additions, or used as a template to create a new file. See [Exporting an EDM](#).

For details on creating the CSV file, see [Structure of the EDM Import File](#).

---

*Note: All PDUs must be added to Power IQ first, before importing an EDM. Importing a CSV file that lists a PDU not added to Power IQ results in an error. See [Adding PDUs to Power IQ Management](#).*

---

To import EDM object mappings:

1. In the Settings tab, click Enterprise Relationships.
2. In the CSV Data Mapping Actions area, click Browse, and select the CSV file.
3. Click Import.

A status window indicates any issues that occurred when the upload completes. If any errors have occurred, none of the objects in the file are added. Edit the CSV file to correct any issues and try again.

## CSV Columns for OUTLET Objects

A line that describes an Outlet object has the following attribute columns in this order:

- object\_type - this value is always "OUTLET"
- pdu\_ip - The IP address of the PDU that this is attached to.
- pdu\_proxy\_address - If the PDU is in a daisy-chained configuration or console server configuration, enter the PDU's position number in the chain or serial port number.
- outlet\_number - The outlet number on the side of the PDU for this outlet.
- parent\_object\_type - This value is always "DEVICE"
- parent\_external\_key - The unique identifier for the DEVICE that this outlet serves.

Power IQ automatically creates Outlet objects when Raritan PX PDUs are placed under its management. If you create an Outlet object with a pdu\_ip not under Power IQ management, the CSV file generates an error.

## CSV Columns for PDU Objects

You must add all PDUs to Power IQ before you can map them in the EDM.

A line that describes a PDU object has the following attribute columns in this order:

- object\_type - This value is always PDU.
- pdu\_ip - The IP address of the PDU.



- pdu\_proxy\_address - If the PDU is in a daisy-chained configuration or console server configuration, enter the PDU's position number in the chain or serial port number.
- parent\_object\_type - One of DATA\_CENTER, FLOOR, ROOM, AISLE, ROW, RACK.
- parent\_external\_key - The unique identifier for the parent object. It can be a name, number, or any other kind of text. This field must be unique to that parent object. Many "child" objects may have the same parent.

## CSV Columns for CIRCUIT Objects

You must add all PDUs to Power IQ before you can map them in the EDM.

A line that describes a CIRCUIT object has the following attribute columns in this order:

- object\_type - This value is always CIRCUIT.
- pdu\_ip - The IP address of the PDU.
- pdu\_proxy\_address - If the PDU is in a daisy-chained configuration or console server configuration, enter the PDU's position number in the chain or serial port number.
- panel\_number - If the circuit is located in a panel, enter the panel number.
- circuit\_number - The circuit's number
- parent\_object\_type - A circuit's parent\_object is always DEVICE.
- parent\_external\_key - The parent DEVICE's external key. This field must be unique to that parent object. Many "child" objects may have the same parent.

## CSV Columns for SENSOR Objects

Sensors must have unique labels.

A line that describes a SENSOR object has the following attribute columns in this order:

- object\_type - This value is always SENSOR.
- pdu\_ip - The IP address of the PDU the sensor is attached to.
- pdu\_proxy\_address - If the PDU is in a daisy-chained configuration or console server configuration, enter the PDU's position number in the chain or serial port number.
- type - One of the following values: AIR\_FLOW,, AIR\_PRESSURE, CONTACT\_CLOSURE, HUMIDITY, SMOKE, TEMPERATURE, VIBRATION, WATER.
- ordinal: The number of the sensor's position on the PDU.
- parent\_object\_type - A sensor's parent\_object is one of the following: DATA\_CENTER, FLOOR, ROOM, AISLE, ROW, RACK.
- parent\_external\_key - The parent DEVICE's external key. This field must be unique to that parent object. Many "child" objects may have the same parent.

## Importing More than 2500 Objects

The EDM import file may contain a maximum of 2500 lines, one line per object. If you have an EDM with more than 2500 objects, create multiple CSV files.



In this case, the contents of each CSV file, and the order in which you import them is important.

All objects except for Data Center must have a valid parent when added. Importing a child object in file #1, and the parent object in file #2, results in an error.

Make sure each file contains a parent object for each object, or import all high-level parent objects first, such as Data Center and Room, then import the lower-level child objects in subsequent files.





## Structure of the EDM Import File

The EDM import file must be in .CSV format.

General structure:

- One Object per line.
- All Objects except for a Data Center list another valid object as a parent.
- All Objects have a unique key for their type.

Within a single CSV file, object order is not important. All objects are processed at the same time.

The CSV file has a maximum length of 2500 lines, meaning a maximum of 2500 objects can be imported at one time. See [Importing More than 2500 Objects](#) for details on importing multiple files. Object order and import order are important in this case.

Object key:

- An object's unique identity is a combination of its object type and its object key, which is called an external key. This means you could have two objects with the same name, as long as they are different types of objects.  
However, if two lines are both type "DEVICE" and both have an external key "Sales1", Power IQ sees only one device object with the key "Sales1". In this case, it uses the last DEVICE object identified as "Sales1" as the description for that device.
- The columns required for each object varies, depending on the object type.
- All columns are separated by a comma.
- Most columns containing text information can be up to 64 characters long. These columns can contain any character except for a comma.
- The custom\_field\_1, custom\_field\_2, external\_key and parent\_external\_key fields can be up to 255 characters long. These columns can contain any character except for a comma.

---

*Note: Currently import EDM does not support objects above Data Centers i.e Region, Country, Territory, City*

---



## CSV Columns for DATA\_CENTER Objects

A line that describes a Data Center object has the following attribute columns in the order listed.

All columns are separated by a comma.

---

*Note: The attribute columns toward the end. For example: by providing the cost of energy for the data center, Power IQ can calculate the cost of running the data center in an Analytics report. Report can be filtered to include only a smaller object, such as a Rack. See [Configuring Charts](#).*

---

- object\_type - this value is always "DATA\_CENTER"
- external\_key - The unique identifier for this object. It can be a name, number, or any other kind of text. This field must be unique.
- name - The name of the data center.
- contact\_name - The name of the contact for this data center.
- contact\_phone - The phone number for the contact for this data center.
- contact\_email - The email address of the contact for this data center.
- company\_name - The name of the company that owns this data center
- city - The city where the data center resides.
- state - The state/province where the data center resides.
- country - The country where the data center resides.
- peak\_kwh\_rate - The cost per kilowatt hour during peak hours
- off\_peak\_kwh\_rate - The cost per kilowatt hour during off-peak hours
- peak\_begin - The time the peak hours begin.
- peak\_end - The time the peak hours end.
- co2\_factor - The co2 factor for this site. This indicates the amount of carbon dioxide produced per kWh.
- cooling\_factor - The cooling factor per kw energy used. This is the energy used for cooling, or how many kilowatts of energy are used to cool 100 kilowatts of power consumption.
- custom\_field\_1 - A custom field for the user to specify.
- custom\_field\_2 - A second custom field for the user to specify.
- capacity - The peak capacity in kilowatts, specified with up to two decimal places.



## CSV Columns for FLOOR, ROOM, AISLE, and ROW Objects

Lines that describe a Floor, Room, Aisle, or Row have the following attribute columns in this order:

- `object_type` - One of the following values: FLOOR, ROOM, AISLE, ROW
- `external_key` - The unique identifier for this object. It can be a name, number, or any other kind of text. This field must be unique.
- `name` - The name of the object.
- `parent_object_type` - One of DATA\_CENTER, FLOOR, ROOM, or AISLE, as described previously.
- `parent_external_key` - The unique identifier for the parent object. It can be a name, number, or any other kind of text. This field must be unique to that parent object (however, many "child" objects may have the same parent).
- `capacity` - The peak capacity in kilowatts, specified with up to two decimal places.



## CSV Columns for RACK Objects

A line that describes a Rack has the following attribute columns in this order:

- object\_type - RACK
- external\_key - The unique identifier for this object. It can be a name, number, or any other kind of text. This field must be unique.
- name - The name of the object.
- parent\_object\_type - One of DATA\_CENTER, FLOOR, ROOM, AISLE, or ROW, as described previously.
- parent\_external\_key - The unique identifier for the parent object. It can be a name, number, or any other kind of text. This field must be unique to that parent object (however, many "child" objects may have the same parent).
- location - an optional field that can be used to identify where rack sits in a row or aisle.
- capacity - The peak capacity in kilowatts, specified with up to two decimal places.
- override\_upper\_critical\_percent - Value to override the default upper critical percent for rack threshold. See [Set Rack Capacity and Override Threshold Percentages](#).
- override\_upper\_warning\_percent - Value to override the default upper warning percent for rack threshold. See [Set Rack Capacity and Override Threshold Percentages](#).

The Rack model object is similar to the Floor, Room, Aisle and Row objects. The exception is the location value. This value is intended to make the rack easier to identify, and can be given a location value. For example: "3rd Rack" to indicate the third rack in a particular row.

It can also use some other identifying trait. For example: "Yellow" if the rack has a yellow color.



## CSV Columns for DEVICE Objects

A line that describes a Device object has the following attribute columns in this order:

- object\_type - this value is always "DEVICE"
- external\_key - The unique identifier for this object. It can be a name, number, or any other kind of text. This field must be unique.
- name - The name of the data center.
- parent\_object\_type - This value is always "RACK".
- parent\_external\_key - The external key for the parent rack.
- customer - The customer using this device.
- device\_type - The type of device. For example: "exchange server" or "test unit".
- power\_rating - The power rating of this device in watts or VA.
- decommissioned - Indicates whether this device has been decommissioned or not. This value is either "true" or "false".
- custom\_field\_1 - A custom field for the user.
- custom\_field\_2 - A second custom field for the user.
- device\_ip - The IP address of the device. Required when also importing a graceful shutdown command.
- shutdown\_command\_name - The name of the shutdown command assigned to this device. See [Add Shutdown Commands](#).
- shutdown\_wait\_time - The number of seconds Power IQ should wait for the shutdown to complete before powering off the associated outlet. See [Enable Graceful Shutdown for an IT Device](#).

Sample CSV for a device with a graceful shutdown command:

```
DEVICE,Device -- 54,Web Server 7,RACK,Rack -- 12,Marketing,Linux Server,,false,Dell PowerEdge R910,Tag#336549,192.168.43.142,Marketing Linux Servers Shutdown Commands,5
```

Sample CSV for a device without a graceful shutdown command:

```
DEVICE,Device -- 55,Router,RACK,Rack -- 12,Marketing,Cisco Router,,false,Cisco 7600 Router,Tag#044142,,,
```



## Exporting an EDM

Power IQ can export the existing EDM, as well as any unmapped PDUs, circuits, and sensors, as a CSV file. Use the file to edit and re-import, as a backup, or as a template for creating a new file.

Power IQ exports all object mappings as a single CSV file, regardless of how many objects it contains. If you want to re-import a file that contains more than 2500 objects, separate them into multiple CSV files.

---

*Note: To find unmapped PDUs, circuits, and sensors in the exported file, look for objects with a blank "parent\_external\_key".*

---

1. In the Settings tab, click Enterprise Relationships.
2. In the CSV Data Mapping Actions area, click Export Relationships.



## Generate a Default EDM

If you've added PDUs to Power IQ, you can generate a default EDM. You can customize the default EDM using the menu options in the Data Centers tab, or use export, edit the file, and re-import.

Generating a default EDM deletes all mappings already configured.

The default EDM contains:

- 1 data center
- 1 room
- 1 aisle
- 1 row per type of facility item, including CRAC, floor PDU, floor UPS, power panel, standalone meter
- 1 rack per rack PDU

1. In the Settings tab, click Enterprise Relationships in the Data Management section.
2. Click Generate Default Enterprise Relationships in the CSV Data Mapping Actions section.
3. Click OK to confirm.



## Associate a Circuit or Outlet with an IT Device

To allow for power control functions for outlets, you must associate your IT devices with their outlet. To allow for charting devices, the IT devices must be associated to their circuits or outlets.

1. In the Data Centers tab, select the IT device in its rack. The IT device details page opens.
2. In the Power Connections section, click Associate, then choose Outlets or Circuits.
3. The Associate Entity dialog opens. Begin typing the circuit or outlet name in the Search field. A list of unassociated circuits or outlets appears that match your search.

---

*Note: If a list does not appear, there are no unassociated outlets or circuits in Power IQ.*

---

4. Select the circuit or outlet in the list, then click Add.





## Clearing Enterprise Relationships

Clearing the enterprise relationships deletes the EDM. Deleting the EDM will disrupt all configured charts that are based on EDM relationships.

1. In the Settings tab, click Enterprise Relationships in the Data Management section.
2. In the CSV Data Mapping Actions box, click Clear Enterprise Relationships.
3. Click "Clear all enterprise relationships" in the warning message to confirm.



## Viewing Enterprise Relationship Summaries

The summary of enterprise mappings provides an overview of the EDM configured in Power IQ.

- In the Settings tab, click Enterprise Relationships. The summary is in the top left corner.



## Viewing Orphaned Systems Information

The Orphaned Systems information shows whether there are any PDUs in Power IQ that are not mapped to a parent object in the EDM. PDUs that are not in the EDM cannot be included in charts.

- In the Settings tab, click Enterprise Relationships in the Data Management section of the page.

The Orphaned Systems information is in the top right section of the page that opens.

See the table for explanations and possible action required.

	All Outlets Mapped	Some Outlets Mapped	No Outlets Mapped
PDU Mapped to the Enterprise	<p>The number of PDUs that are mapped to a parent object, such as a rack, and have all outlets mapped to an IT device.</p> <p>No action is required.</p>	<p>The number of PDUs that are mapped to a parent object, such as a rack, and have at least one outlet mapped to an IT device.</p> <p>No action is required.</p>	<p>The number of PDUs that are mapped to a parent object, such as a rack, but do not have any outlets mapped to IT devices.</p> <p>No action is required.</p>
PDU Not Mapped to the Enterprise	<p>The number of PDUs that are not mapped to a parent object, such as a rack, but have all outlets mapped to IT devices.</p> <p>Action required!</p> <p>If you have unmapped PDUs, you must assign them to a parent object for analytics to perform correctly.</p> <p>See <i>Finding Unmapped PDUs</i> on the next page.</p>	<p>The number of PDUs that are not mapped to a parent object such as a rack but have at least one outlet mapped to an IT device.</p> <p>Action required!</p> <p>If you have unmapped PDUs, you must assign them to a parent object for analytics to perform correctly.</p> <p>See <i>Finding Unmapped PDUs</i> on the next page.</p>	<p>The number of PDUs that are not mapped to a parent object, such as a rack, and have zero outlets mapped to a device.</p> <p>Action required!</p> <p>If you have unmapped PDUs, you must assign them to a parent object for analytics to perform correctly.</p> <p>See <i>Finding Unmapped PDUs</i> on the next page.</p>

## Finding Unmapped PDUs

There are several ways to find unmapped PDUs so that you can map them to parent objects in the EDM.

All PDUs must be mapped to a parent object, such as a rack. PDUs that are not in the EDM cannot be included in charts.

See [Viewing Orphaned Systems Information](#).

To find unmapped PDUs in CSV file export:

1. In the Settings tab, click Enterprise Relationships.
2. Click Export Relationships.
3. In the CSV file, find the section labeled "# The following section contains the current list of PDUs and the PDU column headers for use during import."
4. In that section, find the "parent\_object\_type" column. Rows without data in the "parent\_object\_type" column are unmapped PDUs.
5. Map the unmapped PDUs to parent objects in a data center.

This method maps unmapped PDUs to an "Unassigned Data Center" parent object so that you can view the PDUs in the Data Centers tab. Then, you can drag and drop the PDUs to the correct position beneath a parent object, such as a rack.

1. In the Settings tab, click Enterprise Relationships.
2. Click Generate Default Enterprise Relationships.
3. When the generation completes successfully, click the Data Centers tab and find the Unassigned Data Center.
4. Expand the Unassigned Data Center. All the previously unmapped PDUs are assigned to this data center object.
5. Drag and drop the PDU objects to assign them to the correct parent objects, such as racks, within the correct data center.
6. When you attempt to manually associate PDUs to a parent object in the Data Centers tab, only unmapped PDUs are available in the search tool.
7. In the Data Centers tab, select the parent object, such as a rack, that you want to associate an unmapped PDU with.
8. Click Add > Facility Item association.
9. In the Associate a PDU dialog, select an unmapped PDU in the PDU IP Address field, and click OK. The PDU is mapped to the data center parent object.



## Configuring Custom Fields

The Data Center, Device, and PDU items each contain two custom field values.

Custom fields display in the Data Centers tab's hierarchy on the object page, for all 3 types of custom field. PDU custom fields also display in the Facility Items tab in the PDU Details. IT Device custom fields also display in the IT Devices tab in the Device Details. You can use custom field values as filters when configuring charts. See [Configuring Charts](#).

By default, these are named:

- Data Center Custom Field 1 and Data Center Custom Field 2
- IT Device Custom Field 1 and IT Device Custom Field 2
- PDU Custom Field 1 and PDU Custom Field 2

Rename the field to specify the information it will contain.

### Example

To add data about the department that uses a group of devices, rename the IT Device Custom field "Department," and enter department names in the field for each device in Power IQ.

1. In the Settings tab, click Enterprise Relationships in the Data Management section.
2. In the Configure Custom Fields box, enter the new field name next to each custom field.
3. To assign data to the field, enter the data in the newly renamed custom field in either the Data Centers tab on the objects page or in the Facilities Items or IT Devices tab in the details page. Data Center custom fields can only be accessed in the Data Centers tab. Alternatively, you can use CSV import to update the information. See [Importing EDM Object Mappings](#).



# Chapter 12: Facility Items

Power IQ can manage your data center's facility items, including CRACs, UPSs, Floor PDUs, Standalone Meters, and Power Panels.

You can work with these objects in Power IQ the same way you work with rack PDUs. The Facility Items tab, which lists all rack PDUs, also contains all facility items.

When you flag your facility items as part of your data center's total power, Power IQ calculates your Power Usage Effectiveness (PUE). See [PUE - Power Usage Effectiveness](#).

---

*Note: Screenshots of smart pages are for illustration purposes only, and do not contain real, polled data.*

---



## Using the Facility Items Tab

The Facility Items tab contains a list of all PDUs added to Power IQ, even if they have not been mapped in the EDM. See [Creating Your EDM](#).

The Facility Items List can be configured to meet your needs:

- *Filter the Facility Items List* on the facing page
- *Configuring the Number of Items in the Facility Items List* on page 438

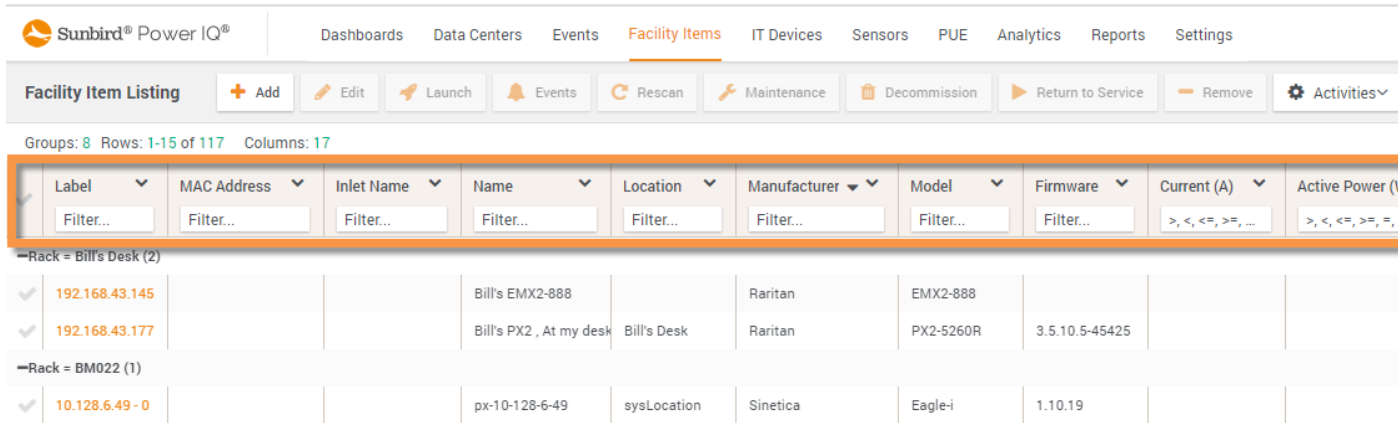


## Filter the Facility Items List

You can customize your view of the Facility Items List by using filters, sorting, and hiding or displaying columns of data.

See *Customizing Your View of Facility Items, IT Devices, and Events* on page 182.

- In the Facility Items tab, all items in the system display in a list.
- The Facility Items list can be filtered by specifying the search criteria for any of the available columns.



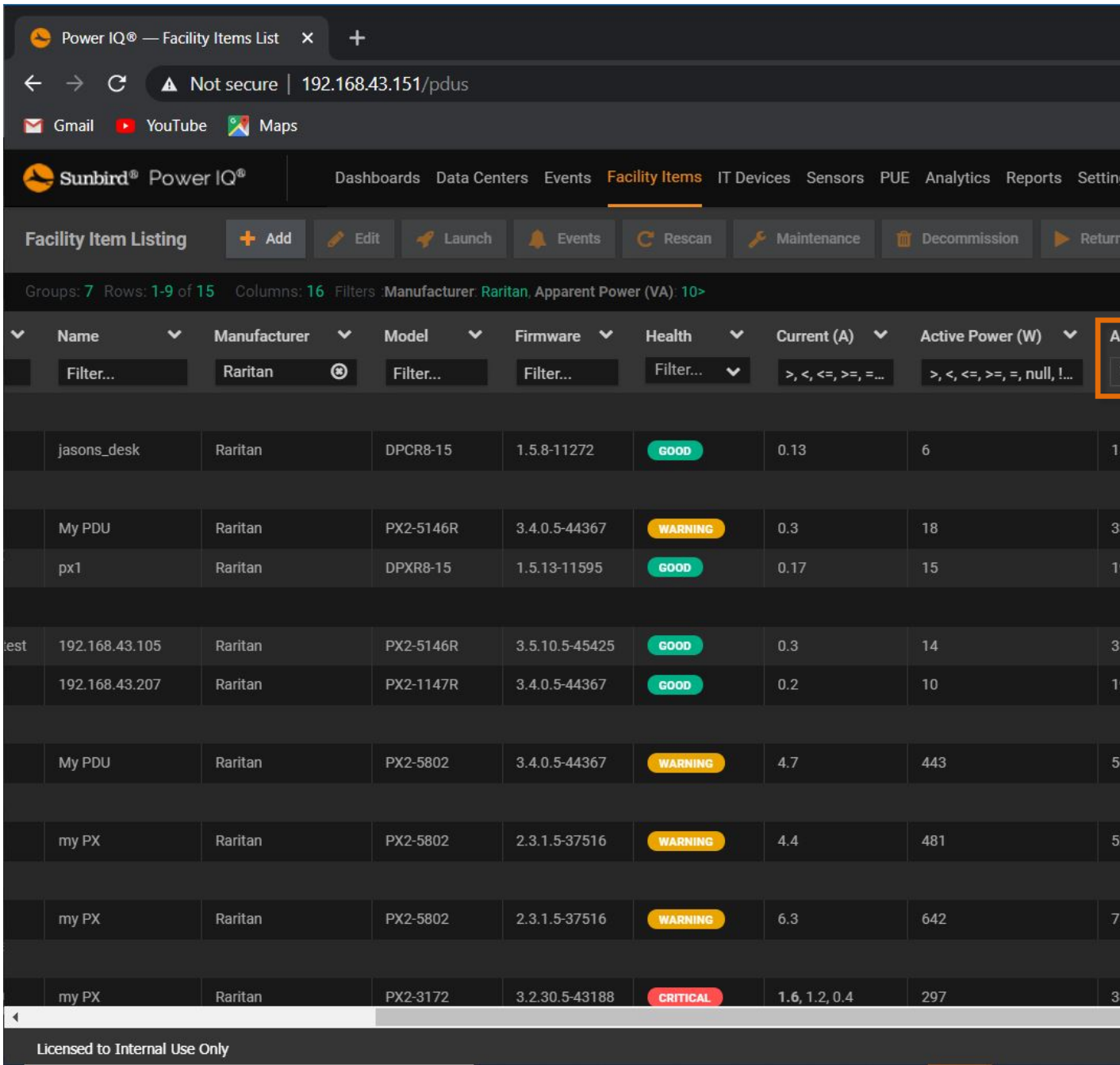
The screenshot shows the Sunbird Power IQ interface with the 'Facility Items' tab selected. The 'Facility Item Listing' section includes a toolbar with buttons for Add, Edit, Launch, Events, Rescan, Maintenance, Decommission, Return to Service, Remove, and Activities. Below the toolbar, it indicates 'Groups: 8 Rows: 1-15 of 117 Columns: 17'. A table with 17 columns is displayed, with the first column highlighted. The columns are: Label, MAC Address, Inlet Name, Name, Location, Manufacturer, Model, Firmware, Current (A), and Active Power (W). The table contains three rows of data, grouped by rack: 'Bill's Desk (2)' and 'BM022 (1)'. The data rows are as follows:

Label	MAC Address	Inlet Name	Name	Location	Manufacturer	Model	Firmware	Current (A)	Active Power (W)
192.168.43.145			Bill's EMX2-888		Raritan	EMX2-888			
192.168.43.177			Bill's PX2 , At my desk	Bill's Desk	Raritan	PX2-5260R	3.5.10.5-45425		
10.128.6.49 - 0			px-10-128-6-49	sysLocation	Sinetica	Eagle-i	1.10.19		

- For filtering on numeric columns we can enter numerical operators (>,<,<=,>=,=, null,!null) in the filter box. For example entering "10>" would only display values greater than 10







The screenshot shows the Sunbird Power IQ web interface. At the top, there's a navigation bar with 'Support Home', 'Solutions', and 'Forums'. Below that, the main header includes the Sunbird logo and 'Power IQ' along with various menu items like 'Dashboards', 'Data Centers', 'Events', 'Facility Items' (which is highlighted), 'IT Devices', 'Sensors', 'PUE', 'Analytics', 'Reports', and 'Settings'. A secondary navigation bar contains buttons for '+ Add', 'Edit', 'Launch', 'Events', 'Rescan', 'Maintenance', 'Decommission', and 'Return'. Below this, a summary line indicates 'Groups: 7 Rows: 1-9 of 15 Columns: 16 Filters: Manufacturer: Raritan, Apparent Power (VA) 10>'. The main content is a table with columns for Name, Manufacturer, Model, Firmware, Health, Current (A), and Active Power (W). The table contains several rows of data, including items like 'jasons\_desk', 'My PDU', 'px1', and 'my PX'. The 'Health' column uses color-coded labels: 'GOOD' in green, 'WARNING' in yellow, and 'CRITICAL' in red. At the bottom of the interface, there is a footer that reads 'Licensed to Internal Use Only'.

- Columns can be sorted by clicking in the field header to toggle between Ascending and Descending order, or by clicking the arrow in the column header and selecting the desired sort option.
- Columns can be arranged by dragging and dropping into place.



- You can choose which columns appear in the grid by clicking the Show/Hide icon in the grid.

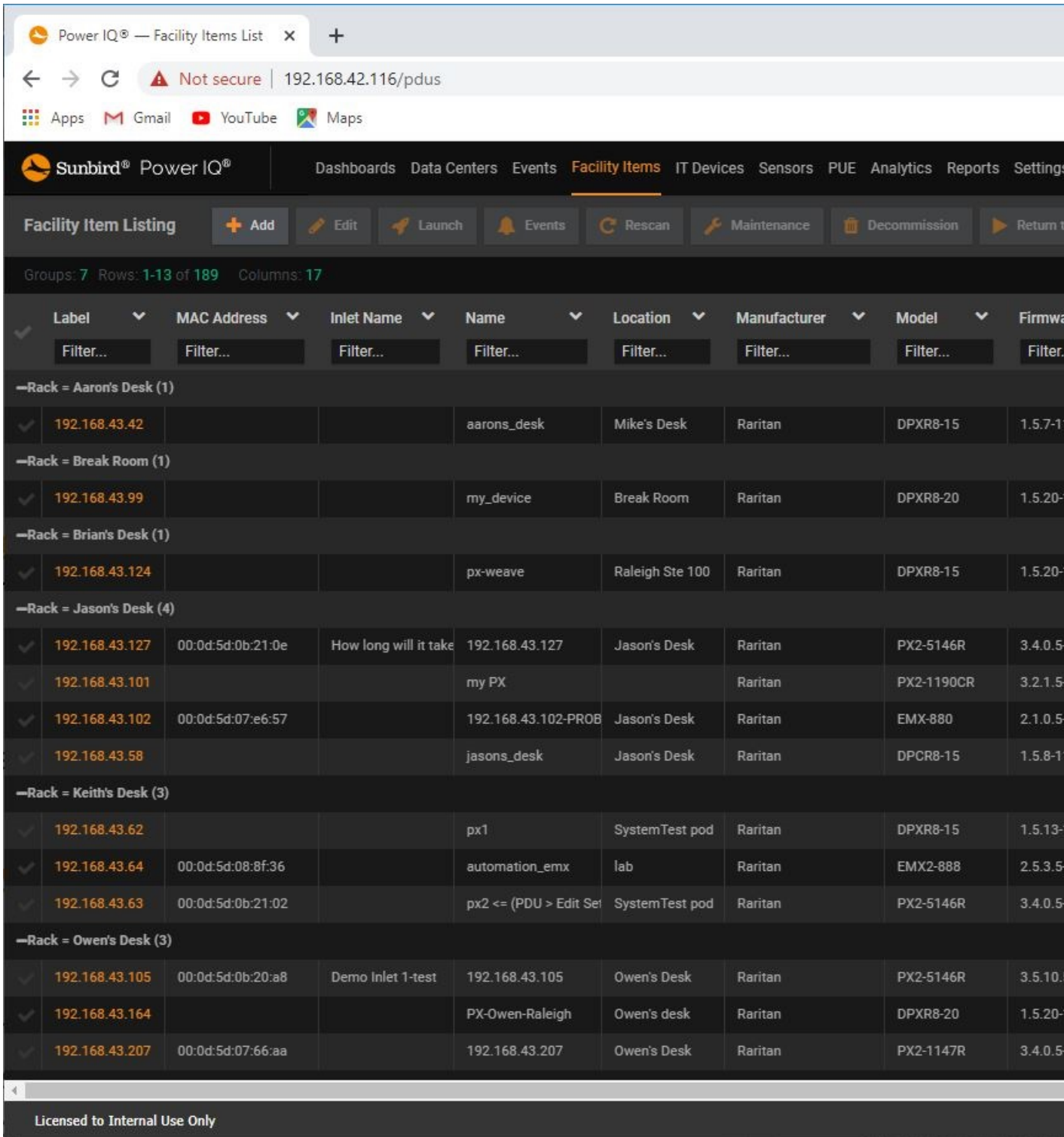
**Sunbird® Power IQ®**   Dashboards   Data Centers   Events   **Facility Items**   IT Devices   Sensors   PUE   Analytics   Reports   Settings

**Facility Item Listing**   [+ Add](#)   [Edit](#)   [Launch](#)   [Events](#)   [Rescan](#)   [Maintenance](#)   [Decommission](#)   [Return to Service](#)   [Remove](#)   [Activities](#)

Groups: 8   Rows: 1-15 of 117   Columns: 17

✓	Label Filter...	MAC Address Filter...	Inlet Name Filter...	Name Filter...	Location Filter...	Manufacturer Filter...	Model Filter...	Firmware Filter...	Current (A) >, <, <=, >=, ...	Active Power ( >, <, <=, >=, ...
-Rack = Bill's Desk (2)										
✓	192.168.43.145			Bill's EMX2-888		Raritan	EMX2-888			
✓	192.168.43.177			Bill's PX2 , At my desk	Bill's Desk	Raritan	PX2-5260R	3.5.10.5-45425		
-Rack = BM022 (1)										
✓	10.128.6.49 - 0			px-10-128-6-49	sysLocation	Sinetica	Eagle-i	1.10.19		

- Activities can be selected by clicking the Activities button in the toolbar



Power IQ® — Facility Items List

Not secure | 192.168.42.116/pdus

Sunbird® Power IQ®   Dashboards   Data Centers   Events   **Facility Items**   IT Devices   Sensors   PUE   Analytics   Reports   Settings

Facility Item Listing   + Add   Edit   Launch   Events   Rescan   Maintenance   Decommission   Return

Groups: 7   Rows: 1-13 of 189   Columns: 17

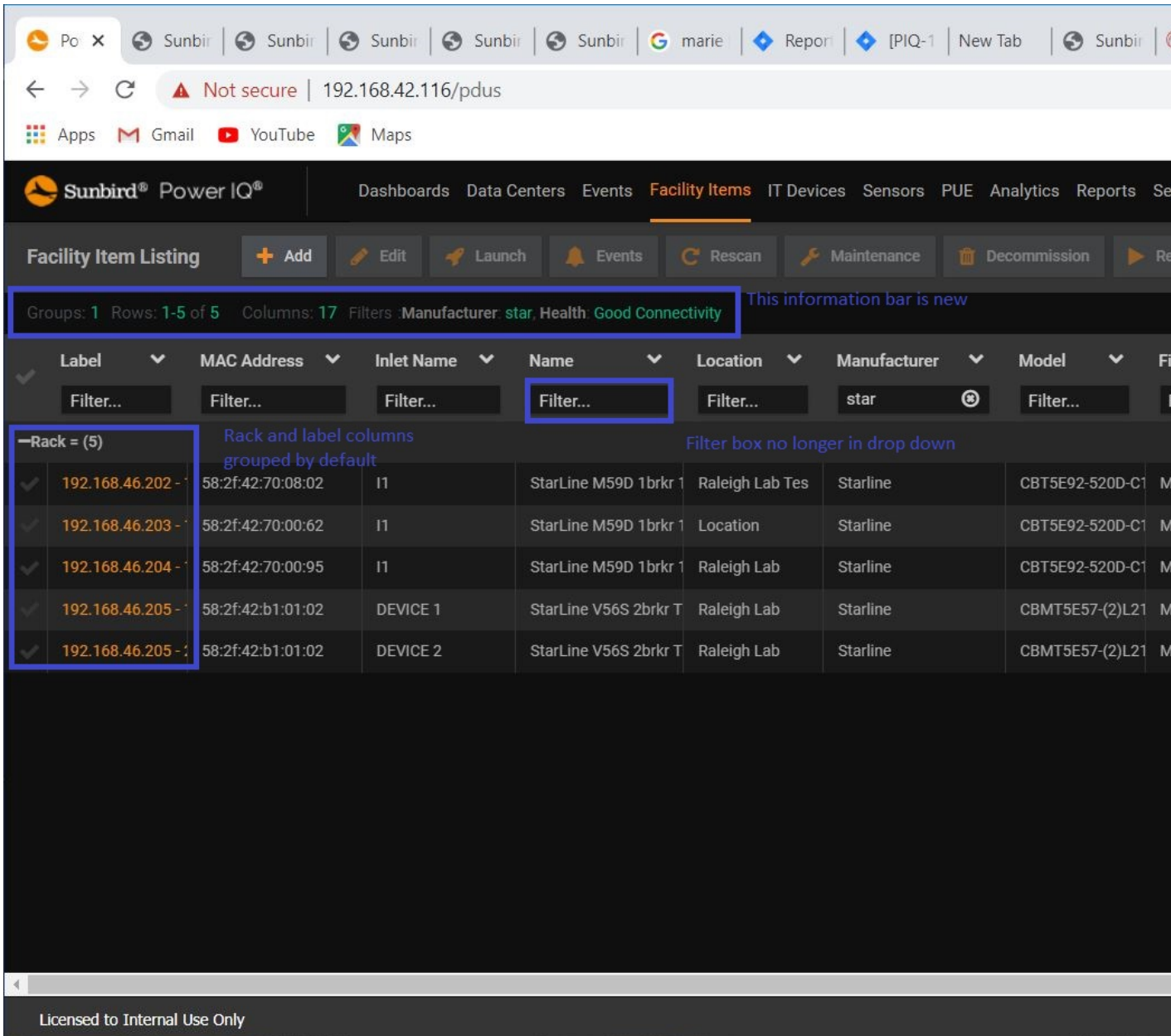
Label	MAC Address	Inlet Name	Name	Location	Manufacturer	Model	Firmware
<b>—Rack = Aaron's Desk (1)</b>							
192.168.43.42			aarons_desk	Mike's Desk	Raritan	DPXR8-15	1.5.7-1
<b>—Rack = Break Room (1)</b>							
192.168.43.99			my_device	Break Room	Raritan	DPXR8-20	1.5.20-
<b>—Rack = Brian's Desk (1)</b>							
192.168.43.124			px-weave	Raleigh Ste 100	Raritan	DPXR8-15	1.5.20-
<b>—Rack = Jason's Desk (4)</b>							
192.168.43.127	00:0d:5d:0b:21:0e	How long will it take	192.168.43.127	Jason's Desk	Raritan	PX2-5146R	3.4.0.5
192.168.43.101			my PX		Raritan	PX2-1190CR	3.2.1.5
192.168.43.102	00:0d:5d:07:e6:57		192.168.43.102-PROB	Jason's Desk	Raritan	EMX-880	2.1.0.5
192.168.43.58			jasons_desk	Jason's Desk	Raritan	DPCR8-15	1.5.8-1
<b>—Rack = Keith's Desk (3)</b>							
192.168.43.62			px1	SystemTest pod	Raritan	DPXR8-15	1.5.13-
192.168.43.64	00:0d:5d:08:8f:36		automation_emx	lab	Raritan	EMX2-888	2.5.3.5
192.168.43.63	00:0d:5d:0b:21:02		px2 <= (PDU > Edit Ser	SystemTest pod	Raritan	PX2-5146R	3.4.0.5
<b>—Rack = Owen's Desk (3)</b>							
192.168.43.105	00:0d:5d:0b:20:a8	Demo Inlet 1-test	192.168.43.105	Owen's Desk	Raritan	PX2-5146R	3.5.10.
192.168.43.164			PX-Owen-Raleigh	Owen's desk	Raritan	DPXR8-20	1.5.20-
192.168.43.207	00:0d:5d:07:66:aa		192.168.43.207	Owen's Desk	Raritan	PX2-1147R	3.4.0.5

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- Filter by PDU health: In the Health column filter, select the health statuses you want to view: Good, Warning, Critical, Maintenance, or Decommissioned. For Good, Warning, or Critical, select the source for each status, either Connectivity or Active Events. Select multiple options as needed.
- If a PDU has multiple line readings in the Current column, all values are shown separated by commas. This column can be filtered using numerical operators (>,<,<=,>=,=,!=,null,!null) in the filter box.” For example entering “10>” would only display values greater than 10.
- Filter by inlet temperature: In the Inlet Temperature (C) column filter box, enter the number of degrees Celsius as well as any of the numerical operators (>,<,<=,>=,=,!=,null,!null) to view only PDUs with inlet temperature sensor readings in the correct range.
- The inlet temperature shown is the maximum reading for all inlet-positioned temperature sensors associated with the PDU.
- Filter by PDU Type: Types of PDU include rack PDUs and facility items managed by dynamic plugin, such as CRACs or Floor PDUs. Add the Type column by selecting the checkbox.





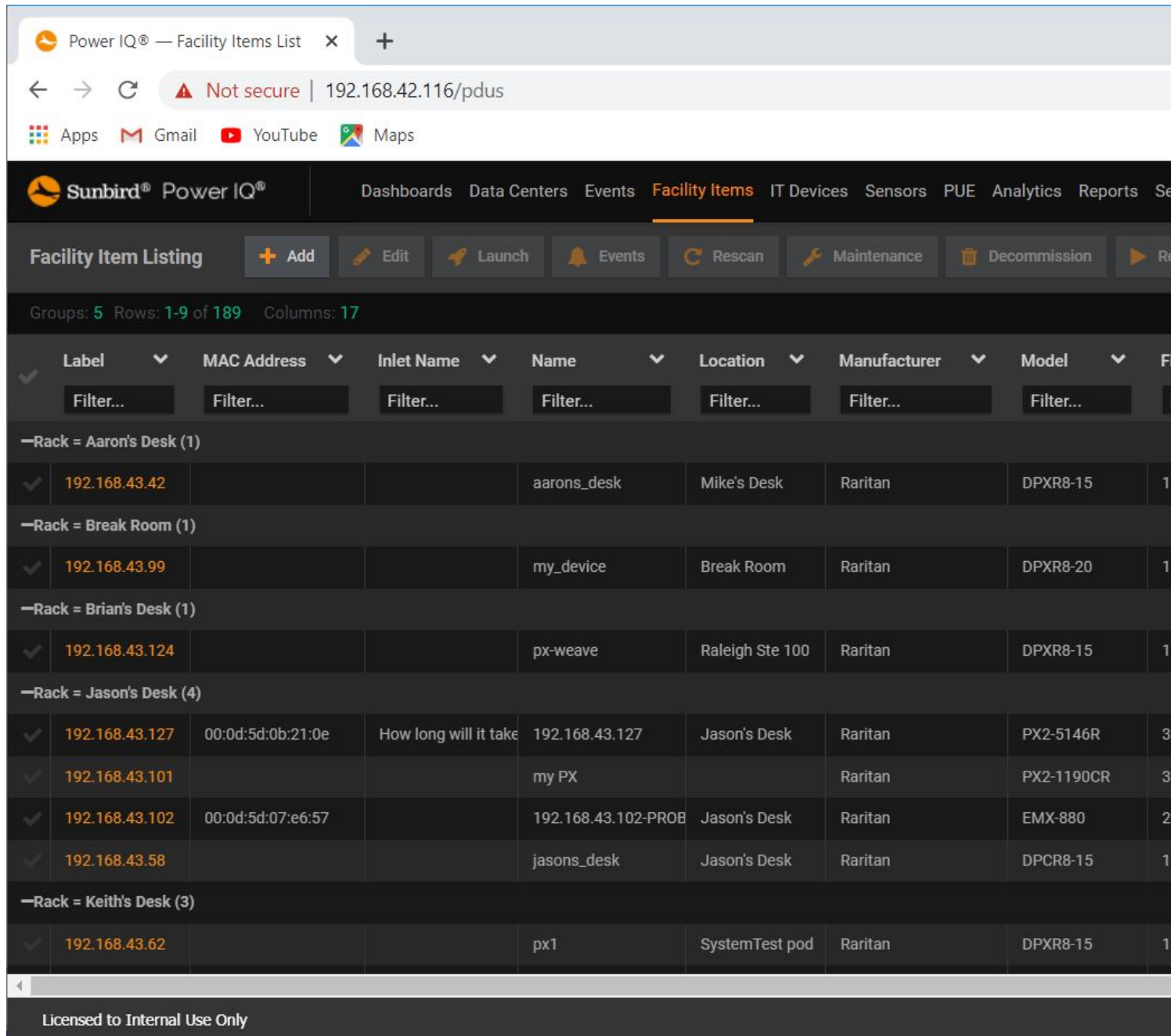
The screenshot shows the Sunbird Power IQ web interface. At the top, there's a navigation bar with 'Support Home', 'Solutions', and 'Forums'. Below that is a browser window showing the URL '192.168.42.116/pdus'. The main interface has a dark theme and a 'Facility Item Listing' section. A toolbar contains buttons for '+ Add', 'Edit', 'Launch', 'Events', 'Rescan', 'Maintenance', and 'Decommission'. Below the toolbar, a status bar shows 'Groups: 1 Rows: 1-5 of 5 Columns: 17 Filters: Manufacturer: star, Health: Good Connectivity'. A table with columns 'Label', 'MAC Address', 'Inlet Name', 'Name', 'Location', 'Manufacturer', and 'Model' is displayed. The 'Name' column filter is highlighted. A dropdown menu for 'Rack' is open, showing 5 items. A note says 'Rack and label columns grouped by default' and 'Filter box no longer in drop down'. The table contains 5 rows of data.

Label	MAC Address	Inlet Name	Name	Location	Manufacturer	Model
✓ 192.168.46.202	58:2f:42:70:08:02	I1	StarLine M59D 1brkr T	Raleigh Lab Tes	Starline	CBT5E92-520D-C1
✓ 192.168.46.203	58:2f:42:70:00:62	I1	StarLine M59D 1brkr T	Location	Starline	CBT5E92-520D-C1
✓ 192.168.46.204	58:2f:42:70:00:95	I1	StarLine M59D 1brkr T	Raleigh Lab	Starline	CBT5E92-520D-C1
✓ 192.168.46.205	58:2f:42:b1:01:02	DEVICE 1	StarLine V56S 2brkr T	Raleigh Lab	Starline	CBMT5E57-(2)L21
✓ 192.168.46.205	58:2f:42:b1:01:02	DEVICE 2	StarLine V56S 2brkr T	Raleigh Lab	Starline	CBMT5E57-(2)L21

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## Configuring the Number of Items in the Facility Items List

The number of PDU's displayed is determined by the user's screen size and resolution. Use the vertical scroll bar to view all of the Items in the grid.



The screenshot shows a web browser window with the URL `192.168.42.116/pdus`. The interface is for Sunbird Power IQ, displaying a 'Facility Item Listing' table. The table has columns for Label, MAC Address, Inlet Name, Name, Location, Manufacturer, and Model. It shows several racks of PDUs, including Aaron's Desk, Break Room, Brian's Desk, Jason's Desk, and Keith's Desk. A vertical scrollbar is visible on the right side of the table.

Label	MAC Address	Inlet Name	Name	Location	Manufacturer	Model	Power (W)
<b>—Rack = Aaron's Desk (1)</b>							
192.168.43.42			aarons_desk	Mike's Desk	Raritan	DPXR8-15	1
<b>—Rack = Break Room (1)</b>							
192.168.43.99			my_device	Break Room	Raritan	DPXR8-20	1
<b>—Rack = Brian's Desk (1)</b>							
192.168.43.124			px-weave	Raleigh Ste 100	Raritan	DPXR8-15	1
<b>—Rack = Jason's Desk (4)</b>							
192.168.43.127	00:0d:5d:0b:21:0e	How long will it take	192.168.43.127	Jason's Desk	Raritan	PX2-5146R	3
192.168.43.101			my PX		Raritan	PX2-1190CR	3
192.168.43.102	00:0d:5d:07:e6:57		192.168.43.102-PROB	Jason's Desk	Raritan	EMX-880	2
192.168.43.58			jasons_desk	Jason's Desk	Raritan	DPCR8-15	1
<b>—Rack = Keith's Desk (3)</b>							
192.168.43.62			px1	SystemTest pod	Raritan	DPXR8-15	1

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## Exporting the Facility Items List to CSV

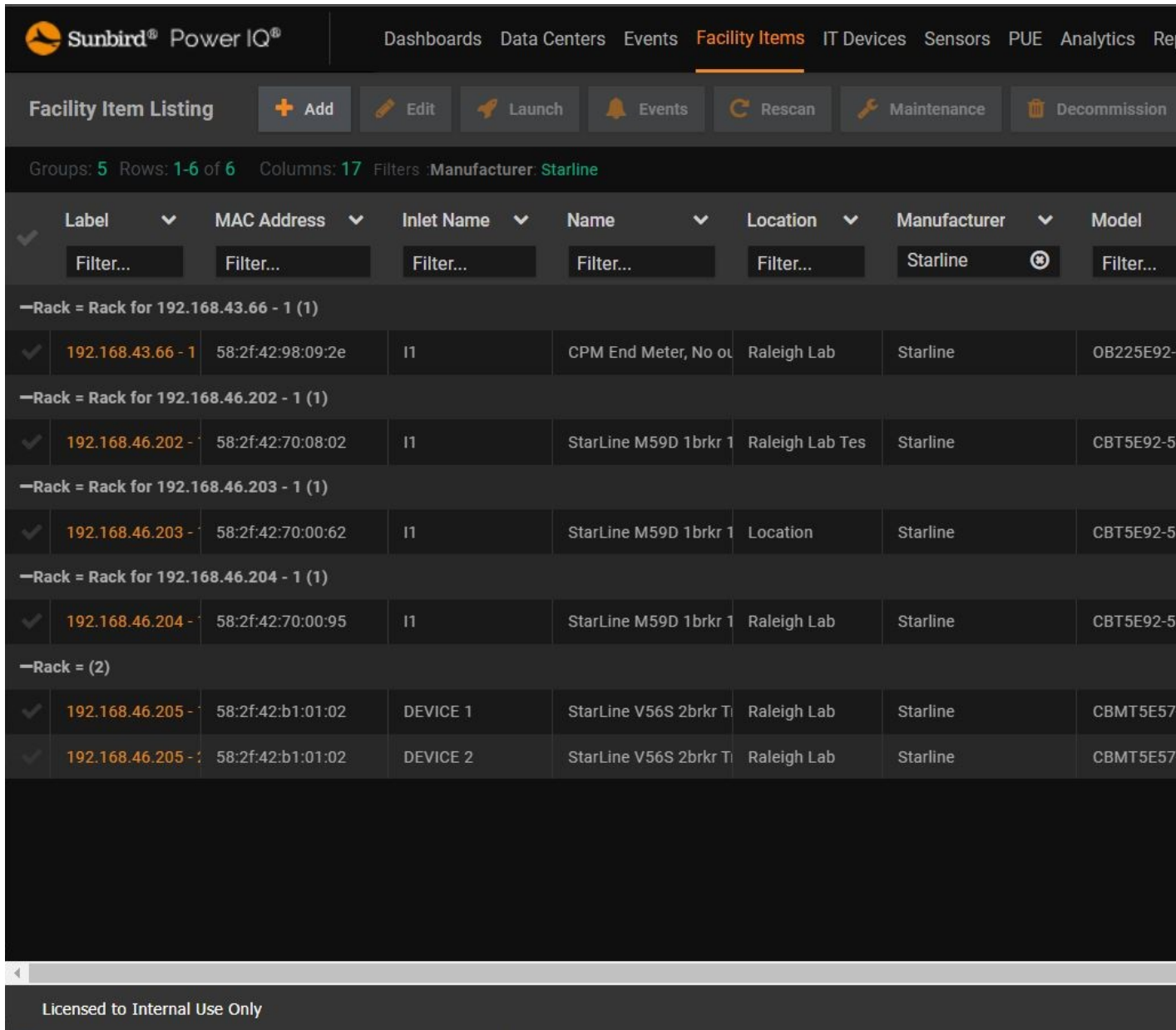
Export the Facility Items to create a CSV file containing all the data listed in the grid on the Facility Items tab.

If you have applied filters, the same filters will apply to the exported information.

The export PDUs CSV file is not the same as the file used for importing PDUs into Power IQ. See [Adding PDUs in Bulk with CSV Files](#).

1. In the Facility Items tab, click the Settings icon in the upper right corner of the grid and select the Export Grid Data to CSV option.





The screenshot shows the Sunbird Power IQ interface for Facility Item Listing. The top navigation bar includes 'Dashboards', 'Data Centers', 'Events', 'Facility Items' (highlighted), 'IT Devices', 'Sensors', 'PUE', 'Analytics', and 'Rep'. Below the navigation bar, there are action buttons: '+ Add', 'Edit', 'Launch', 'Events', 'Rescan', 'Maintenance', and 'Decommission'. The main content area displays a table of facility items with columns: Label, MAC Address, Inlet Name, Name, Location, Manufacturer, and Model. The table is filtered by 'Manufacturer: Starline'. The table content is as follows:

Label	MAC Address	Inlet Name	Name	Location	Manufacturer	Model
-Rack = Rack for 192.168.43.66 - 1 (1)						
192.168.43.66 - 1	58:2f:42:98:09:2e	I1	CPM End Meter, No ou	Raleigh Lab	Starline	OB225E92-
-Rack = Rack for 192.168.46.202 - 1 (1)						
192.168.46.202 -	58:2f:42:70:08:02	I1	StarLine M59D 1brkr 1	Raleigh Lab Tes	Starline	CBT5E92-5
-Rack = Rack for 192.168.46.203 - 1 (1)						
192.168.46.203 -	58:2f:42:70:00:62	I1	StarLine M59D 1brkr 1	Location	Starline	CBT5E92-5
-Rack = Rack for 192.168.46.204 - 1 (1)						
192.168.46.204 -	58:2f:42:70:00:95	I1	StarLine M59D 1brkr 1	Raleigh Lab	Starline	CBT5E92-5
-Rack = (2)						
192.168.46.205 -	58:2f:42:b1:01:02	DEVICE 1	StarLine V56S 2brkr T	Raleigh Lab	Starline	CBMT5E57
192.168.46.205 - :	58:2f:42:b1:01:02	DEVICE 2	StarLine V56S 2brkr T	Raleigh Lab	Starline	CBMT5E57

At the bottom of the interface, there is a footer that reads 'Licensed to Internal Use Only'.

2. Save or open the file using the dialog that appears.

The exported file contains the following columns:

- Region Name
- Country Name
- Territory Name
- City Name





- Data Center Name
- Floor Name
- Room Name
- Aisle Name
- Row Name
- Rack Name
- Door Name
- Region ID
- Country ID
- Territory ID
- City ID
- Data Center ID
- Floor ID Room ID
- Aisle ID
- Row ID
- Rack ID
- Door ID
- ID
- Location
- MAC Address
- Serial Number
- Model
- Manufacturer
- Firmware Version
- Inlet Name
- Name
- Dynamic Plugin Name
- Current Status
- Overall Health (raw)
- Overall Health
- Proxy Index
- Health Label
- External Key



- Custom Field 1
- Custom Field 2
- Decommissioned At
- Maintenance Enabled
- Name
- Type Code
- Inlet Temperature (F)
- IP Address
- Latest Active Power (W)
- Latest Apparent Power (VA)
- Latest Current (A)
- Latest Pole Current (A)
- Latest Status Start Time
- Latest Status End time
- Latest Status (raw)
- Latest Status
- Severity of Latest Status (raw)
- Severity of Latest Status



## Launch the Web Interface for a Raritan PX PDU

You can launch the web interface for a Raritan PX PDU in Power IQ.

Users must have identical credentials on Power IQ and on the target Raritan product, and be logged in to Power IQ with those credentials for single sign on to succeed. Single sign on must be enabled in Settings > Single Sign On. See [Enabling Single Sign On for Raritan PDUs](#).

1. In the Facility Items tab, select a Raritan PX PDU.
2. Hover your mouse on the Actions column, then click the center icon to go directly to this PDU in a new window. If single sign on is not enabled, log in.



## Quick Search for Facility Items, Racks, Doors, and IT Devices

You can use the Quick Search field at the top of the Power IQ interface to search for a facility item, rack, door, or IT device.

Simply type the name of a facility item, rack, door, or IT device to search by name.

Type the IP address of a facility item or IT device into the Quick Search field to search by IP address.

If a match is found, Power IQ displays the appropriate smart view.

---

*Note: The facility item display setting affects the Quick Search feature. If IP address is selected in the display settings, you can search facility items by either name or IP address. If facility item name is selected, only searching by facility item name is permitted. Devices can always be searched by either name or IP address regardless of the PDU display preference. See [Configuring Facility Item Display Settings - View Facility Items by IP or Name on page 181](#).*

---



## Adding Facility Items to Power IQ Management

You can add facility items to Power IQ using the dynamic plugins function. The process for adding facility items is:

1. Create a dynamic plugin capable of managing your object. See [Dynamic Plugins](#).
2. Add the object using the Add a PDU function. See [Adding PDUs to Power IQ](#). If you use a custom mapping dynamic plugin, see [Adding PDUs with Custom Dynamic Plugins](#).
3. Make sure the object is included in your enterprise data model (EDM), which displays in the Data Centers tab. Objects must be in the EDM for inclusion in PUE calculations and Dashboard charts. See [Enterprise Relationships and the EDM](#). See also [Organizing Facility Items in the Data Center Browser](#).

---

*Note: Some rack transfer switches are supported, and you do not need to create a dynamic plugin.*

---



## Viewing a Facility Item

Each facility item has a smart view page, which you can access from different tabs.

For details on the smart views:

- [Rack PDU Smart View](#)
- [Rack Smart View](#)
- [CRAC Smart View](#)
- [Floor PDUs Smart View](#)
- [Floor UPS Smart View](#)
- [Power Panels Smart View](#)
- [Standalone Meters Smart View](#)

View a PDU in the Data Centers tab:

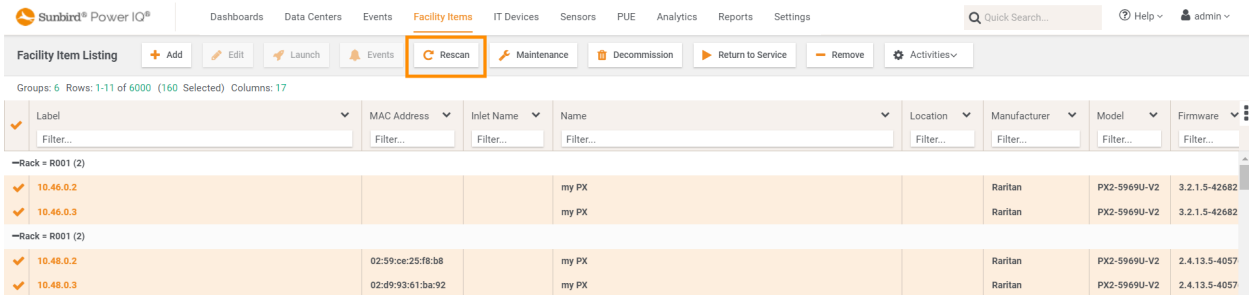
- The Data Centers tab displays your EDM. See [Enterprise Relationships and the EDM](#). Find your PDU within the EDM hierarchy, and click it to access the smart view.



# Rescanning Facility Items

You can rescan a facility item to poll it and update its status from the Facility Items list or the item's smart page. You can rescan items in bulk from the Facility Items list.

1. In the Facility Items tab > Facility Items list, select the PDUs you would like to rescan. Click the Rescan link.



The screenshot shows the Sunbird Power IQ interface. The 'Facility Items' tab is active, and the 'Rescan' button in the top toolbar is highlighted with an orange box. Below the toolbar, a table lists facility items with columns for Label, MAC Address, Inlet Name, Name, Location, Manufacturer, Model, and Firmware. The table contains several rows, some of which are grouped under 'Rack = R001 (2)'. The 'Rescan' button is located above the table.

2. The selected items will be rescanned. Click the Dismiss button to dismiss the status popup.
3. When the task is completed, click the OK button.

To rescan from the item's smart page:

1. On the item's smart page, click the Actions menu > Rescan.
2. The rescan task will run.
3. When the task is complete, click the OK button.

---

*Note: SNMPv3 PDUs will not manually re-scan after powering Off/On. The re-scan does not occur until after the next polling cycle.*

---



## PDU

In the GUI and in this documentation, Power IQ uses the term PDU to encompass any device that Power IQ polls to gather power or sensor data. In some cases, PDU and Facility Item may be used interchangeably.

When you see the terms PDU and Facility Items in the product interface, remember that they include every polled object: rack PDUs, CRACs, floor PDUs, floor UPSs, power panels, standalone meters, and environmental sensor aggregators.

In this guide, the following terms are also used:

- Rack PDU
- Facility Items: CRAC, floor PDU, floor UPS, power panel, and standalone meter.





## Rack PDU Smart View

A rack PDU smart view may contain the following sections, depending on the PDU:

- *Rack PDU Energy Trends* on the facing page
- *PDU Elements - Rack Smart View and Rack PDU Smart View* on page 463
- *Rack IT Devices* on page 460
- *Rack PDU Readings* on page 451
- *Rack PDU Sensors* on page 454
- *Rack PDU Details* on page 454
- *Rack PDU Event Listing* on page 455
- *Rack PDU Asset Strips* on page 456



## Rack PDU Energy Trends

Energy Trends display at the top of the rack PDU smart view.

- Active Power
- IT Energy
- Line Current - one trend-line for each line in the PDU
- Circuit Breaker Current - one trend-line for each circuit breaker in the PDU



## Rack PDU Readings

The Readings section of the Smart PDU view contains the power readings for the PDU.

The Inlet Readings shows the Voltage, Current, Active Power, Apparent Power, Power Factor, and Energy for each inlet of the PDU. Readings are shown for each inlet on a multiple inlet PDU.

The Inlet/Outlet Readings section for an inline meter shows the Voltage, Current, Active Power, Apparent Power, Power Factor, and Energy for each inlet/outlet.

The Line Readings section shows Voltage, Current, and the available current for each line.

The Circuit Breakers Readings section shows the Current in amps and the available current for each circuit breaker.

The Sensor Readings section shows the latest reading for each attached sensor, and the ordinal number of the sensor on the PDU.

The status at the bottom of the Readings section shows the latest reading time.



## Inlet Readings and Line Readings for Three Phase PDUs

For three phase PDUs, the Inlet Current and Voltage readings are maximum current and minimum voltages of the individual line readings of the inlet.

The line readings voltages are "line-to-line."

Description	Example
The inlet voltage reading is the Minimum of the line voltages.	Min Line Voltage
The inlet current reading is the maximum of the line currents.	Max Line Current
The line voltage readings are from line to line.	L1 = L1-L2 L2 = L2-L3 L3 = L3-L1



## Multi-Inlet PDU Readings

A multi-inlet PDU displays readings for each inlet, and for each line of each inlet, the same as single inlet PDUs. The Readings section of the rack PDU smart view contains this information.

## Residual Current Readings

Residual current monitoring is available in Power IQ 6.1.0 and above for Raritan PX3s.

Residual current can be monitored on a facility item smart page, under Inlet Readings in the Readings section. The Residual Current column is located by default between the Current and Active Power columns.

Readings							
Inlet Readings							
PDU Element	Voltage (V)	Current (A)	Residual Current (A)	Active Power (W)	Apparent Power (VA)	Power Factor	Energy (Wh)
Inlet 1	110	3.8	0.058	413.0	0.0	1.0	0.0

The unit for residual current is amps. If the value in Power IQ is null, "N/A" will be displayed in the Residual Current column. The Residual Current value in Power IQ is mapped to the Residual Operating Current in the Raritan PDU.

Residual Current Monitor		<a href="#">Setup</a>
RCM State	warning	
Residual Operating Current	0.058 A	
Self Test	<input type="button" value="Start Self Test"/>	

---

*Note: Residual current monitoring is supported for Raritan PX3 facility items only.*

---

## Rack PDU Sensors

A sensors list displays in the rack PDU smart view when attached sensors are detected.

The sensor label is clickable and opens the sensor smart view. If the sensor is not associated in the EDM, the label is not clickable, and there is no smart view. See [Sensors](#).

## Rack PDU Details

The Details section contains all information about the PDU except for the IP address, which may or may not display depending on the PDU display setting. See [Configuring PDU Display Settings - View PDUs by IP or Name](#).

Click the Belongs To link to view the rack, or other parent object in the EDM.



## Rack PDU Event Listing

The Event Listing section of the rack PDU smart view shows all events for the PDU.

1. Click an Event link to open the Event details page.
2. Select the checkbox for one or more events, then click Clear Selected Events to clear them. See [Clearing Events](#).

## Rack PDU Asset Strips

Power IQ can detect asset management strips connected to rack PDUs.

The asset strip information displays in the rack PDU smart view.

1. In the row of the asset tag whose color you want to change, double click the hexadecimal color code.
2. Select the new color from the chart of colors.

The LED color on the strip changes.

3. Copy the asset tag ID number from the PDU smart view for the PDU connected to the asset strip.
4. In the IT Devices tab, select the device you want to associate with the asset tag.
5. In the Device details page, paste the code into the Asset Tag Id field then click Save.





## Asset Strip and Tag Events

Power IQ can receive an event whenever an asset strip or tag is moved.



## Rack PDU Smart View

A rack PDU smart view may contain the following sections, depending on the PDU:

- *Rack PDU Energy Trends* on page 450
- *PDU Elements - Rack Smart View and Rack PDU Smart View* on page 463
- *Rack IT Devices* on page 460
- *Rack PDU Readings* on page 451
- *Rack PDU Sensors* on page 454
- *Rack PDU Details* on page 454
- *Rack PDU Event Listing* on page 455
- *Rack PDU Asset Strips* on page 456



## Rack Energy and Environmental Trends

The rack smart view shows Energy and Environmental Trends at the top of the page.

The first and last data points in the trend are shown at the left end of the chart.

The minimum and maximum values in the trend are shown at the right end of the chart.




- Environmental sensor charts
- Temperature, one chart per sensor.
- Humidity, one chart per sensor.

Total Active Power for all devices and PDUs in the rack, including circuits associated with devices in the rack.



## Rack IT Devices

The IT Devices section of the Smart Rack view contains a list of all devices that are connected to one or more outlets or circuits. If a device does not have any associated outlets or circuits, it will not appear in this list. Devices without associated outlets or circuits do still appear in the tree view.

IT Devices				
💡 Power Control ▾				
<input type="checkbox"/>	PDU Element	Status	Trend	Active Power (W)
<input checked="" type="checkbox"/>	<b>43.62, outlet 6</b>			<b>21 W</b>
<input type="checkbox"/>	192.168.43.62 6 (Acer Monitor)	ON		21.0
<input checked="" type="checkbox"/>	<b>43.62, outlet 7</b>			<b>0 W</b>
<input type="checkbox"/>	192.168.43.62 7 (outlet_7)	OFF		0.0
<input checked="" type="checkbox"/>	<b>43.62, outlet 8</b>			<b>9 W</b>
<input type="checkbox"/>	192.168.43.62 8 (Mac Mini)	ON		9.0
 Trend <input type="text" value="maximum"/> ▾ active power for the past <input type="text" value="day"/> ▾				

Devices that have associated circuits display the current and active power of the circuit. You cannot control power to circuits.

The outlets associated with each device display beneath the IT device. There is a checkbox for each outlet, to select it for power control operations.

Each outlet shows a Trend chart showing the active power trend.

Each device shows outlet status and an Active Power reading, per device and per outlet.

- Outlets that are powered on display in black with ON as the status in the Status column.
- Outlets that are powered off display in gray with OFF as the status in the Status column.

At the bottom of the IT Devices section, select the readings and time period to include in the fields.

- Trend: minimum, maximum or average readings. Not available for past hour readings.
- For the past: hour, day, week, month.

To perform power control on devices:

- Select the checkboxes for each outlet associated with a device. All outlets are grouped beneath the device.

To select all devices in a rack, select the top checkbox.

- Choose Power Control > On, Power Control > Off, or Power Control > Cycle.



---

*Note: Power Off and Power Cycle operations on this page do not use graceful shutdown, even if it is enabled for a selected device.*

---



## Rack Details

The Actions button on the Smart Rack view opens options for changing the rack name, location, external key, and capacity, editing for user permissions on this rack, and tags.

1. Click the Actions button, then choose an option.
2. Choose Edit Details.
3. Enter a new rack name, location, external key, or capacity and overrides. See [Set Rack Capacity and Override Threshold Percentages](#) for details on these fields. Click OK.
4. Choose Edit Permissions.
5. View and change the roles and permissions assigned for users of this rack. See [Assign Roles within a Data Center](#) for more details.
6. Click Add Role to > Add User Role or Add Role to > Add Group Role. Adding a Group Role will give permissions selected to all users in the group. Then, select the user or group who needs permission to this object. rack.
7. Select the role to allow in the Roles list. Click OK.
8. Choose Edit Tags.
9. Tags are used in tabular reports. See [Reports and Tags](#).



## PDU Elements - Rack Smart View and Rack PDU Smart View

The PDU Elements section appears in both the rack and rack PDU smart views.

This section contains a list of all outlets in the rack, or all outlets on the PDU, respectively.

---

*Note: Circuit breaker information is in the rack PDU's Readings section.*

---

The trend chart's topics is selected via the dropdown at the bottom of the section: active power or current. Data included in the trend chart is filtered by the minimum/maximum/average selection, and the time period dropdown can be used to display data for the past hour, day, week, or month.

The last column shows the latest poll data for either Active Power or Current, as selected. The min/max/average and time period selections do not affect this reading. For Active Power (W), the latest poll reading is shown. For Current (A), the latest poll reading is shown.

Each outlet shows the outlet status and a trend chart showing the active power trend or the current (amps) trend.





---


*Note: In Internet Explorer 7 and 8, click Load Chart to view the trend chart.*

---



- Outlets that are powered on display in black with ON as the status in the Status column.
- Outlets that are powered off display in gray with OFF as the status in the Status column.

PDU Elements				
💡 Power Control ▾				
<input type="checkbox"/>	PDU Element	Status	Trend	Active Power (W)
<input checked="" type="checkbox"/>	<b>192.168.43.101</b>			<b>0 W</b>
<input checked="" type="checkbox"/>	<b>192.168.43.127</b>			<b>7 W</b>
<input checked="" type="checkbox"/>	<b>192.168.43.58</b>			<b>91 W</b>
<input type="checkbox"/>	Outlet 1 (Empty)	ON		<b>0.0</b>
<input type="checkbox"/>	Outlet 2 (Outlet 2)	OFF	N/A	N/A
<input type="checkbox"/>	Outlet 3 (Mac Mini)	ON		<b>36.0</b>
<input type="checkbox"/>	Outlet 4 (Mac Mini Monitorrrrr)	ON		<b>0.0</b>
<input type="checkbox"/>	Outlet 5 (Left Monitor)	ON		<b>24.0</b>
<input type="checkbox"/>	Outlet 6 (emx-880.raleigh.rari...)	ON		<b>6.0</b>
<input type="checkbox"/>	Outlet 7 (Empty)	ON		<b>25.0</b>
<input type="checkbox"/>	Outlet 8 (Outlet 8)	OFF		N/A


Trend maximum ▾ active power ▾ for the past day ▾

Apparent Power, Voltage, and Unutilized Capacity columns also display in the Rack PDU Elements section. These columns do not display at the rack level.

The minimum/maximum/average setting and the time period setting change what data is included in the small trend charts. The last column always displays the latest poll data.

At the bottom of the PDU Elements section, select the readings and time period to include in the fields.

- Trend: minimum, maximum or average readings. Not available for past hour readings.
- For the past: hour, day, week, month.

Select either Active Power or Current in amps.

To perform power control on outlets:





1. Select the checkboxes for each outlet.
2. To select all outlets in a rack, select the top checkbox.
3. Choose Power Control > On, Power Control > Off, or Power Control > Cycle.

---

*Note: Power Off and Power Cycle operations on this page do not use graceful shutdown, even if it is enabled for a selected device.*

---



## 3 Phase PDU Outlet Readings for Raritan PX1

Power IQ uses the following algorithm to convert three line readings into one outlet reading for current and voltage only. This algorithm applies only to 3 phase PX1 inline meters.

In the algorithm, "LineX\_Readings" is a list of all the readings for a given time period.

```
MAX = MAX(MAX(Line1_Readings), MAX(Line2_Readings), MAX(Line3_Readings))
AVG = MAX(AVG(Line1_Readings), AVG(Line2_Readings), AVG(Line3_Readings))
MIN = MAX(MIN(Line1_Readings), MIN(Line2_Readings), MIN(Line3_Readings))
```



## PDU with Fuses

Most Raritan PDUs monitor load at the internal PDU circuit breaker. Some PDUs have fuses instead of circuit breakers.

If a PDU has fuses, information about them displays in Power IQ with the "Circuit Breaker" label.

PX models with an F1 suffix have a fuse instead of a circuit breaker.



## Rack Transfer Switches

Rack Transfer Switches are high speed switches that provide power from one of two sources depending on settings and availability. Power IQ supports several Raritan and APC rack transfer switches.



## Transfer Switch Smart View

The header in the transfer switch smart view shows the switch's operating status, such as Normal or Standby.

## Transfer Switch Energy Trends

Energy Trends display at the top of the rack transfer switch smart view.

- Active Power
- Energy
- Inlet Current - one trend-line for each line in the transfer switch
- Circuit Breaker - one trend-line for each circuit breaker in the transfer switch

Some data may not be supported by your transfer switch model.

## Transfer Switch Readings

Readings display in the second section of the smart view.

Configure the columns by clicking the arrow in a heading, then selecting options to display, hide, or sort.

Transfer switch readings come from the inlets, lines, circuit breakers, and sensors.

This sample smart view shows one possible configuration of a transfer switch.

To see details on the transfer switch status, see the Details section of the smart view. See [Transfer Switch Details](#).

## Transfer Switch Elements

Elements display in the third position in the smart view. The title "PDU Elements" is used for all types of PDUs and facility items.

The default Elements view for transfer switches includes this information:

- PDU Element: outlets
- IT Device: IT devices associated with outlets include a link to the IT device page.
- Trend: small trend chart for active power. Change the trend to min/max/average active power or current using the fields below it.
- Active Power (W): latest poll reading for active power. Change the latest poll reading to Current using the field below it.

## Transfer Switch Details

Details are the fourth section in the smart view.

See the details section for the ordinal of the Active and Preferred Inlet of the transfer switch.



## Transfer Switch Event Listing

Event listing is the fifth section in the smart view.

Events are created from transfer switch traps. For transfer switch functions, state change traps are supported. For Raritan PX3TS transfer switches, additional traps are supported for other functions.

See supported traps here:

- [APC Transfer Switch Supported Events](#)
- [Raritan PX3TS Transfer Switch Supported Events](#)

To export the events to CSV, click the Save icon at upper right.

To clear events, select the checkboxes, then click Clear selected events.

To view event details, click the Event link.



## PDU Connectivity Health Statuses

These statuses appear in the mouse-over text when your mouse hovers over the Health column for a PDU on the PDU listings page. The statuses also appear in the Health section of the PDU smart view.

When Health Polling is enabled, results of both the Health Pollers' pings and the Data Poller's data collection attempts are used to update the status. See [Configuring Health Polling](#).

Status	Explanation
OK	Most recent polls of the target PDU was successful.
New	The system has not yet completed a successful scan or poll of the PDU. This is typical for systems that have been recently added.
Unknown	The system has not yet completed a successful scan or poll of the PDU. This is typical for systems that have been recently added.
Degraded	This status indicates certain non-critical aspects of the poll failed. The issue is most commonly caused when data-buffered data retrieval is enabled in Power IQ but is configured with a "read" SNMP community string instead of a "write" community string. In this case, Power IQ can still perform a poll, but it won't be able to enable data buffering and set the appropriate sample rate on PDUs that support data buffering. Other possible causes of this error are incompatibility issues with the PDU running older firmware revisions, or if Power IQ is unable to persist sensor readings data to CSV file.
Poll incomplete	Certain aspects of the scan or poll failed, such as retrieving the model name, persisting outlet sensor data to CSV file, or retrieving information via SNMP. This can be due to an incompatibility with this version of the PDU or because the SNMP is misconfigured or the agent is disabled on the target PDU.  Make sure the PDU's SNMP settings are correct. See <a href="#">Editing PDUs under Power IQ Management</a> .
Application error	If the PDU is associated with a dynamic plugin, an index mapping may have failed to resolve. Check the dynamic plugin log for mapping resolution errors.  If the PDU is not associated with a dynamic plugin, this indicates an unexpected application error. Contact Professional Services on the <a href="http://support.sunbirdcim.com/support/home">Sunbird Support portal at http://support.sunbirdcim.com/support/home</a> .
No contact	This indicates that Power IQ was unable to communicate with the PDU over any of the supported management protocols and so can't discover and manage the PDU. The most often used protocol is SNMP, but a few PDU models are managed using other protocols like HTTP. There are a number of possible root causes for this.  This may indicate that the IP address is incorrect.



Status	Explanation
	Correct the PDU's IP address. See <a href="#">Editing PDUs under Power IQ Management</a>
Invalid Login Credentials	This indicates that the PDU was configured with an invalid administrative username or password. SNMP communication is still possible and Power IQ can manage the PDU, but firmware upgrades will not work.
Missing credentials	This indicates invalid or missing credentials. Correct the PDU's credentials. See <a href="#">Editing PDUs under Power IQ Management</a> .
Unmanageable	This indicates that Power IQ contains no plug-in capable of managing the PDU. The target PDU is not supported by this version of Power IQ, or the plug-in requires a proxy index and one was not specified. Specify an appropriate proxy index if one is required but was not specified. Make sure Power IQ supports the PDU. See the list of supported PDUs <a href="#">on the Sunbird Addons Site</a> . Create a dynamic plugin for the PDU. See <a href="#">Dynamic Plugins</a>
Data Collection Failed	This indicates a PDU has not responded to the Data Poller after all retries. Event is generated: "Lost Connectivity: Data Collection Failed"
Ping Failed	This indicates a PDU has not responded to the Health Poller's pings after all retries. Event is generated: "Lost Connectivity: Ping Failed."
No Communication	This indicates a PDU has not responded to the Health Poller OR the Data Poller after all retries.



## Troubleshooting Connectivity Health

A PDU's Ping Failed, No Communication, or Data Collection Failed Connectivity health status may be caused by one of these common problems. Troubleshoot using the following checklist.

Cause	Solution
The user has configured Power IQ with the wrong community string for the PDU.	Verify that Power IQ is configured with the correct SNMP community string.
The user has configured Power IQ with the wrong IP address for the PDU.	Verify that Power IQ is configured with the correct IP address.
There is an actual network connectivity issue between Power IQ and the target PDU.	<p>Make sure the required ports are open between Power IQ and the PDU. See <a href="#">Ports Open Between Power IQ and PDUs</a>.</p> <p>Verify that there aren't any other network issues preventing communication between Power IQ and the target PDU.</p>
The PDU is powered off or not connected to the network.	Confirm that the PDU is powered on and is responding to requests over the network. For example, responding to ICMP echo or PING requests.
SNMP support is disabled on the PDU.	Some PDUs allow the SNMP agent to be started and stopped through the PDU's management interface. Verify that SNMP is running on the PDU and that it is responding to SNMP requests by running SNMP diagnostics from Power IQ or through 3rd party tools.
The configured SNMP timeout and retry value are insufficient for your use case. For example, managing remote PDUs over a WAN and due to network latency or bandwidth limitations, the default SNMP settings result in a large number of SNMP timeouts.	If you suspect that the default SNMP settings used by Power IQ are insufficient it may be possible to correct the issue by modifying the default SNMP settings used by Power IQ. See <a href="#">Advanced Thread Pooling Settings</a> .
The SNMP agent on the target PDU is not responding to requests. One possible reason is that the PDU's processor is busy handling other tasks and is temporarily unable to respond to SNMP requests.	Verify that SNMP is running on the PDU and that it is responding to SNMP requests by running SNMP diagnostics from Power IQ or through 3rd party tools. If the SNMP agent on the PDU is the issue, restarting the SNMP agent on the PDU or rebooting the PDU may correct the problem.

## Trend Chart Settings in Smart Views

The large trend charts at the top of each smart view are configurable.

At the bottom of the trend charts section, select the readings and time period to include in the fields.

- Trend: minimum, maximum or average readings. Not available for past hour readings.
- For the past: hour, day, week, month.



## Active Power Trends for Devices

In the Data Centers tab, an IT device displays the Energy and Environmental Trends at the top of its page. Only Active Power data is available in the trend chart.

If the device has zero or only one connection to outlets or circuits, the trend chart displays the total active power only.

If the device has more than one connection to outlets or circuits, the trend chart displays both the total active power and one active power chart per connection.

The first and last data points in the trend are shown at the left end of the chart.

The minimum and maximum values in the trend are shown at the right end of the chart.

To change the trend chart settings, see [Trend Chart Settings in Smart Views](#).



## Actions Menu in Smart Views

Smart views for rack PDUs and other facility items include an Actions menu in the top right corner.

1. Choose Actions> Edit to open the edit page for PDU credentials. See [Editing PDUs under Power IQ Management](#).
2. Choose Actions> Remove to delete the PDU from Power IQ. The PDU and all data collected from it are deleted when you remove a PDU. Click Remove PDU(s) and Data to confirm.
3. Choose Actions> Rescan to poll the PDU.
4. Choose Actions> Edit Permissions to view and change the roles and permissions assigned for users of this PDU. See [Assign Roles within a Data Center](#) for more details.
5. Click Add Role to > Add User Role or Add Role to > Add Group Role. Adding a Group Role will give permissions selected to all users in the group. Then, select the user or group who needs permission to this object.
6. Choose Actions> SNMP Diagnostics to run SNMP walk on the PDU.
7. Choose Actions> Launch to open the web interface for Raritan PX PDUs only. See [Launch the Web Interface for a Raritan PX PDU](#).



## Native Support for Chatsworth eConnect PDUs

Power IQ 5.1.1 and higher have a built-in plug-in for Chatsworth e-Connect PDUs. When adding a PDU via the GUI, entering the Proxy Index as an Integer or in Hex is now supported. When a user enters in Hex, it will convert to an Integer and vice versa.

The standard plugin will allow for Power Monitoring, Environmental Monitoring and Power Control.

---


*Note: When entering the proxy index in Hex for PDUs that use the MAC address as the proxy index, including Chatsworth e-Connect PDUs, enter the last six digits of the MAC address only.*

---





### Add a New PDU

IP Address:

Proxy Index:  Integer:  Hex :

External Key:

Custom Field 1 :

Custom Field 2 :

SNMP Version:

#### PDU Administrative Credentials

Username:

Password:

Password Confirm:

#### SNMP v1/2c Credentials

Community String:

Community String Confirm:

#### Backup IP Address

Backup IP Address:

Validate and wait for discovery to complete before proceeding

Once the Chatsworth PDU is discovered via SNMP, a smart page will be created. The smart page will display Min/Max/Avg values for Power, Energy, Intel Currents, as well as Humidity and Temperature values. If the PDU has outlets, these will also be available to view the monitored data and to perform power control, and power cycling of the outlets.

**Data Centers**

[Add](#) [Remove](#) [Refresh](#) [Import/Export](#)

- SITE A
  - 1A
    - 10.35.0.24
    - 10.35.0.26**
    - CPUTEST
    - Cisco 9000
    - DEMO BLADE
    - DEMO CHASSIS
    - DEMO SERVER
    - Dell PowerEdge
    - HP C7000
    - Humidity Sensor 1
    - Humidity Sensor 1
    - IBM BladeCenter S
    - NJESX01
    - NJESX02
    - NJESX03



**Data Centers**

[Add](#) [Remove](#) [Refresh](#) [Import/Export](#)

- SITE A
  - 1A
    - 10.35.0.24
    - 10.35.0.26**
    - CPUTEST
    - Cisco 9000
    - DEMO BLADE
    - DEMO CHASSIS
    - DEMO SERVER
    - Dell PowerEdge
    - HP C7000
    - Humidity Sensor 1
    - Humidity Sensor 1
    - IBM BladeCenter S
    - NJESX01
    - NJESX02
    - NJESX03

**Inlet Readings**

PDU Element	Voltage (V)	Current (A)	Active Power (W)	Apparent Power (VA)	Power Factor	Energy (Wh)
Inlet 1	N/A	4.4	2,314	N/A	N/A	N/A

**Line Readings**

PDU Element	Voltage (V)	Current (A)	Unutilized Capacity (A)
<b>Inlet 1</b>			
L1	N/A	4.4	N/A
L2	N/A	2.9	N/A
L3	N/A	3.8	N/A

**Sensors**

Ordinal	Label	Type	Latest Reading
1	<a href="#">Humidity Sensor 1</a>	Humidity	43.9%
1	<a href="#">Temperature Sensor 1</a>	Temperature	71.2°F

Latest reading taken 3 minutes ago

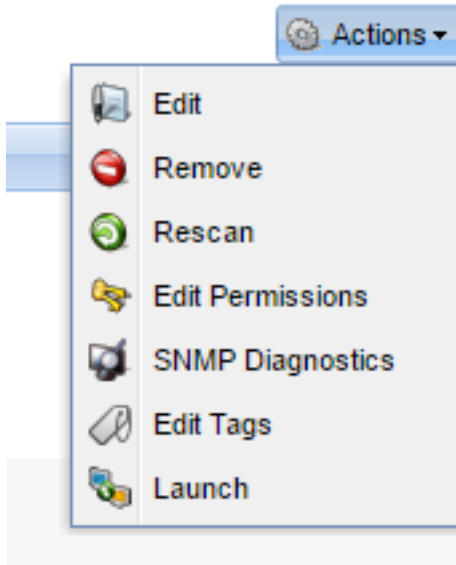
**PDU Elements**

PDU Element	IT Device	Active Power...	Apparent Po...	Current (A)	Voltage (V)	Unutilized Ca...	Active Power Trend
Outlet 1 (null)	<a href="#">Cisco 9000</a>	183.0	183.0	0.9	N/A	N/A	████████████████████
Outlet 2 (null)	<a href="#">Cisco 9000</a>	332.0	332.0	1.6	N/A	N/A	████████████████████

## Launching the Web Browser of the Chatsworth PDU

From the Actions menu on the PDU smart page, the user will be able to launch the web browser of the Chatsworth PDU. To launch the browser, click Actions > Launch.





After clicking Launch, the user will be brought to the login page of the PDU itself.



Username:

Password:



## Organizing Facility Items in the Data Center Browser

Some facility items you want to manage in Power IQ, such as floor PDUs, power panels, and UPSs may provide power to multiple locations.

Objects may only have one location in the hierarchical Data Centers browser, so associate the object in the enterprise data model using its physical location. Standalone meters may be placed where it best helps you understand their data.

### Example

A floor PDU is physically located on Floor A, but provides power to several locations, not all on that floor. Organize the floor PDU on Floor A.



## CRACs in the Data Center Browser

You can add a Computer Room Air Conditioner (CRAC) as a node in the Data Centers browser. Place the CRAC in the EDM in the location where it manages air, rather than the physical location of the CRAC controls.

### Example

A CRAC serves Rooms 1, 2, and 3 of your data center. Organize the CRAC in the EDM at the Floor level that contains these rooms.



## CRACs

Computer Room Air Conditioners (CRAC) refers to any HVAC system that manages the temperature or humidity of a computer room. It does not refer to a standalone raised-floor unit that sits on the data center floor.

### CRAC Smart View

Power IQ gathers power readings from the CRAC's inlet and inlet lines.

---

*Note: The data Power IQ can gather depends on how you configure the dynamic plugin that manages the object. See [Dynamic Plugins](#). Power IQ displays all data gathered in a smart view. Access the smart view by clicking on the object either in the Facility Items tab or in the Data Centers tab.*

---

A fully populated CRAC smart view includes:

- [CRAC Energy Trends](#)
- [CRAC Readings](#)
- [CRAC Details](#)

### CRAC Energy Trends

Energy Trends display in the top section of the smart view.

Trend charts display data for the whole unit.

The trend can be configured to show minimum, maximum, or average over a selected time period, using the fields below it.

CRAC energy trends show a trend line for two readings.

- Active power
- Energy
- Current for each inlet pole

### CRAC Readings

Readings display in the second section of the smart view.

Configure the columns by clicking the arrow in a heading, then selecting options to display, hide, or sort.

CRAC readings include the inlet and the inlet lines.

CRAC Inlet Readings shows the Voltage, Current, Active Power, Apparent Power, Power Factor, and Energy.

CRAC Inlet Line Readings for each line shows the Voltage, Current, and Unutilized Capacity

The status at the bottom of the Readings section shows the latest reading time.



## CRAC Details

Details are the fourth section in the smart view.

## Floor PDUs

Floor PDUs refers to an intelligent floor PDU system with inlets, panels, and branch circuits.

### Floor PDUs Smart View

Power IQ gathers power readings from the FPDU inlets, panel inlets, circuits, and circuit poles.

The mapping of the inlets to panels to circuits and circuit poles is achieved through your dynamic plugin configuration.

---

*Note: The data Power IQ can gather depends on how you configure the dynamic plugin that manages the object. See [Dynamic Plugins](#).*

---

Power IQ displays all data gathered in a smart view. Access the smart view by clicking on the object either in the Facility Items tab or in the Data Centers tab.

A fully populated FPDU smart view includes:

- [Floor PDU Energy Trends](#)
- [Floor PDU Elements](#)
- [Floor PDU Readings](#)
- [Floor PDU Details](#)

### Floor PDU Energy Trends

Energy Trends display in the top section of the smart view.

Trend charts display data for the whole unit.

The trend can be configured to show minimum, maximum, or average over a selected time period, using the fields below it.

Floor PDU energy trends include a trend line for several types of readings.

- Active Power
- Energy

Current for each line of the primary inlet, if applicable. If the FPDU does not have a primary inlet, trend line for current does not display.

### Floor PDU Readings

Readings display in the second section of the smart view.

Configure the columns by clicking the arrow in a heading, then selecting options to display, hide, or sort.

Floor PDU readings come from the inlets, panel inlets, circuits and circuit poles. floor PDUs come in many different configurations. Your configuration may vary.

This sample smart view shows one possible configuration of a three-phase floor PDU.



- 1 primary inlet with 3 lines
- 2 panels
- Each panel has a panel inlet with 3 lines, and 2 circuits
- Each circuit has 3 circuit poles

**Readings start from the "highest level" or top of the power chain. The top of the power chain is the first section of readings, progressing down the page to lower points in the power chain.**

The primary inlet of this floor PDU has three lines.

Readings						
Inlet Readings						
PDU Element	Voltage (V)	Current (A)	Active Po...	Apparent ...	Power Fac...	Energy (Wh)
Inlet 1	121	13	240.0	480.0	0.5	11,520

Line Readings			
PDU Element	Voltage (V)	Current (A)	Unutilized Capacity (A)
Inlet 1			
L1	121	11	N/A
L2	122	12	N/A
L3	123	13	N/A

Panel Readings: Panel 1						
-------------------------	--	--	--	--	--	--

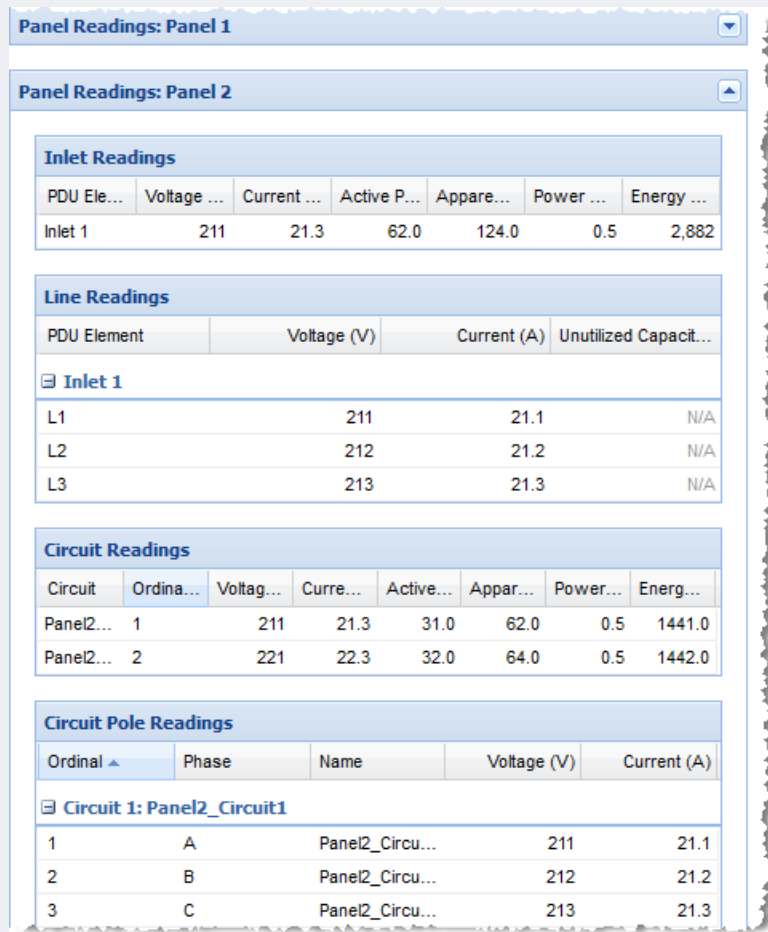
**Readings start from the "highest level" or top of the power chain. The top of the power chain is the first section of readings, progressing down the page to lower points in the power chain.**

Below the primary inlet, the panel inlets display, grouped by panel. Panel readings are collapsed by default, see Panel 1 in the image.

This floor PDU's Panel 2 has one panel inlet with three lines.

Below the line readings for the panel inlet, the circuit readings display.

This floor PDU's Panel 2 has 2 circuits, each with 3 circuit poles.



**Panel Readings: Panel 2**

**Inlet Readings**

PDU Ele...	Voltage ...	Current ...	Active P...	Appare...	Power ...	Energy ...
Inlet 1	211	21.3	62.0	124.0	0.5	2,882

**Line Readings**

PDU Element	Voltage (V)	Current (A)	Unutilized Capacit...
<b>Inlet 1</b>			
L1	211	21.1	N/A
L2	212	21.2	N/A
L3	213	21.3	N/A

**Circuit Readings**

Circuit	Ordina...	Voltag...	Curre...	Active...	Appar...	Power...	Energ...
Panel2...	1	211	21.3	31.0	62.0	0.5	1441.0
Panel2...	2	221	22.3	32.0	64.0	0.5	1442.0

**Circuit Pole Readings**

Ordinal ▲	Phase	Name	Voltage (V)	Current (A)
<b>Circuit 1: Panel2_Circuit1</b>				
1	A	Panel2_Circu...	211	21.1
2	B	Panel2_Circu...	212	21.2
3	C	Panel2_Circu...	213	21.3

## Floor PDU Elements

Elements display in the third position in the smart view. The title "PDU Elements" is used for all types of PDUs and facility items.

The floor PDU's circuits are grouped by panel if mapped accordingly. The Elements section is blank for floor PDUs that do not have circuits.

The default Elements view for floor PDU includes this information:

- PDU Element: circuits grouped by panel
- IT Device: IT devices associated with circuits include a link to the IT device page.



- Trend: small trend chart for active power. Change the trend to min/max/average active power or current using the fields below it.
- Active Power (W): latest poll reading for active power. The last column can be changed from latest poll reading for active power (W) to latest poll reading for current (A) by selecting Current from the drop-down list below the PDU Elements section.
- Apparent Power, Voltage, and Unutilized Capacity



PDU Elements			
PDU Element	IT Device	Trend	Active Power (W)
Panel 1			63 W
Circuit 1 (Panel1_Circuit1)			31.0
Circuit 2 (Panel1_Circuit2)			32.0
Panel 2			63 W
Circuit 1 (Panel2_Circuit1)			31.0
Circuit 2 (Panel2_Circuit2)			32.0
Panel 3			63 W
Circuit 1 (Panel3_Circuit1)			31.0
Circuit 2 (Panel3_Circuit2)			32.0
Panel 4			63 W
Circuit 1 (Panel4_Circuit1)			31.0
Circuit 2 (Panel4_Circuit2)			32.0
		Trend	maximum
			active power
			for the past
			day

PDU Elements	
PDU Element	IT Device
Panel 1	
Circuit 1 (Panel1_Circuit1)	<a href="#">Device for 10.128.200.1 pan...</a>
Circuit 2 (Panel1_Circuit2)	<a href="#">Device for 10.128.200.1 pan...</a>
Panel 2	





## Floor PDU Details

Details	
Type	Floor PDU
IP Address	10.128.200.10
External Key	10.128.200.10
Name	Floor PDU1
Manufacturer	Acme Electronics
Model	FPDU-3phase-4panel-pole-position
Firmware	1.1.1
Contact	
Location	Raleigh Data Center
Custom Field 1	
Custom Field 2	
SNMP Version	1/2c
Inlet Phase	 Three Phase
Belongs to	 <a href="#">Row for 10.128.200 subnet</a>
Health	<b>Connectivity:</b> OK Most recent poll of the target PDU was successful. <b>Active events:</b> Good No active events.



## Floor UPS

Floor UPS refers to an intelligent, standalone Uninterruptible Power Supply (UPS) device. Rack UPS is not supported.

### Floor UPS Smart View

Power IQ gathers power readings from the Floor UPS inlets and inlet lines, circuits, and circuit poles.

The mapping of the circuit poles to circuits is achieved through your dynamic plugin configuration.

---

*Note: The data Power IQ can gather depends on how you configure the dynamic plugin that manages the object. See [Dynamic Plugins](#).*

---

Power IQ displays all data gathered in a smart view. Access the smart view by clicking on the object either in the Facility Items tab or in the Data Centers tab.

A fully populated Floor UPS smart view includes:

- [Floor UPS Energy Trends](#)
- [Floor UPS Elements](#)
- [Floor UPS Readings](#)
- [Floor UPS Details](#)

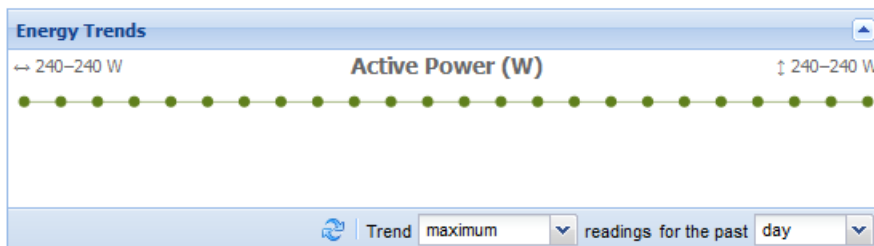
### Floor UPS Energy Trends

Energy Trends display in the top section of the smart view.

Trend charts display data for the whole unit.

The trend can be configured to show minimum, maximum, or average over a selected time period, using the fields below it.

Floor UPS energy trends includes a trend line for active power.



### Floor UPS Readings

Readings display in the second section of the smart view.

Configure the columns by clicking the arrow in a heading, then selecting options to display, hide, or sort.

This sample smart view shows one possible configuration of a three-phase Floor UPS.

- 1 inlet with 3 lines
- 2 circuits
- Each circuit has 3 circuit poles

**Readings start from the "highest level" or top of the power chain. The top of the power chain is the first section of readings, progressing down the page to lower points in the power chain.**

The inlet of this Floor UPS has three lines.

Readings come from the whole inlet, and from each line for three-phase inlets.

Below the inlet and line readings, the circuit and circuit pole readings display.

This Floor UPS has 2 circuits.

Circuit1 has 3 circuit poles.

**Readings**

Inlet Readings						
PDU Element	Voltage (V)	Current (A)	Active Po...	Apparent ...	Power Fa...	Energy (Wh)
Inlet 1	121	1.3	240.0	480.0	0.5	11,520

Line Readings			
PDU Element	Voltage (V)	Current (A)	Unutilized Capacity (A)
<b>Inlet 1</b>			
L1	121	1.1	N/A
L2	122	1.2	N/A
L3	123	1.3	N/A

Circuit Readings							
Circuit	Ordinal ▲	Voltage ...	Current ...	Active P...	Appare...	Power F...	Energy (...)
Circuit1	1	111	11.3	31.0	62.0	0.5	1,441
Circuit2	2	121	12.3	32.0	64.0	0.5	1,442



Circuit Pole Readings				
Ordinal ▲	Phase	Name	Voltage (V)	Current (A)
<b>Circuit 1: Circuit1</b>				
1	A	Circuit1_Pole1	111	11.1
3	B	Circuit1_Pole2	112	11.2
5	C	Circuit1_Pole3	113	11.3
<b>Circuit 2: Circuit2</b>				


## Floor UPS Elements

Elements display in the third position in the smart view. The title "PDU Elements" is used for all types of PDUs and facility items.

The default Elements view for Floor UPS includes this information:



- PDU Element: circuits
- IT Device: IT devices associated with circuits include a link to the IT device page.
- Trend: small trend chart for active power. Change the trend to min/max/average active power or current using the fields below it.
- Active Power (W): latest poll reading for active power. Change the latest poll reading to Current using the field below it.
- Apparent Power, Voltage, and Unutilized Capacity

PDU Elements			
PDU Element ▲	IT Device	Trend	Active Power (W)
Circuit 1 (Circuit1)			31.0
Circuit 2 (Circuit2)			32.0


 Trend   for the past

## Floor UPS Details

Details are the fourth section in the smart view.

Details	
Type	Floor UPS
IP Address	10.128.200.60
External Key	10.128.200.60
Name	UPS - Room 1
Manufacturer	Acme Electronics
Model	UPS-3phase
Firmware	1.1.1
Contact	facilitiesmanager@raritan.com
Location	Raleigh Data Center
Custom Field 1	
Custom Field 2	
SNMP Version	1/2c
Inlet Phase	 Three Phase
Belongs to	 <a href="#">Row for 10.128.200 subnet</a>
Health	<p><b>Connectivity:</b> OK Most recent poll of the target PDU was successful.</p> <p><b>Active events:</b> Good No active events.</p>



## Power Panel

Power Panel refers to a single intelligent power panel on a wall that may contain inlets, circuits and circuit poles.

Anything with multiple panels should be added as a floor

## Power Panels Smart View

Power IQ gathers power readings from the Power Panel's inlets, circuits, and circuit poles.

The mapping of the panels to circuits and circuit poles is achieved through your dynamic plugin configuration.

---

*Note: The data Power IQ can gather depends on how you configure the dynamic plugin that manages the object. See [Dynamic Plugins](#).*

---

Power IQ displays all data gathered in a smart view. Access the smart view by clicking on the object either in the Facility Items tab or in the Data Centers tab.

A fully populated Power Panels smart view includes:

- [Power Panels Energy Trends](#)
- [Power Panels Elements](#)
- [Power Panels Readings](#)
- [Power Panels Details](#)

## Power Panels Energy Trends

Energy Trends display in the top section of the smart view.

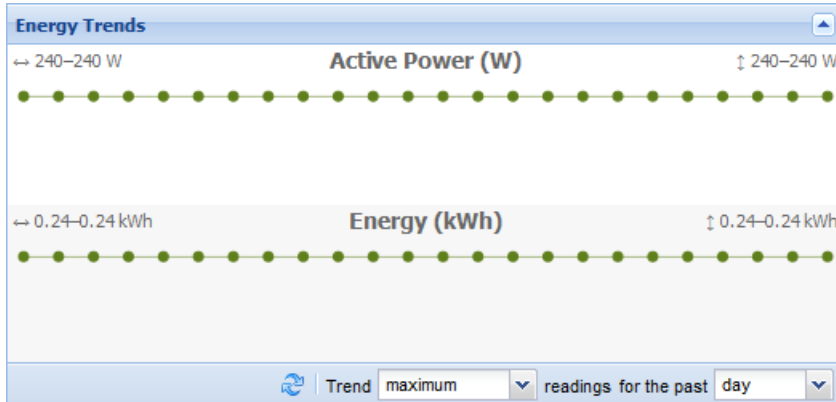
Trend charts display data for the whole unit.

The trend can be configured to show minimum, maximum, or average over a selected time period, using the fields below it.

Power panel energy trends include a trend line for several types of readings.

- Active Power
- Energy
- Current, when the power panel has inlet poles





## Power Panels Readings

Readings display in the second section of the smart view.

Configure the columns by clicking the arrow in a heading, then selecting options to display, hide, or sort.

Power Panel readings come from the inlets, circuits, and circuit poles. Power panels come in many different configurations. Your configuration may vary.

This sample smart view shows one possible configuration of a three-phase Power Panel.

- 1 inlet with 3 lines
- 2 circuits
- Each circuit has 3 circuit poles



**Readings start from the "highest level" or top of the power chain. The top of the power chain is the first section of readings, progressing down the page to lower points in the power chain.**

The inlet of this Power Panel has three lines.

Readings come from the whole inlet, and from each line for three-phase inlets.

Below the inlet and line readings, the circuit and circuit pole readings display.

This Power Panel has 2 circuits.

Circuit1 has 3 circuit poles.

**Readings**

Inlet Readings						
PDU Element	Voltage (V)	Current (A)	Active Po...	Apparent ...	Power Fa...	Energy (Wh)
Inlet 1	121	1.3	240.0	480.0	0.5	11,520

Line Readings			
PDU Element	Voltage (V)	Current (A)	Unutilized Capacity (A)
<b>Inlet 1</b>			
L1	121	1.1	N/A
L2	122	1.2	N/A
L3	123	1.3	N/A

Circuit Readings							
Circuit	Ordinal ▲	Voltage ...	Current ...	Active P...	Appare...	Power F...	Energy (...)
Circuit1	1	111	11.3	31.0	62.0	0.5	1,441
Circuit2	2	121	12.3	32.0	64.0	0.5	1,442

Circuit Pole Readings				
Ordinal ▲	Phase	Name	Voltage (V)	Current (A)
<b>Circuit 1: Circuit1</b>				
1	A	Circuit1_Pole1	111	11.1
3	B	Circuit1_Pole2	112	11.2
5	C	Circuit1_Pole3	113	11.3
<b>Circuit 2: Circuit2</b>				



## Power Panels Elements


Elements display in the third position in the smart view. The title "PDU Elements" is used for all types of PDUs and facility items.

The default Elements view for Power Panels includes this information:

- PDU Element: circuits
- IT Device: IT devices associated with circuits include a link to the IT device page.
- Trend: small trend chart for active power. Change the trend to min/max/average active power or current using the fields below it.
- Active Power (W): latest poll reading for active power. Change the latest poll reading to Current using the field below it.
- Apparent Power, Voltage, and Unutilized Capacity

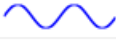



PDU Elements			
PDU Element	IT Device	Trend	Active Power (W)
Circuit 1 (Circuit1)			31.0
Circuit 2 (Circuit2)			32.0

 Trend

## Power Panels Details

Details are the fourth section in the smart view.

Details	
Type	Power Panel
IP Address	10.128.200.4
External Key	10.128.200.4
Name	PP - Floor 3
Manufacturer	Acme Electronics
Model	RPP-1phase
Firmware	1.1.1
Contact	facilitiesmanager@raritan.com
Location	Raleigh Data Center
Custom Field 1	
Custom Field 2	
SNMP Version	1/2c
Inlet Phase	 Single Phase
Belongs to	 <a href="#">Row for 10.128.200 subnet</a>
Health	<p><b>Connectivity:</b> OK Most recent poll of the target PDU was successful.</p> <p><b>Active events:</b> Good No active events.</p>



## Standalone Meters

Standalone Meters refers to a standalone power meter that may be used throughout the data center.

### Standalone Meters Smart View

Power IQ gathers power readings from the Standalone Meter's circuits and circuit poles.

The mapping of the circuits and circuit poles is achieved through your dynamic plugin configuration.

---

*Note: The data Power IQ can gather depends on how you configure the dynamic plugin that manages the object. See [Dynamic Plugins](#).*

---

Power IQ displays all data gathered in a smart view. Access the smart view by clicking on the object either in the Facility Items tab or in the Data Centers tab.

A fully populated Standalone Meter smart view includes:

- [Standalone Meter Energy Trends](#)
- [Standalone Meter Elements](#)
- [Standalone Meter Readings](#)
- [Standalone Meter Details](#)

### Standalone Meter Energy Trends

Energy Trends display in the top section of the smart view.

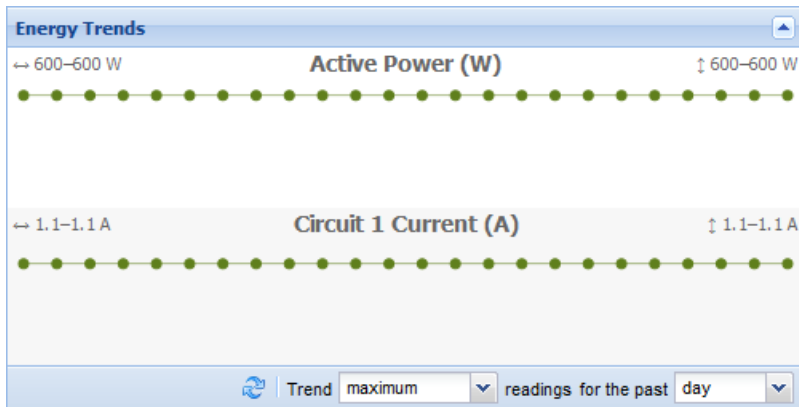
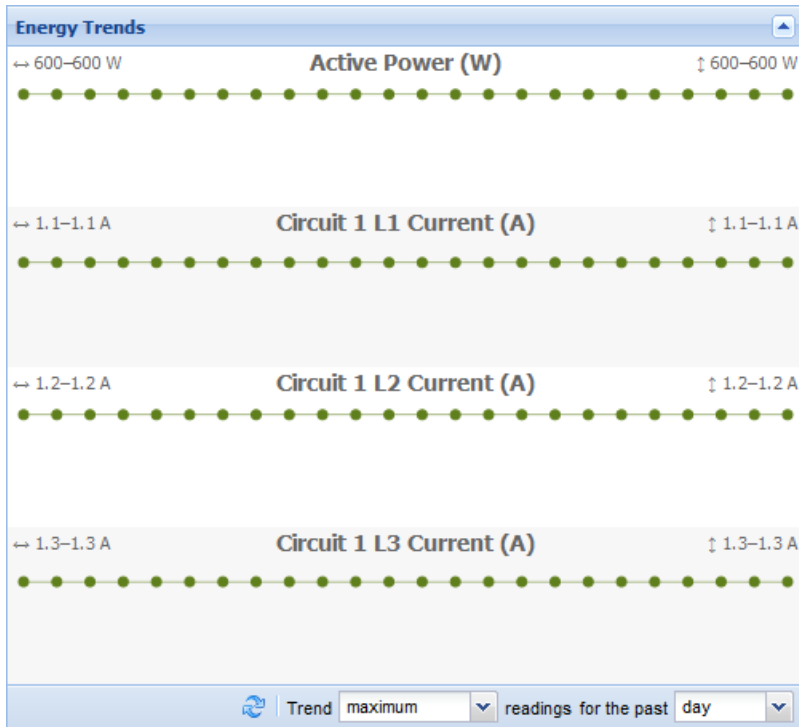
Trend charts display data for the whole unit.

The trend can be configured to show minimum, maximum, or average over a selected time period, using the fields below it.

Standalone Meter energy trends include a trend line for several types of readings.

- Active Power
- Current: one trend line for single phase circuits and one trend for each line of three-phase circuits





## Standalone Meter Readings

Readings display in the second section of the smart view.

Configure the columns by clicking the arrow in a heading, then selecting options to display, hide, or sort.

Standalone Meter readings come from the circuits and circuit poles. Your configuration may vary.

This sample smart view shows one possible configuration of a three-phase Standalone Meter.

1 circuit with 3 circuit poles



**Readings start from the "highest level" or top of the power chain. The top of the power chain is the first section of readings, progressing down the page to lower points in the power chain.**

The circuit of this Standalone Meter has 3 circuit poles.  
Readings come from the whole circuit, and from each line for three-phase circuits.

**Readings**

Circuit Readings							
Circuit	Ordinal ▲	Voltage (...)	Current (...)	Active P...	Apparen...	Power F...	Energy (...)
Circuit1	1	121	1.3	600.0	1,200	0.5	1,441

Circuit Pole Readings				
Ordinal ▲	Phase	Name	Voltage (V)	Current (A)
<b>[-] Circuit 1: Circuit1</b>				
1	A	Circuit1_Pole1	121	1.1
2	B	Circuit1_Pole2	122	1.2
3	C	Circuit1_Pole3	123	1.3

Latest reading taken 9 minutes ago


## Standalone Meter Elements

Elements display in the third position in the smart view. The title "PDU Elements" is used for all types of PDUs and facility items.

The default Elements view for Standalone Meters includes this information:

- PDU Element: circuits
- IT Device: IT devices associated with circuits include a link to the IT device page.
- Trend: small trend chart for active power. Change the trend to min/max/average active power or current using the fields below it.
- Active Power (W): latest poll reading for active power. Change the latest poll reading to Current using the field below it.



**PDU Elements**

PDU Element	IT Device	Trend	Active Power (W)
Circuit 1 (Circuit1)			600.0

🔄 Trend
maximum ▼
active power ▼
for the past
day ▼

## Standalone Meter Details

Details are the fourth section in the smart view.

Details	
Type	Standalone Meter
IP Address	10.128.200.2
External Key	10.128.200.2
Name	Standalone Meter - ABC Data Center
Manufacturer	Acme Electronics
Model	SAM-SinglePhase
Firmware	1.1.1
Contact	facilitiesmanager@raritan.com
Location	Raleigh Data Center
Custom Field 1	
Custom Field 2	
SNMP Version	1/2c
Inlet Phase	 Single Phase
Belongs to	 <a href="#">Row for 10.128.200 subnet</a>
Health	<b>Connectivity:</b> OK Most recent poll of the target PDU was successful. <b>Active events:</b> Good No active events.



# Chapter 14: Sensors

When you add a PDU to Power IQ, the attached sensors are discovered.

Sensors can be viewed and managed using the Sensors grid in the Sensors tab. For more information, see *Using the Sensors Tab* below.

You can view the list of sensors attached to a PDU in the PDU's smart view. See [Rack PDU Smart View](#).

Power IQ automatically associates your sensors into the EDM when their PDU is in the EDM. See [Automatically Associate Sensors in the EDM](#).

You can change this automatic association to place a sensor in the EDM at any room, row, aisle, or rack level. View your sensors in the EDM hierarchy in the Data Centers tab. See [Creating Your EDM](#).

Once associated in the EDM, you can access the sensor smart view. In the smart view, you can edit sensor label and position. The sensor smart view also has a configurable trend line. See [Sensor Smart View](#).

## Using the Sensors Tab

The Sensors tab displays a grid that lists the sensors in Power IQ and provides information about them, including name, associated facility item, type, and thresholds. In this tab, users can easily view and manage all sensors in Power IQ:

- Edit sensor information, including name, position in rack, height in rack, and thresholds (high warning, high critical, low warning, and low critical thresholds) in bulk or by double-clicking to edit
- Sort, filter, and group sensors by any of the available column criteria
- Aggregate numeric columns using count, sum, minimum, maximum, and average aggregate functions
- Show/hide the columns in the Sensors grid and save the modified grid configuration as the default
- Export the data to CSV

You can view a sensor's smart page by click on the blue link with the sensor's name in the Name column. You can view the associated facility item's smart page by clicking the associated IP address link in the Facility Item column.

## Editing Sensors in the Sensors Tab

Sensor name, position in rack, height in rack, and thresholds (high warning, high critical, low warning, and low critical) can be edited via the Sensors grid in the Sensors tab.

To end sensor information:

1. Select one or more sensors in the Sensors grid. Note that the information will be changed for each sensor selected.
2. Click the Edit button. If no sensors are selected, the Edit button will be grayed out and inaccessible.
3. In the Updating Sensor popup, make your desired changes to the following fields:
  - a. Name
  - b. Position in Rack: Inlet, Outlet, Outside Air



- c. Height in Rack: Top, Middle, Bottom
  - d. Critical High Threshold (leave blank to use the default)
  - e. Warning High Threshold (leave blank to use the default)
  - f. Warning Low Threshold (leave blank to use the default)
  - g. Critical Low Threshold (leave blank to use the default)
4. Click the Submit button.

A success message will display if your updates are successful.

Following the success message, the popup will automatically close. You will be returned to the Sensors grid.

Default values for temperature and humidity sensors can be set through the Power IQ settings. For more information, see [Configuring Default Threshold Settings](#).

## Sorting, Filtering, and Grouping Sensors

On the Sensors grid, you can sort, filter, aggregate, and group sensors by any of the available columns.

Name	Facility Item	Sensor Type	Status	State	Latest Read...	30 Day High	30 Day Moving ..	30 Day Low	Rack	Critical Low	Warning Low	Warning High	Critical High
Humidity AE17...	192.168.43.125	Humidity	Warning		37.0%	38.0%	34.2%	25.0%	Rack B6				
T06-43.117	192.168.43.117	Temperature	Good		76.5°F	78.3°F	76.3°F	70.9°F	Rack B5				95.0°F
RH06-43.117	192.168.43.117	Humidity	Good		29.0%	41.0%	31.1%	27.0%	Rack B5				
Temperature 43...	192.168.43.125	Temperature	Good		73.4°F	85.1°F	75.7°F	72.5°F	Rack B6				
T05-43.117	192.168.43.117	Temperature	Warning		79.5°F	83.5°F	80.9°F	75.2°F	Rack B5				
RH05-43.117	192.168.43.117	Humidity	Warning		25.0%	33.0%	25.5%	22.0%	Rack B5				
Temperature AE...	192.168.45.156	Temperature	Warning		74.3°F	87.8°F	77.7°F	71.6°F	Rack A4				
Humidity AE1B...	192.168.45.236	Humidity	Good						Rack A4				
Humidity AE17...	192.168.45.244	Humidity	Good						Rack A4				
Temperature AE...	192.168.45.244	Temperature	Good						Rack A4				

To sort, click on the downward chevron in next to the column name in the header row. A dropdown menu will display with the options to sort, hide or group columns. For numeric columns, you'll also see options for the following aggregate functions: count, sum, minimum, maximum, and average.



Latest Read...	30 Day High	30 Day Moving ...	30 Day Low	Rack
>, <, <=, >=,	>, <, <=, >=, =,	>, <, <=, >=, =,	>, <, <=, >=, =,	A1 <input type="button" value="x"/>
64.0°F	79.5°F	66.9°F		Rack A1
54.0%	55.0%	48.9%		Rack A1
65.1°F	82.9°F	68.1°F		Rack A1
52.0%	53.0%	46.4%		Rack A1

- Sort Ascending
- Sort Descending
- Hide Column
- Group
- Agg: Count
- Agg: Sum
- Agg: Min
- Agg: Max
- Agg: Avg

Type text to filter by that text in the filter text box fields directly under the name of each column. Numeric filters (less than, equal to, and greater than) can be used in any of the numeric columns.

Edit Default Thresholds										
✓	Name	Facility Item	Sensor Type	Status	State	Latest Read...	30 Day High	30 Day Moving ...	30 Day Low	Rack
						>, <, <=, >=,	>, <, <=, >=, =,	>, <, <=, >=, =,	>, <, <=, >=, =,	A1 <input type="button" value="x"/>
✓	Temperature 1	192.168.43.111	Temperature	Warning		64.0°F	79.5°F	66.9°F	63.7°F	Rack A1
✓	Humidity 1	192.168.43.111	Humidity	Good		54.0%	55.0%	48.9%	36.0%	Rack A1
✓	Temperature 2	192.168.43.111	Temperature	Good		65.1°F	82.9°F	68.1°F	64.8°F	Rack A1
✓	Humidity 2	192.168.43.111	Humidity	Good		52.0%	53.0%	46.4%	34.0%	Rack A1

To clear filters, click the cancel (X) in each filter text field, or click the grid configuration icon and select the Clear all filters option.

To group sensors, click the downward chevron next to the name of the column you want to group by, then select the Group option.

When you group sensors by criteria, all of the sensors will be organized based on your selected criteria. The column you want to group by will be set to the first column in the grid. To view the sensors in each group, click the plus sign in the left column to expand each group. To ungroup, click the download chevron next to the name of the column you are grouping by, and then select the Ungroup option.



Edit Default Thresholds					
		Sensor Type ▲ ▼	Name ▼	Facility Item ▼	Status ▼
		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
+	✓				
	✓	Absolute humidity	AH05-43.117	192.168.43.117	Good
	✓	Absolute humidity	AH06-43.117	192.168.43.117	Good
	✓	Absolute humidity	AH10-43.63	192.168.43.63	Good
+	✓				
	✓	Air flow	Air Flow 1	192.168.43.106	Good
	✓	Air flow	AirFlow PRB1A...	192.168.45.242	Good
	✓	Air flow	Air Flow 1	192.168.43.127	Good
+	✓				
+	✓				
+	✓				

## Exporting Data to CSV

Column data in the Sensors grid can be exported to a CSV file for further analysis. You can export either all of the sensor data in the grid or only the visible columns.

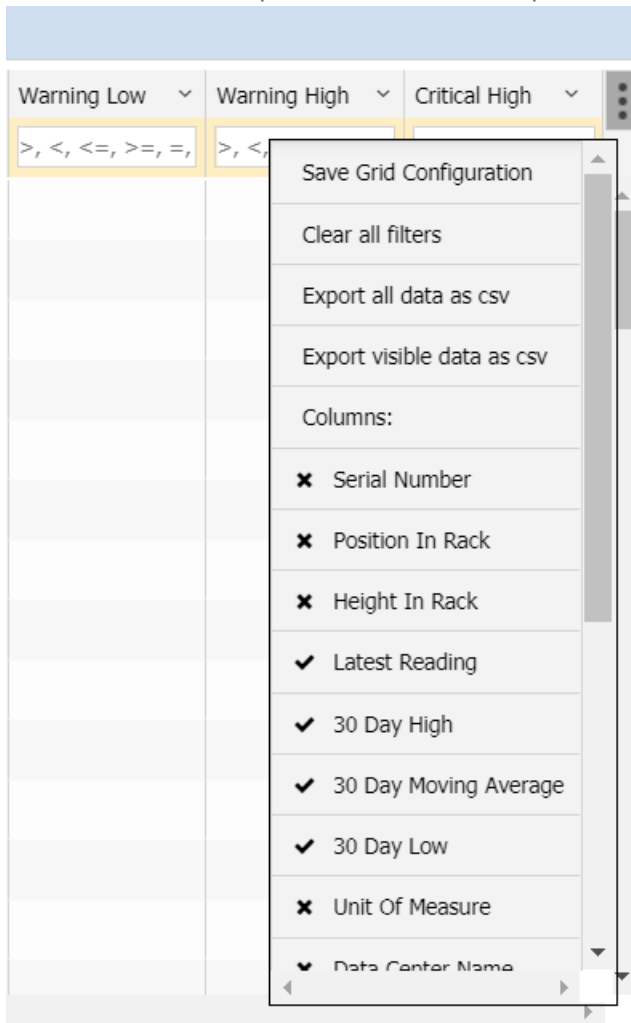
To export data to CSV:

1. On the Sensors grid, click the Grid Configuration icon in the upper right corner of the grid.
2. A dropdown menu will display.





- To export all data in the grid, select the Export all data as csv option. To export only the data you can see in the current view, select the Export visible data as csv option.



- In the Save As dialog, name your file and click the Save button.

## Sensor Grid Columns

The following columns are available in the Sensors grid:

- Name (always shown)
- Facility Item (always shown)
- Sensor Type
- Serial Number
- Position in Rack: Inlet, Outlet, Outside Air
- Height in Rack: Top, Middle, Bottom
- Status: Critical, Warning, Good, Commissioned, Maintenance, Decommissioned



- State
- Latest Reading
- 30 Day High
- 30 Day Moving Average
- 30 Day Low
- Unit of Measure (hidden by default)
- EDM Information Columns
  - Data Center
  - Floor
  - Room
  - Aisle
  - Row
  - Rack
- Critical Low
- Warning Low
- Warning High
- Critical High

## Sensor Thresholds

Sensor thresholding creates events and event notifications when a temperature or humidity sensor reading exceeds or is below the threshold settings. The readings are based on the latest readings collected by Power IQ via the associated facility item.

You can set default sensor thresholds under the Settings tab > Appliance Administration > Threshold Settings or override the default values individually on the Sensors grid in the Sensors tab. Note that environmental thresholding is automatically enabled if rack power thresholding is already enabled on your system. Otherwise, it's disabled by default. You can configure the setting on the Settings > Default Thresholds page. For more information, see:

- [Configuring Default Threshold Settings](#).
- *Using the Sensors Tab* on page 501

To receive event notifications, configure notification filters to include environment sensor events. See *Configuring Notification Filters* on page 275.

## Configuring Default Threshold Settings

To edit default thresholds:

1. Click the Settings Tab.
2. Under Appliance Administration, click the Default Thresholds link.
3. On the Default Thresholds page, check the Enable Power, Temperature, and Humidity Thresholding box.

---

*Note: To disable thresholding, uncheck the Enable Power, Temperature, and Humidity Thresholding box. However, if you disable thresholding, a message will display indicating that changing polling options requires the poller soft-*

---



---

*ware to restart, which may take up to a few seconds. To confirm and continue, click the OK button. Otherwise, click the Cancel button to return to the Default Thresholds page.*

---

4. To edit the lower warning, lower critical, upper warning, and upper critical thresholds, double-click in each cell.
5. Your changes are saved automatically. A green success message will display at the top of the page when a threshold change has successfully been saved.



## Sensor Smart View

Once a sensor is associated in the EDM, you can access the smart view.

All environmental sensor smart views contain:

- [Sensor Environmental Trends](#)

A sensor smart view may contain the following options, depending on the sensor type:

- [Specify Inlet, Outlet, or Outside Air Location for Environmental Sensors](#)
- [Naming Environmental Sensors](#)



## Sensor Environmental Trends

The top section of the sensors smart view is a trend line. Configure the trend time period using the field below the trend.

---

*Note: If you need to release and then re-manage a sensor associated with a Raritan PDU, always use the manual assignment option to ensure the accuracy of sensor environmental trends. See [Sensor Assignment Guideline](#).*

---



## Specify Inlet, Outlet, or Outside Air Location for Environmental Sensors

You can specify whether a sensor is inlet or outlet located or if the sensor is for outside air. By default, Power IQ considers all environmental sensors to be inlet located.

Sensors are editable only when included in the EDM. See [Creating Your EDM](#).

All sensor types can be included in Cooling charts on the dashboard. See [Cooling Chart Widget](#).

In the sensors smart view, select the Sensor Location: Inlet, Outlet, or Outside Air.



## Naming Environmental Sensors

Environmental sensors have sensor labels that you can change in Power IQ.

The following PDUs support naming environmental sensors, depending on model: APC, Eaton, Baytech, Liebert, Raritan, Servertech, Sinetica.

Sensor names cannot include only white space characters. The maximum name length is 256 characters. The maximum name length for PX1 sensors is 33 characters.

Sensor labels must be unique. During polling, if Power IQ finds two sensors of the same type with the same name, the sensor readings for those sensors are not saved. Power IQ adds an error message to the audit log.

SNMP read and write access to the PDU is required to name sensors. See [Adding PDUs to Power IQ](#).

- In the sensors smart view, enter a unique name in the label field, then click Save.



## Sensors Connected to PX1 and PX2 PDUs

Raritan PX1 and PX2 PDUs support environmental and contact closure sensors, which you can poll through Power IQ.

The sensors must be setup and configured correctly via PX1 or PX2 before they will work correctly with Power IQ.

See the online help for your PX model PDU here:

- <http://www.raritan.com/support/product/px/>
- <http://www.raritan.com/support/product/px2/>





## States of Managed Sensors

An environmental sensor shows the state after being managed.

Available sensor states vary depending on the sensor type -- numeric or discrete sensors. For example, a contact closure sensor is a discrete (on/off) sensor so it switches between three states only -- unavailable, alarm and normal.

---

*Note: Numeric sensors show both numeric readings and sensor states to indicate environmental or internal conditions while discrete (on/off) sensors show sensor states only to indicate state changes.*

---

Sensor states	Applicable to
unavailable	All sensors
Alarm	Discrete sensors
Normal	Discrete sensors
ok	Numeric sensors
below lower critical	Numeric sensors
below lower non-critical	Numeric sensors
above upper non-critical	Numeric sensors
above upper critical	Numeric sensors

---

*Note: The state change of a contact closure sensor occurs only if the sensor enters the new state for at least 1 consecutive sample.*

---



## Sensor Assignment Guideline

A Raritan PDU allows users to release managed sensors and then bring them back under management, using either automatic or manual assignment option.

- Automatic assignment: This option may change the sensor ID on the PDU. Therefore, sensor indexes of the same sensor type are likely to swap in Power IQ, causing the sensor readings to swap as well. Power IQ users must not use this option.
- Manual assignment: This option permits users to specify the original sensor ID so that no sensor indexes and readings are swapped in Power IQ. Always use this option to ensure the sensor data accuracy in Power IQ.



# Chapter 15: Power Control

Power control is only available for PDUs that support this feature.

Power IQ must have valid SNMP write access to the PDU for power control to work.



## Enable or Disable Power Control

Only authorized users can control power. See [Power IQ Role Definitions](#).

1. In the Settings tab, click Power IQ Settings in the Appliance Administration section.
2. In the Power Control Settings box, select the "Enable power control" checkbox to enable power control.
3. Click Save Power Control Settings.



## Configuring Power Control Options

1. In the Settings tab, click Power IQ Settings in the Appliance Administration section.
2. In the Power Control Settings box:
3. Select the "Enable power control" checkbox to enable power control.
4. Select the "Require reason message for power control operations" checkbox to require users to log a reason for all power control operations.
5. Select the "Allow ad hoc power control for rooms, aisles, rows, and racks" to allow authorized users to control power at the room, aisle, row and rack levels of the data center.
6. Select the "Allow scheduled power control" checkbox to allow authorized users to schedule power control tasks.
7. Click Save Power Control Settings.



## Control Power to Outlets in a Data Center

You must enable power control. See [Enable or Disable Power Control](#).

Power control is available at the outlet and IT device outlet group level, unless you also enable higher levels, such as all outlets in a rack, row, aisle, or room. See [Configure Power Control Options](#).

You must be assigned a role that permits power control.

For details about controlling power in the Smart Rack and Smart PDU views, see [Rack IT Devices](#) and [PDU Elements - Smart Views](#).

**Warning: Graceful shutdown is not supported when controlling power from the Smart Rack or Smart PDU pages, which are accessed by clicking the rack or PDU in the EDM/Data Centers tab. Use the right-click option on the rack or PDU in the EDM, or the power control options in the IT Devices tab for graceful shutdown.**

1. In the Data Centers tab, select the data center level, such as a rack, that contains the outlets you want to control.
2. Select the checkboxes of the outlets you want to control in the IT Devices or PDU Elements section.
3. Click Power Control > On or Power Control > Off.
4. If required, enter a reason message for the power control operation, and click OK to confirm.
5. In the Data Centers tab, right-click an IT device, or higher level, if enabled, then select On or Off.
6. If required, enter a reason message for the power control operation, and click OK to confirm.
7. In the Facility Items tab, select a PDU, then click View.
8. Select the checkboxes of the outlets you want to control in the Readings section.
9. Click Power Control > On, Power Control > Off, or Power Control > Cycle.
10. If required, enter a reason message for the power control operation, and click OK to confirm.
11. In the IT Devices tab, select a device.
12. Click Power Control > On or Power Control > Off.
13. If required, enter a reason message for the power control operation, and click OK to confirm.



## Control Power to Devices in a Group

You can manually control power to devices in a group, or schedule a task to run a power control operation at a specified time.

1. In the IT Devices tab, choose Activities > Device Groups.
2. Select the checkbox for the device group you want to control power to.
3. Click Power Control > On or Power Control > Off.

All devices in the group are powered on or off sequence specified in the group settings.

4. Devices are powered off in sequence, and powered on in the reverse sequence.

See [Creating Device Groups for Power Control](#).

Devices in the group that are configured with graceful shutdown will be shutdown when a power off operation is selected here. The configured graceful shutdown delay is used. See [Configuring Graceful Shutdown](#).

See [Add a Power Control Task](#).



## Power Cycle a Device

The power cycle feature enables you to hard power cycle devices that are mapped to one or more outlets. This can be useful in the event of a major software failure.

Graceful shutdown does not apply when using power cycle. There is a 30 second delay after the last outlet is turned off before turning the first outlet back on.

1. In the IT Devices tab, click the IT device name link in the IT Devices tab to go to the IT device page in the Data Centers tab. The EDM expands to show the IT device.
2. Find the power cycle button in either of these locations.
3. Right-click the IT Device in the EDM, choose Power Control > Cycle.
4. Click Power Cycle in the center of the IT Device details page.
5. If required, enter a reason message for the power control operation, and click OK to confirm.

A status bar shows progress and success or failure message.





## Scheduling Power Control

You can schedule power control for device groups only.



## Adding a Power Control Task

Schedule a power control task to control power to a device group at a specified time. You can schedule a task that runs only once, or that recurs on a regular schedule.

You must create device groups before you add power control tasks. See [Create Device Groups for Power Control](#).

1. In the IT Devices tab, choose Activities > Add New Task. The New Power Scheduling Task page opens.
2. Select Power On or Power Off. If Graceful Shutdown is configured for a device in the device group, a power-off task will use graceful shutdown automatically, unless you select the Skip Graceful Shutdown checkbox in the next step.
3. Select the Skip Graceful Shutdown checkbox to force a hard shutdown for all devices in the device group, even if graceful shutdown is enabled.
4. Select the Leave Outlets On checkbox to leave outlets powered on in cases where devices have been powered off using graceful shutdown.
5. Select the Device Group for the power control operation.
6. Specify when the task should run.
7. To schedule a task that runs only once, select the Date from the calendar in the Run Once section.
8. To schedule a task that recurs, select the checkboxes for the days of the week the task should run in the Recurring section.
9. For both types, select the time the task should run in the Hour and Minute fields.
10. Select the Active checkbox to allow this task to run. Deselect this checkbox to stop the task from running.
11. Click Save.



## Viewing Power Control Task Results

View the results of power control tasks that have been scheduled.

---

*Note: Make sure that power control and scheduled power control are enabled. See [Enable or Disable Power Control](#).*

---

1. In the IT Devices tab, choose Activities > View Task Results. The Power Scheduling Task Results page opens.
2. Click a task name link to view the results.



## Configuring Graceful Shutdown

You can configure Power IQ to send a graceful shutdown command to a server before powering off outlets. Power IQ allows you to define a set of system-wide shutdown commands with credentials to use across multiple devices. Power IQ supports both SSH and NetRPC commands to shutdown either Unix or Windows servers.

Process for Configuring Graceful Shutdown in Power IQ:

- Enable power control. See [Enable or Disable Power Control](#).
- Prepare your servers for graceful shutdown: check open ports, define accounts for authentication, test authentication methods. See [Open Ports for Graceful Shutdown](#) and [Preparing Servers for Graceful Shutdown](#).
- Add the shutdown commands to Power IQ. See [Adding Shutdown Commands](#).
- Enable graceful shutdown for the server, known as an IT Device in Power IQ, specify the command and wait time, and test the connection. See [Enable Graceful Shutdown for an IT Device](#).
- To shutdown servers, use the power control functions.
- Add a power control task to schedule the power off for a device group. See [Adding a Power Control Task](#).

**OR**

- Power off an individual outlet. See [Control Power to Outlets in a Data Center](#).



## Adding Shutdown Commands

Add shutdown commands if you want to enable graceful shutdown to occur on servers before Power IQ switches off outlets. Graceful shutdown will occur both when you manually power outlets off or when a scheduled power control task runs.

You can test the commands you configure when you enable graceful shutdown for a particular device. See *Enable Graceful Shutdown for an IT Device* on the next page.

Add shutdown commands using Windows Remote Shutdown

Windows Remote Shutdown is the most common choice for shutting down Windows systems.

1. In the IT Devices tab, choose Activities > Shutdown Commands. The Add New Shutdown Command page opens.
2. Click Add.
3. Select Using Windows Remote Shutdown and click Next.
4. In the Name field, enter a name to describe this shutdown command. This name appears in the list of shutdown commands to be selected when you enable graceful shutdown for a server. See [Enable Graceful Shutdown for an IT Device on the next page](#).
5. In the Login field, enter the username of the account to be authenticated on each server to be shutdown.
6. Login can include letters, digits, underscores, dots, and hyphens.
7. In the Password and Password Confirmation fields, enter the password for the username in the Login field.
8. In the Comment field, enter the message to display to users of the server when it is shutdown.
9. Click Add.

Add shutdown commands using SSH:

1. SSH is the most common choice for shutting down Linux, Unix, or other systems:
2. In the IT Devices tab, choose Activities > Shutdown Commands. The Add New Shutdown Command page opens.
3. Click Add.
4. Select SSH and click Next.
5. In the Name field, enter a name to describe this shutdown command. This name appears in the list of shutdown commands to be selected when you enable graceful shutdown for a server. See *Enable Graceful Shutdown for an IT Device* on the next page.
6. In the Login field, enter the username of the account to be authenticated on each server to be shutdown.
7. Login can include letters, digits, underscores, dots, and hyphens.
8. Enter the appropriate credentials for the account specified in the Login field. See *Basic Configuration for SSH Shutdown* on page 532 for more details on authentication. The following options are valid.
  - Password and Password Confirmation
  - Private Key
  - Private Key and Passcode and Passcode Confirmation
9. In the Command field, enter the command. See *Sample SSH Shutdown Commands* on page 533 for examples.
10. Click Add.



## Enable Graceful Shutdown for an IT Device

Enable graceful shutdown for an IT Device if you want Power IQ to send a shutdown command that you configure to a server before powering it off.

You must add the shutdown commands before enabling graceful shutdown. See [Adding Shutdown Commands](#).

1. In the Data Centers tab, select a device that requires graceful shutdown to be enabled.
2. Make sure the IP address for the device is completed in the IP Address field.
3. Expand the Graceful Shutdown section of the IT Device details page and select the Graceful Shutdown checkbox.
4. Select the command to send to the server from the Shutdown Command list. You must add commands to Power IQ before selecting a command here. See [Adding Shutdown Commands](#).
5. In the Shutdown Wait field, enter the number of seconds Power IQ should wait for the shutdown to complete before powering off the associated outlet.
6. Click Test Connection. Power IQ attempts to connect to the device using the selected command. If you see a success message, click Save. If you see an error message, click View Log in the dialog to troubleshoot the failure.
7. Click Save to save all changes.



## Disable Graceful Shutdown for an IT Device

There are two methods for disabling graceful shutdown for an IT Device.

Remove the IT device from the shutdown command details page:

1. In the IT Devices tab, choose Activities > Shutdown Commands.
2. Select the shutdown command that you want to disable for the IT device.
3. Select the IT device in the Devices Using Shutdown Command list and click Remove.
4. Click Yes to confirm. The command is removed from the IT device and graceful shutdown is disabled.

Disable graceful shutdown from the Data centers tab:

1. In the Data Centers tab, select a device that requires graceful shutdown to be disabled.
2. Expand the Graceful Shutdown section of the IT Device details page and deselect the Graceful Shutdown checkbox.
3. Click Save.



## Viewing the IT Devices Using a Shutdown Command

View the shutdown command details to see a list of IT Devices using each shutdown command.

1. In the IT Devices tab, choose Activities > Shutdown Commands.
2. Select the shutdown command whose usage you want to view and click Edit.

The list of IT devices that are using the shutdown command displays below the command details.





## Remove a Shutdown Command from Power IQ

When you remove a shutdown command from Power IQ, you can assign a different command to the IT devices that were using the removed command. Or, you can disable graceful shutdown for those devices.

1. In the IT Devices tab, choose Activities > Shutdown Commands link.
2. Select the command you want to remove from Power IQ and click Remove.
3. If the command is being used by any IT devices, a dialog appears. an option and click
4. Select Remove Command from Devices and Disable Graceful Shutdown, and click OK to remove the command from Power IQ and not assign a different shutdown command to the IT devices.

### OR

5. Select Assign Another Shutdown Command to Devices, and then select a different shutdown command from the list, and click OK, to assign a different shutdown command to the IT devices.



## Preparing Servers for Graceful Shutdown

Servers must be configured to allow the shutdown commands to run when you enable graceful shutdown from Power IQ.



## Open Ports for Graceful Shutdown

Servers that will receive graceful shutdown commands from Power IQ must have the following open ports.

- TCP 22: For SSH commands only. Custom SSH ports are not supported.

Windows:

- TCP 139: NetBIOS Session Service, for Windows systems only.
- TCP 445 : For NetRPC commands only.



## Basic Configuration for SSH Shutdown

- Open Ports
- Open port 22.

Authentication for SSH:

Power IQ can send a shutdown command via SSH to systems that share an authentication method, including the following methods.

- common user directories
- common username and password
- common username and password (users managed by a common LDAP server)
- common username and encrypted key: Append the public key file as a string to the `~/.ssh/authorized_keys` file of the user on each machine to be shut down.

The user must have permission to shut down the machines using the authentication method.

Each authentication method must be tested from the command line.

Shutdown Commands:

- There are two types of shutdown commands that you can use in Power IQ.

A call to the native shutdown command, which varies by Unix type

**OR**

- A common shutdown script that carries out a backup

Each method must be tested from the command line of each machine to be shut down

The command has 30 minutes to complete before Power IQ stops trying. If the time expires, Power IQ closes the SSH connection, logs an error, and does NOT power off the outlet.

If the command returns stderr, Power IQ assumes a failure. Power IQ logs stdout and stderr.

Error details are written to the Power IQ log.



## Sample SSH Shutdown Commands

Resources for information on writing SSH shutdown commands:

- <http://www.unix.com/man-page/OpenSolaris/1m/shutdown/>

**Sample Linux command:**

```
/sbin/shutdown -h now
```

**Sample OpenSolaris command:**

```
sudo -E /usr/sbin/shutdown -y -i5 -g5
```

## Basic Configuration for Windows Remote Shutdown

NetRPC shutdown commands can be used to shutdown Windows machines remotely.

Open ports:

- Open port 445.

Authentication:

- The Windows Remote Shutdown command requires a user account whose security policy allows shutdowns from a remote system.
- Each server that will receive graceful shutdown commands must accept the user account's username and password.

Windows Server Configuration:

- RPC commands must be enabled on each Windows server that you will shutdown via Power IQ.



## When Will Graceful Shutdown Abort?

If there is any error between beginning to connect with the server and the server returning from the shutdown script with a non-zero code, that is, no errors in the script, then the attempt is marked as failed and the outlet task does not proceed.



## Creating a Device Group

To create device groups for power control:

1. Make sure power control and scheduled power control is enabled. See [Enable or Disable Power Control](#) and [Configuring Power Control Options](#).
2. In the IT Devices tab, select the devices you want to add to the group.
3. Click Add to Device Group > Create a new device group.
4. In the "Create a new device group" dialog, enter a name for the group, then click "Create device group".
5. The group is created, and the selected devices are added. A success message displays. Click "View device group" to open the device group details, where you can set the default power control delays and sequence of devices for power control operations. See [Configuring the Power Control Settings for a Device Group](#).





## Creating a Device Group

To create device groups for power control:

1. Make sure power control and scheduled power control is enabled. See [Enable or Disable Power Control](#) and [Configuring Power Control Options](#).
2. In the IT Devices tab, select the devices you want to add to the group.
3. Click Add to Device Group > Create a new device group.
4. In the "Create a new device group" dialog, enter a name for the group, then click "Create device group".
5. The group is created, and the selected devices are added. A success message displays. Click "View device group" to open the device group details, where you can set the default power control delays and sequence of devices for power control operations. See [Configuring the Power Control Settings for a Device Group](#).



## Adding Devices to an Existing Device Group

Once groups have been created, you can add devices to the group in the IT Devices tab.

1. In the IT Devices tab, select the devices you want to add to the group.
2. Click Add to Device Group, and the list of groups that have been created displays beneath the "Create a new group" option. Select the group you want to add the devices to.



## Adding Devices to a Group in the Data Centers Tab

You can add one device or all devices within a data center, row, rack, and so on, to a group in the Data Centers tab.

1. In the Data Centers tab, select a device to add to the group. To add all devices from a section of the data center, select the room, or aisle, or rack. You can select any level, up to and including the data center.
2. Right-click the selected level, select "Add devices to a device group", then select the group. To add a group, select "Create a new device group", enter a device group name then click "Create device group."



## Configuring the Power Control Settings for a Device Group

Configure each device group to set the default power control delay and the sequence of devices for power control operations.

1. In the IT Devices tab, choose [Activities > Device Groups](#).
2. Click a device group Name link. The Edit Device Group page opens.
3. Set the Default Power On Delay (sec), which is the number of seconds that Power IQ delays after powering on each device in the sequence of devices in a group. These settings are the default power-on delay for all new devices you add to the group.
4. Set the sequence for power control operations. Select a device, then click Up, Down, Top, Bottom, and Move To to arrange the device list in the sequence that power control operations should occur.
5. Devices will power off in the sequence set.
6. Devices will power on in the REVERSE sequence set.



## Remove a Device from a Group

1. In the IT Devices tab, choose Activities > Device groups.
2. Click the device group Name link.
3. Select the device you want to remove, then click Remove. The device is removed from the group, but not removed from Power IQ.



## Set a Different Power On Delay for a Device

Power IQ will follow the default delay setting for power-on sequences, unless you specify a different delay setting for a device. Delays are for power-on sequences only. The delay occurs after each power-on operation completes.

1. In the IT Devices tab, click a device group Name link in the Device Groups column. The Edit Device Group page opens.
2. Select the device in the Devices in This Group list, then double-click the Power On Delay value and enter a new value in the field.



# Chapter 16: Door Access Management

Power IQ 5.2 and above support the ability to control door access and door locks on cabinet and containment area doors.

Doors can be added and deleted via the EDM in the Data Centers tab.

The door smart page view displays details on the door's status, sensor mappings, placement, and associated card readers. For more information, see *Door Smart Page* on the next page.

Users with the appropriate authorization can manage door access permissions and authentication through Power IQ for supported devices. For more information, see *Door Control Permissions* on the next page.

Door status is tracked via contact closure and powered dry contact sensors mapped to door, handle, and electronic lock components. Contact closure sensors can be mapped to door or handle components only. Powered dry contact sensors can be mapped to electronic lock components only. Only one sensor at a time can be mapped to each door component. For more information, see *Configuring a Door* on page 548.

Doors, sensor mappings, and values for the override relock timer also can be added, edited, and deleted via CSV import in bulk. For more information, see *Bulk Configuring Doors Using CSV* on page 550.

Card readers can be added to doors to electronically control physical access to them. For more information, see *Card Reader Access Support*.

---

*Note: Door access management is supported for CPI, Raritan, and Panduit devices only. Card reader access management is supported for Raritan facility items only.*

---



## Door Control Permissions

Power IQ 5.2 introduces the Door Control role to manage access to doors. The Door control role can apply globally, to individual EDM nodes and their children, and to individual doors.

Users with the View and Door Control roles will be able to lock/unlock the doors they have access to from the doors' respective smart pages in Power IQ, but they cannot edit the door details.

Users with the Operator role and above can edit a door's name and other details, map/unmap sensors, and add a door to the EDM. Operators also can add a door via drag-and-drop to nodes that they have access to.

In addition to the door-related tasks available to Operators, Site Administrators and Administrators have the ability to assign and revoke the Door Control role on specific nodes and individual doors. Site Administrators can lock/unlock any door in the system, while Administrators can lock/unlock only those doors that they have Administrator privileges for. Only Site Administrators can assign the Door Control role globally.

For more information on assigning roles in Power IQ, see *Assigning Roles for User Permissions* on page 341.

## Door Smart Page

The door smart page displays information related to the door details, including the door status, its sensor mappings, and the door's name, external key, and placement. The door smart page also displays the relock timer default and the value for the override relock timer if configured.

Users with the View role are able to read the door smart page but will be unable to edit it. Users with the Door Control role can lock/unlock doors. Users with the Operator role and above can edit the details for the doors they have access to.

Click on the door in the EDM to view the door smart page.





## Front Door

**Door Control**

**Sensors and Door Status**

Sensor Mappings		Available Sensors	
		Status	PDU
Door	<input type="text" value="Door Status"/>	Closed	<input type="text" value="Dry Contact 1"/> <a href="http://192.168.46.214">192.168.46.214</a>
Handle	<input type="text" value="Handle Status"/>	Closed	<input type="text" value="Dry Contact 2"/> <a href="http://192.168.46.214">192.168.46.214</a>
Lock	<input type="text" value="Electronic lock"/>	Locked	<input type="text" value="On/Off 1"/> <a href="http://192.168.46.214">192.168.46.214</a> <input type="text" value="On/Off 3"/> <a href="http://192.168.46.214">192.168.46.214</a> <input type="text" value="On/Off 4"/> <a href="http://192.168.46.214">192.168.46.214</a>

**Door**

Name:

External Key:

An external key is a unique identifier of this object that is used when importing and exporting enterprise relationships through a CSV file.

Override Relock Timer:  seconds. 0 is disabled.  
Default: 30 seconds

Placement:  [Manage door placements](#)

**Card Readers**

Add Remove

Name	PDU
<input type="checkbox"/> <a href="#">Card Reader - 40004403</a>	<a href="http://192.168.46.214">192.168.46.214</a>

Page  of 1

Displaying 1 - 1 of 1



The door smart page includes the following sections:

## Door Control

This section provides controls to lock/unlock the door. The button aligning to the door's current state (Locked or Unlocked) will be grayed out.

## Sensors and Door Status

This section provides controls to map/unmap sensors for the door components. There is one row for each door, handle, and electronic lock component.

Components are mapped by dragging-and-dropping sensors from the Available Sensors list on the right to the appropriate component. Only sensors that are siblings to the door node (listed under the same parent node in the EDM hierarchy) will be displayed under Available Sensors.

The status of the component is noted in each row. For door and handle sensors, the status can be Open or Closed. For Lock Sensors, the status can be Unlocked or Locked. For door components without a sensor mapped to them, the status area will be blank.

Sensor mappings also can be imported via CSV in bulk. For more information, see *Bulk Configuring Doors Using CSV* on page 550.

## Door

This section displays the fields where you edit the door name, external key, placement, and override relock timer value.

The external key is a unique attribute that is used to identify the door when importing and exporting enterprise relationships through a CSV file.

The override relock timer is an optional feature that allows users with the Operator role or above to override the global door relock timer on the individual doors that they have access to. If this option is not configured, the door will automatically relock based on the global door relock timer value. For more information, see *Enabling/Disabling the Global Door Relock Timer* on page 552 and *Enabling/Disabling the Door Override Relock Timer* on page 553.

Placement is an optional setting defined using tags for the Door Placements tag group. For more information on editing tags for this group, see *Setting Door Placement with Tags and Tag Groups* on page 551

## Card Readers

This section displays the card readers associated with the door and the facility items that have the card readers attached. You also can add or remove a card reader from this section. For more information, see *Card Reader Support*.

Users with the View role on a door (but not Operator or above) have permissions to view a list of associated card readers. Users with the Operator role or above on a door, on the Door smart page have permissions to see a list of associated card readers, with the ability to add or remove them.

---

*Note: Card reader access management is supported for Raritan facility items only.*

---



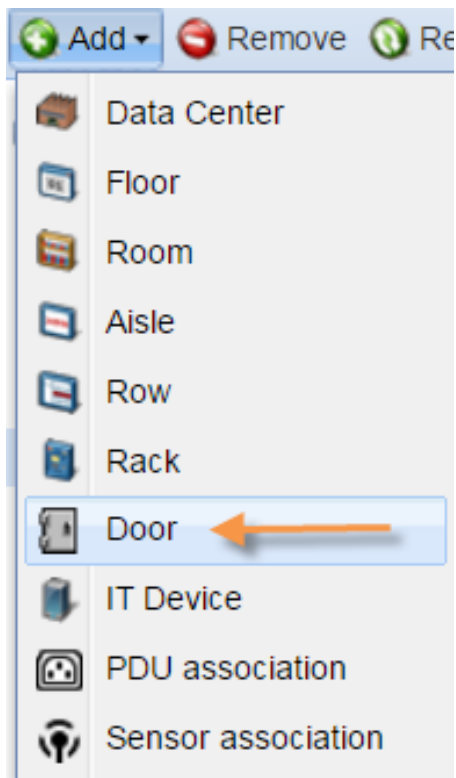
## Adding or Deleting a Door

Doors can be added or deleted through the EDM in the Data Centers tab.

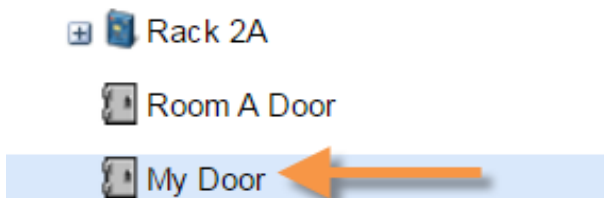
### Adding a Door

Users with the Operator role and above can add doors to the EDM via the Data Centers tab.

1. In the EDM hierarchy, highlight the node where you want to add the door.
2. Click the Add icon and select Door from the dropdown menu.



3. The door will be added as a child of the node highlighted in Step 1.



---

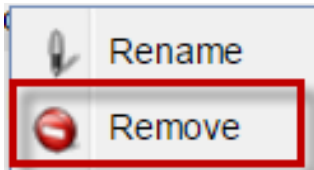
*Note: The default name for a new door is "My Door." You can rename the door by left-clicking on it twice (first to select the door and second to rename it) or by right-clicking and selecting the Rename option.*

---

## Deleting a Door

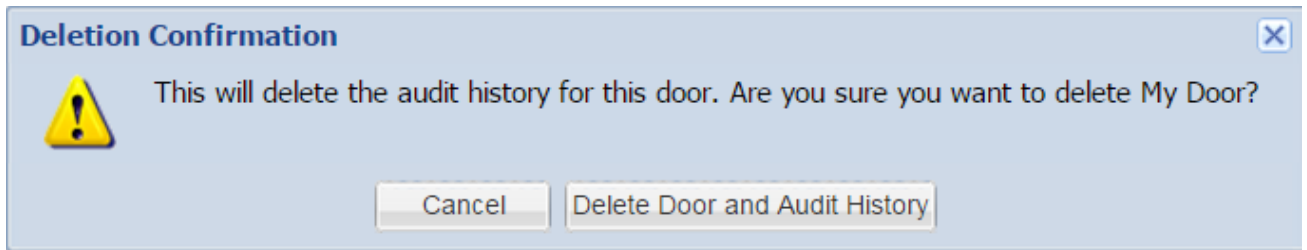
Users with the Operator role and above can delete doors in the EDM via the Data Centers tab.

1. Right-click the door in the EDM hierarchy in Power IQ and select the Remove option.



Alternatively, highlight the door you want to remove and click the Remove icon in the EDM menu.

2. You will be asked to confirm the deletion.



---

*Note: Deleting a door will delete the door and the audit history for the door.*

---

3. Click the Delete Door and Audit History button to delete the door. To cancel out of the dialog, click the Cancel button.

Once the deletion is confirmed, the EDM will automatically refresh, and the door will be removed.

## Configuring a Door

Once added, the door can be edited or configured by users with the appropriate permissions.

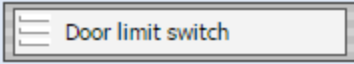

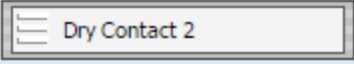
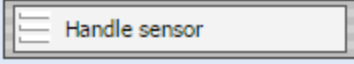

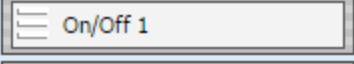
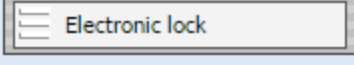

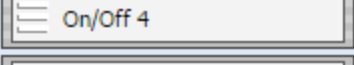
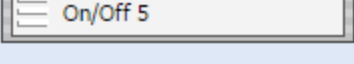
Click on the door in the EDM to view the door smart page and edit its details.



## Rack 1A Front Door

**Door Control**

**Sensors and Door Status**

Sensor Mappings		Available Sensors	
		Status	PDU
Door		 Closed	 <a href="http://192.168.43.63">192.168.43.63</a>
Handle		 Closed	 <a href="http://192.168.43.63">192.168.43.63</a>
Lock		 Locked	 <a href="http://192.168.43.63">192.168.43.63</a>
			 <a href="http://192.168.43.63">192.168.43.63</a>

**Door**

Name:

External Key:


An external key is a unique identifier of this object that is used when importing and exporting enterprise relationships through a CSV file.

Override Relock Timer:  seconds. 0 is disabled.  
Default: 120 seconds

Placement:  [Manage door placements](#)

1. In the Door Control section, select the Lock or Unlock button to request the door be locked or unlocked.
2. In the Sensors and Door Status section, drag-and-drop sensors to map/unmap them to the door components: door, handle, and electronic lock.
  - a. Available sensors are located in the Available Sensors panel on the right.
  - b. To replace a mapped sensor, drag the available replacement sensor to the mapped sensor you want to replace.



- c. To unmap a sensor, click the Unmap icon () to the right of the sensor. The unmapped sensor will be listed in the Available Sensors panel. If there is no sensor to be removed, the icon will be grayed out.
    - d. Only one sensor at a time can be mapped to each door component. Contact closure sensors can be mapped to door or handle components only. Powered dry contact sensors can be mapped to electronic lock components only.
3. In the Door section, change the name, external key, and placement of the door.
  - a. The external key is a unique attribute that is used to identify the door when importing and exporting enterprise relationships through a CSV file.
  - b. The placement of the door is an optional field. Placement is defined using tags for the Door Placements tag group. For more information on editing tags for this group, see *Setting Door Placement with Tags and Tag Groups* on the facing page.
4. Click the Save button to save your changes.

---

*Note: Doors and sensor mappings also can be added, edited, and deleted via CSV import/export in bulk. For more information, see *Bulk Configuring Doors Using CSV*.*

---

For more information on the details available on the door smart page, see *Door Smart Page* on page 544.

## Bulk Configuring Doors Using CSV

Users with the appropriate permissions can add, edit, and delete doors and sensor mappings via CSV import/export.

1. In the Data Centers tab, click the Import/Export button on the EDM menu to go to the Enterprise Relationships page. Alternatively, go to Settings > Data Management > Enterprise Relationships.
2. Export the existing EDM relationships to CSV by clicking the Export Relationships link in the CSV Data Mapping Actions section. The resulting CSV file will include all doors and their associated sensors.
3. To map a door to its parent, add or edit the attributes in the following door columns in the CSV file:
  - a. parent\_object\_type (required)
  - b. parent\_external\_key (required)
  - c. override\_relock\_timer (optional; configure to enable/disable the override relock timer on the door)
  - d. object\_type
  - e. external\_key
  - f. name
4. To map a sensor to a door, add or edit the attributes in the following door columns in the CSV file.
  - a. parent\_object\_type (required; specify as DOOR)
  - b. parent\_external\_key (required)
  - c. door\_component (required; specify as DOOR, HANDLE, ELECTRONIC\_LOCK/ELECTRONIC LOCK/ELECTRONIC-LOCK)
  - d. object\_type
  - e. pdu\_ip
  - f. pdu\_proxy\_address
  - g. type
  - h. ordinal
5. Import your edited CSV file.



---

*Note: Attempting an import without the required fields completed will display an error.*

---

*Note: Contact closure sensors can be mapped to door or handle components only. Powered dry contact sensors can be mapped to electronic lock components only. An error will be displayed on import if you attempt to map sensors to incompatible components.*

---

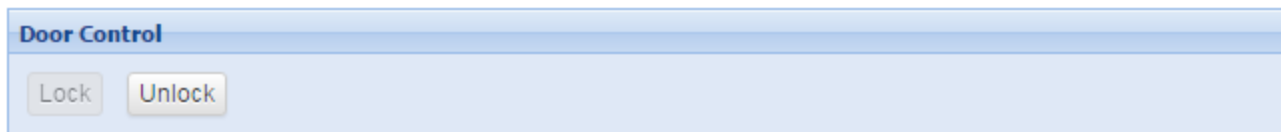
## Locking, Unlocking, and Automatic Relocking of Doors

Users with the Door Control role can lock/unlock a door from the door smart page.

In the Door Control section, select the Lock or Unlock button to request the door be locked or unlocked. The button aligning to the door's current state (Locked or Unlocked) will be grayed out.

In the screenshot below, the door is locked. The user can request to unlock the door by clicking the Unlock button.

### Rack 1A Front Door



Unlocked doors will be automatically scheduled to relock based on either the global door relock timer value or the override relock timer value on the individual door if configured. If both the global door relock timer and the local override relock timer on the door are disabled, Power IQ will not attempt to relock the door. For more information, see *Enabling/Disabling the Global Door Relock Timer* on the next page and *Enabling/Disabling the Door Override Relock Timer* on page 553.

When a relock attempt is successful, the door will be locked, and an event indicating relock success via the relock timer will be created in Power IQ.

When a relock attempt is unsuccessful, the door will remain unlocked, and an event indicating the relock failure will be created in Power IQ. Power IQ will attempt to relock the door every 60 seconds afterward for up to 20 retries or until the attempt is successful.

For more information, see *Door Smart Page* on page 544.

## Setting Door Placement with Tags and Tag Groups

Placement is an optional dropdown field in the Door section of the door smart page. On the door smart page, select the appropriate dropdown option to set the door placement.

Placement is defined using tags from the Door Placements tag group.

Users with the Manage Tag Groups role or Site Administrator role will see a Manage Door Placements link to the right of the Placement drop-down menu on the door smart page. Clicking on the link will direct the user to the Manage Tags and Tag Groups page.

**Door**

Name:

External Key:

An external key is a unique identifier of this object that is used when importing and exporting enterprise relationships through a CSV file.

Placement:  [Manage door placements](#)

By default, in Power IQ 5.2 and above, there is a Door Placements tag group containing Front and Back tags.

Tag Group: Door Placements	
<input type="checkbox"/> Back	1
<input type="checkbox"/> Front	1

Users can add tags to this tag group to define placement. For more information, see *Adding Tag Groups and Tags* on page 636.

Tags also can be added via CSV import.

*Note: Only add one Door Placement tag for each door. If you add multiple Door Placement tags, only the oldest tag (the tag added earliest) will be displayed on the door smart page and will be used to determine door placement.*

## Enabling/Disabling the Global Door Relock Timer

The global door relock timer is an optional setting that allows you to set a default duration before unlocked doors are automatically relocked. As a global setting, the door relock timer affects all doors in Power IQ.

Only users with the Site Administrator role can enable/disable the global door relock timer.

The global door relock timer is set in seconds. It can be disabled by setting the value to 0. In the example screenshot below, the relock timer is set for 120 seconds.

**Door Settings**

Relock timer (in seconds) "0" for disabled:

1. In the Settings tab, click Power IQ Settings (in the Appliance Administration section).
2. Under Door Settings, set the relock timer value in seconds.





3. Click the Save Relock Timer Setting button to save your changes.

*Note: This global setting can be overridden locally when the override relock timer is enabled on an individual door. For more information, see [Enabling/Disabling the Door Override Relock Timer](#) below.*

## Enabling/Disabling the Door Override Relock Timer

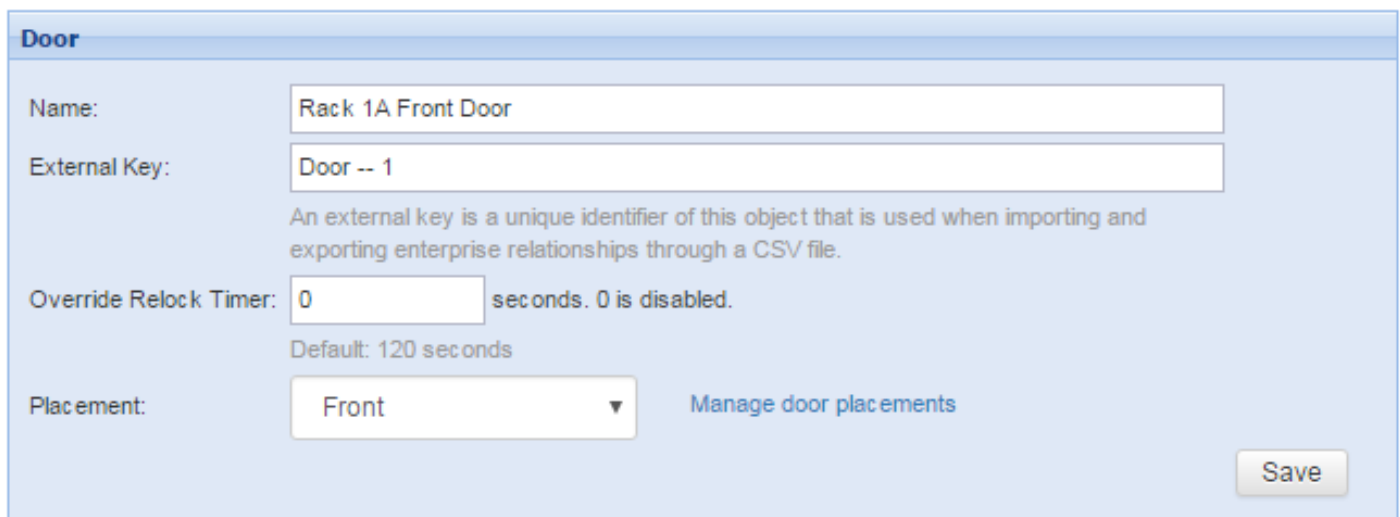
The override relock timer is an optional setting on each individual door that allows you to override the global door relock timer on the individual doors that they have access to. If this option is disabled, the door will automatically relock based on the global door relock timer value, which is displayed in seconds for convenience below the Override Relock Timer field. For more information, see [Enabling/Disabling the Global Door Relock Timer](#) on the previous page.

*Note: If the global door relock timer is set to 0, the default value under the Override Relock Timer field will display as disabled.*

The override relock timer value can also be set via CSV import. For more information, see [Bulk Configuring Doors Using CSV](#) on page 550.

Only users with the Operator role or above can configure the door override relock timer.

The override relock timer is set in seconds. It can be disabled by setting the value to 0. In the example screenshot below, the override relock timer is disabled, and the global door relock timer value is set to 120 seconds.



The screenshot shows a configuration form for a door. The form has a blue header with the word "Door". Below the header, there are several fields: "Name:" with the value "Rack 1A Front Door"; "External Key:" with the value "Door -- 1"; "Override Relock Timer:" with a text input field containing "0" and the text "seconds. 0 is disabled." below it; and "Placement:" with a dropdown menu showing "Front" and a "Manage door placements" link. A "Save" button is located at the bottom right of the form. A note below the External Key field states: "An external key is a unique identifier of this object that is used when importing and exporting enterprise relationships through a CSV file."

1. In the Data Centers tab, click the door you want to edit to display its smart page.
2. On the door smart page, in the Door section, set the override relock timer value.
  - a. The override relock timer value must be set in seconds. For example, a desired value of two minutes should be set as 120 seconds (1 minute = 60 seconds).
  - b. To disable the override relock timer, set the value to 0.
3. Click the Save button to save your changes.

## Card Reader Access Support

Power IQ 6.0 and above support electronic access control via cards and card readers.

Card readers are added to Power IQ via discovery. Upon polling, discoverable card readers that are attached to supported devices are added to the Power IQ database.

Once in the system, card readers can be associated with doors. For more information, see *Adding and Removing Card Readers from the Door Smart Page* on page 558.

Card readers can be decommissioned and recommissioned by 1) decommissioning or recommissioning the facility item where the card reader is attached respectively, or 2) unplugging the card reader from the facility item. For more information, see *Decommissioning and Recommissioning Card Readers* on page 561.

The card reader smart page provides information on a reader's name, manufacturer, serial number, doors it is associated with, and permissions. For more information, see *Card Reader Smart Page* on page 556.

Cards can be assigned to users in the Card Access Control panel, which lists card assignment details, including the card number, status, first and last name, user login, and user email. Users with the Site Administrator role and above have permissions to create, deactivate, and reactivate cards and to edit card assignments. For more information, see *Creating, Activating, Deactivating, and Assigning Cards* on page 562.



## Adding Card Readers in Power IQ

Card readers are added to Power IQ via discovery. Upon polling, discoverable card readers that are attached to supported devices are added to the Power IQ database. If there are multiple card readers attached for each front and back door, both card readers will be found by Power IQ.

The default card name assigned is the card serial number.

Once in the system, card readers can be associated with doors. For more information, see *Adding and Removing Card Readers from the Door Smart Page* on page 558.

---

*Note: When a card reader is associated to a facility item, PIQ will automatically associate it with the facility item's parent in the EDM hierarchy.*

---



## Card Reader Smart Page

The card reader smart page provides information on a reader's name, manufacturer, serial number, doors it is associated with, and permissions.

Users with the Operator role and above on the card reader have permissions to edit the smart page. Users with the View role on the card reader have permissions to see a read-only view of the card reader smart page.

Click on the card reader EDM node to view the smart page. Card readers can be placed under any of the following in the EDM hierarchy: data center, floor, room, aisle, row, or rack. Card readers cannot be placed under a door.

### Card Reader - 40004403

**Card Reader**

Name:

Manufacturer: Baltech

Product: ID-engine

Serial Number: 40004403

PDU: [192.168.46.214](#)

**Doors**

Name	Enclosure	Placement
<a href="#">Front Door</a>	A6	Front

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**Permissions**

Name	Label	Source
Site Administrator	Power IQ system settings and administrator for all PDUs, device...	<a href="#">User: admin</a>
Site Administrator	Power IQ system settings and administrator for all PDUs, device...	<a href="#">Group: Site Administrat...</a>
View Tag Groups	View tags and tag groups.	<a href="#">Group: All Users</a>
View	View all PDUs, devices, etc. Read-only.	<a href="#">Group: All Users</a>

Page 1 of 1 |  | Displaying 1 - 4 of 4

A card reader smart page includes the following sections.

## Card Reader

This panel provides information to identify the card reader, including its name, manufacturer, serial number, and associated PDU or facility item.

Power IQ assigns a default name when the card reader is added to the database. Only the Name field can be edited by users with the appropriate permissions. The manufacturer, serial number, and PDU/Facility Item fields cannot be edited.

## Doors

This panel lists the doors associated with the card reader. You will only see doors for which you have the View role or above. The name or IP address of each door links to its smart page.

## Permissions

This panel lists the roles and permissions for the card reader. Users with the appropriate permissions are able to add or remove roles.

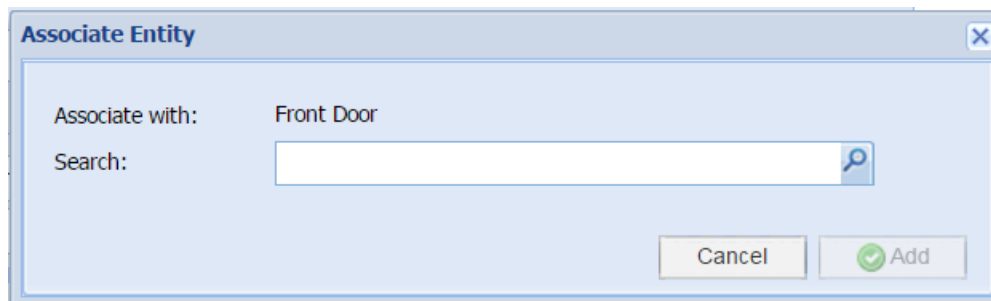


## Adding and Removing Card Readers from the Door Smart Page

Users with the Operator role and above on a door can add or remove readers from the door smart page. The reader must already be in your Power IQ system to be added to the door. You can add one card reader at a time.

### Adding a Card Reader from the Card Readers Panel

1. In the Card Readers panel, click the Add button.
2. In the Associate Entity panel, search for the card reader. The readers attached to the door's parent object in the EDM will be displayed at the top of the search results. The list shall show the card reader name and the facility item label. The facility item label will display either the name of the facility item or its IP address, based on your Power IQ settings.
3. Select the desired card reader.
4. Click the Add button to add the card reader. Click the Cancel button to close the dialog box.



Associate Entity

Associate with: Front Door

Search:

Cancel Add

### Removing a Card Reader from the Card Readers Panel

1. In the Card Readers panel, select the card reader that you want to remove.
2. Click the Remove button.

## Renaming and Removing Card Readers from the EDM Hierarchy

Card readers can be renamed and removed from the EDM in Power IQ.

### Renaming a Card Reader

1. In the Data Centers tab, in the EDM, select the node of the card reader you want
2. Right-click to display the Rename or Remove buttons
3. Click the Rename button
4. Rename the card reader
5. The EDM will display the card reader node with the new name

Removing a card reader disassociates the card reader from the parent node. The card reader will no longer be visible in the EDM; however, the card reader will still be available in the system, and no data will be deleted.

### Removing a Card Reader


1. In the Data Centers tab, in the EDM, select the node of the card reader you want
2. Right-click to display the Rename or Remove buttons
3. Click the Remove button
4. In the Warning dialog, confirm that you want to remove the card reader.
5. The EDM will refresh with the card reader removed

---

*Note: Like a sensor node, if a card reader node is removed from the EDM, it will be “refound” within five minutes and will be placed under the same parent node as the facility item it is attached to.*

---










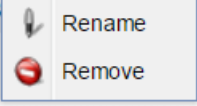









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[Dashboards](#) | **Data Centers** | [Events](#) | [Facility Items](#)

**Data Centers**

[Add](#) [Remove](#) [Refresh](#) [Import/Export](#)

-   Raleigh
  -   POD1
    -   A6
      -  192.168.46.214
      -  Back Door
      -  Card Reader - 40004403 
        -  Rename
        -  Remove
      -  Dry Contact 1
      -  Dry Contact 2
      -   Front Door
      -  On/Off 1



## Decommissioning and Recommissioning Card Readers

Card readers can be decommissioned and recommissioned by 1) decommissioning or recommissioning the facility item where the card reader is attached respectively, or 2) unplugging the card reader from the facility item.

---

*Note: A decommissioned card reader will be identified with “(Decommissioned)” at the end of its name in the door smart page, EDM hierarchy, and card reader smart page.*

---

If you decommission a facility item with an attached card reader, the card reader will also be decommissioned. If you recommission a facility item with an attached card reader, that the card reader will also be recommissioned.

---

*Note: If a facility item with an attached card reader is set to maintenance mode, Power IQ to continue to process card reader events. For more information on facility item maintenance, see [Maintenance Mode on page 778](#).*

---

If a card reader is unplugged from a facility item, when that facility item is polled, the card reader will be decommissioned. If a card reader is removed from one facility item and added to another, the card reader will be added or recommissioned (if it had been previously attached to the new card reader) on the next polling cycle.



## Creating, Activating, Deactivating, and Assigning Cards

Users with the Site Administrator role and above have permissions to create, deactivate, and reactivate cards and to edit card assignments. Any updates made to card assignments, including when cards are created, activated, and deactivated, will create entries in the Power IQ audit log.

Cards can be assigned to users in the Card Access Control panel, which lists card assignment details, including the card number, status, first and last name, user login, and user email. Select a card to activate, deactivate, or edit its assignment.

Card Access Control						
Add   Deactivate   Activate   Edit Assignment						
	Card Number	Card Status	First Name	Last Name	User Login	User Email
<input type="checkbox"/>	9BB6BA72	Active	John	Authorized	AuthUser	john@sunbird...
<input type="checkbox"/>	EBB9BF72	Active	Mike	NotAuthorized	NoAuthUser	nogo@sunbird...

Page 1 of 1 | Displaying 1 - 2 of 2

Users can be assigned multiple cards. To assign a user to a newly created card, first create the card, and then edit its assignment.

---

*Note: To unlock a door, the user must have the Door Control role for the specified door.*

---

*Note: For auditing purposes, Power IQ does not allow a user to delete a card from the system. Users with the appropriate permissions can, however, deactivate a card or change who is assigned it. Power IQ tracks the history of who was assigned to each card for the purposes of generating the door security audit report and to show accurate information when viewing an event.*

---

## Creating a New Card

1. Go to Settings > Authorization and Authentication > Card Access Control
2. In the Card Access Control panel, click the Add link
3. In the Add New Card panel, add the card number
4. Click the Add button

## Deactivating a Card

1. Go to Settings > Authorization and Authentication > Card Access Control
2. In the Card Access Control panel, select the cards that you want to deactivate.
3. Click the Deactivate link to make the card inactive.

## Activating a Card

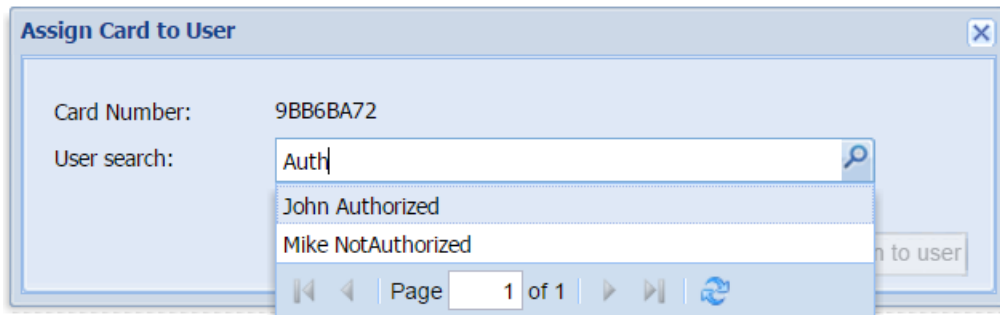
1. Go to Settings > Authorization and Authentication > Card Access Control
2. In the Card Access Control panel, select the cards that you want to activate.



3. Click the Activate link to activate the card.

## Editing a Card's Assignment

1. Go to Settings > Authorization and Authentication > Card Access Control
2. In the Card Access Control panel, select the card whose assignment you want to edit. Note: You can only edit one card assignment at a time.
3. In the Assign Card to User dialog, search for and select the user you want to assign the card to.
4. Click the Assign to User button.



The image shows a dialog box titled "Assign Card to User". It contains the following fields and elements:

- Card Number:** 9BB6BA72
- User search:** A text input field containing "Auth" with a search icon to its right.
- Search Results:** A list box showing two entries: "John Authorized" and "Mike NotAuthorized".
- Page Navigation:** A footer area with navigation icons and the text "Page 1 of 1".
- Buttons:** A "Assign to user" button is partially visible on the right side of the dialog.

## Card Reader Events and Audit Log Entries

Power IQ tracks the history of who was assigned to each card for the purposes of generating the door security audit report and to show accurate information when viewing an event and in the audit log.

Power IQ processes events from the facility item that has a card reader to determine when access has been authorized via the card reader.

All events for successful card access authorizations have a severity of Informational. All events for failed card access authorizations have a severity of Warning.

When a card reader event is processed:

- The door security audit report will display the user, the requested action, and a summary of the request. For more information on the door security audit report, see *Creating a Door Security Audit Report* on page 621.
- A date- and time-stamped event is created with the event name, severity, target (the card reader), and a summary of the event.
- A date- and time-stamped entry is created in the audit log with a message indicating whether the attempt was successful, the card reader name, card number, user (if applicable) and reason the authorization attempt succeeded or failed.

Additionally, users with the appropriate permissions will see entries in Power IQ's audit log for each time they:

- Create a card
- Deactivate a card
- Activate a card
- Assign a card to a user
- Update a card assignment

The table below summarizes card reader events and audit log entries in Power IQ.

Description	Event Name	Event Summary	Audit Log Message
Card number is valid, but the card either isn't associated to a user or is deactivated.	Card reader authorization failed	A failed card authorization attempt was made at reader <reader_name>. Reason: Card is either deactivated or not associated with a user.	Power IQ: Failed card authorization attempt <attempt_id> at reader <reader_name> using card number <card_number>. Card is either deactivated or not associated with a user.
Card number is associated to an active user, but that user does not have Door Control permissions to any of the doors associated to the card reader. This also applies when no	Card reader authorization failed	A failed card authorization attempt was made at reader <reader_name>. Reason: User <user>	Power IQ: Failed card authorization attempt <attempt_id> at reader <reader_name> using card number <card_number>. User <user_name > is not author-



Description	Event Name	Event Summary	Audit Log Message
doors are associated to the card reader.		is not authorized.	ized.
Card number is associated to an active user and that user has Door Control permissions to one or more of the doors associated to the card reader.	Card reader authorization succeeded	A successful card authorization attempt was made by user <user> at card reader <reader_name>.	Power IQ: Successful card authorization attempt <attempt_id> at reader <reader_name> using card number <card_number>. User <user_name > has access to <authorized_doors> of <controlled_doors> doors.

---

*Note: There are no automatic clearing events.*

---



## Bulk Card Reader Configuration via CSV

Users with the appropriate permissions can configure card readers via CSV import/export.

1. In the Data Centers tab, click the Import/Export button on the EDM menu to go to the Enterprise Relationships page. Alternatively, go to Settings > Data Management > Enterprise Relationships.
2. Export the existing EDM relationships to CSV by clicking the Export Relationships link in the CSV Data Mapping Actions section.

---

*Note: You must have an EDM in your Power IQ to export existing EDM relationships via CSV. For more information, see [Creating Your EDM on page 410](#).*

---

3. Use the CSV file to configure card readers.
4. Import your edited CSV file back into Power IQ.

## Mapping a Card Reader to Its Parent

To map a card reader to its parent, add or edit the following attributes in the card reader columns in the CSV file (specifying parent\_object\_type and parent\_external\_key will map a card reader to its parent):

1. object\_type (required; specify as CARD\_READER)
2. pdu\_ip (required)
3. pdu\_proxy\_address
4. serial\_number (required)
5. parent\_object\_type (required)
6. parent\_external\_key (required)

## Mapping a Card Reader to a Door

To map a card reader to a door, add or edit the following attributes in the CSV file (specifying these attributes and door\_external\_key will associate the door with the card reader):

- object\_type (required; specify as DOOR\_CARD\_READER\_MAPPING)
- pdu\_ip (required)
- pdu\_proxy\_address
- serial\_number (required)
- door\_external\_key (required)

---

*Note: Attempting an import without the required fields completed will result in an error.*

---

## Electronic Access Control for CPI Doors and Locks

Power IQ 5.2.2 and above provide centralized cabinet-level Electronic Access Control (EAC) for doors and electronic locks connected to supported Chatsworth Products, Inc. (CPI) PDUs, including eConnect Monitored, Monitored Pro, Switched,



and Switched Pro PDUs.

When you associate a supported CPI PDU that has door sensors in the Power IQ EDM (data model), doors and door sensor mappings are automatically created. For more information, see *Autoconfiguration of CPI Doors and Door Mappings* below.

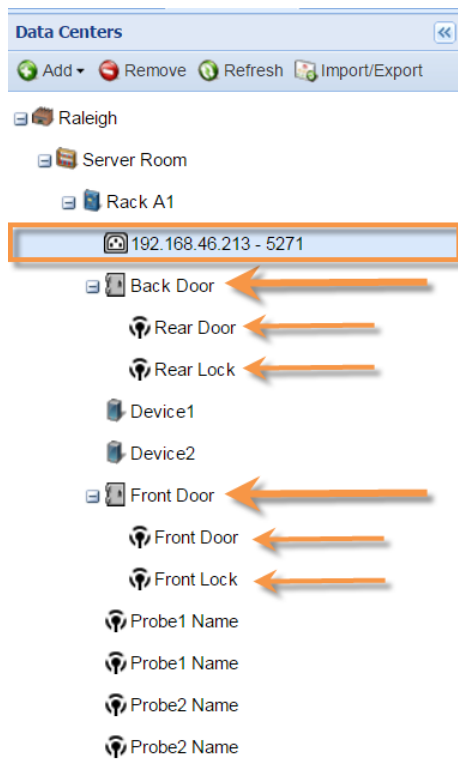
After a door is created or identified, the sensors will be mapped to it. Contact closure sensors are mapped to the door component. Powered dry contact closures are mapped to the electronic lock component. For more information, see *Supported CPI Door and Electronic Lock Sensor Statuses* on the next page.

CPI doors can only be unlocked, not locked or relocked, through Power IQ. For more information, see *Unlocking CPI Doors* on the next page.

## Autoconfiguration of CPI Doors and Door Mappings

When you associate a supported CPI PDU that has door sensors in the Power IQ EDM (data model), doors and door mappings are automatically created. Tags for door placement also are applied as appropriate to the created doors.

Doors are created as siblings to the PDU in the EDM. Doors are tagged for the door placement as either Front for the front door or as Back for the rear door. Contact closure door status sensors and powered dry contact closure electronic lock sensors are created for each door attached to the PDU. For more information, see *Supported CPI Door and Electronic Lock Sensor Statuses* on the next page.



A door named Front Door is created if either a front contact closure or powered dry contact closure exists. If a front door already exists, that door will be tagged with a Front tag, and no new door will be created. Similarly, a door named Back



Door will be created if either a rear contact closure or powered dry contact closure exists. If a rear door already exists, that door will be tagged with a Back tag, and no new door will be created.

*Note: Front and Back tags will be created if the tags do not already exist. For more information on door placement, see [Setting Door Placement with Tags and Tag Groups](#) on page 551.*

## Supported CPI Door and Electronic Lock Sensor Statuses

After a CPI door is created or identified, the sensors will be automatically mapped to it. Contact closure sensors are mapped to the door component. Powered dry contact closures are mapped to the electronic lock component. Door and electronic lock sensors and their statuses can be viewed on the Door smart page > Sensors and Door Status > Sensor Mappings section.

### Front Door

**Door Control**

**Sensors and Door Status**

**Sensor Mappings**

		Status
Door	<input type="text" value="Front Door"/>	Closed
Handle	<input type="text" value=""/>	
Lock	<input type="text" value="Front Lock"/>	Locked

**Available Sensors**

	PDU

Supported contact closure door sensor statuses include:

- Open
- Closed
- N/A

Supported powered dry contact closure electronic lock sensor statuses include:

- On
- Off
- N/A

*Note: Door handle sensors are not supported in 5.2.2.*

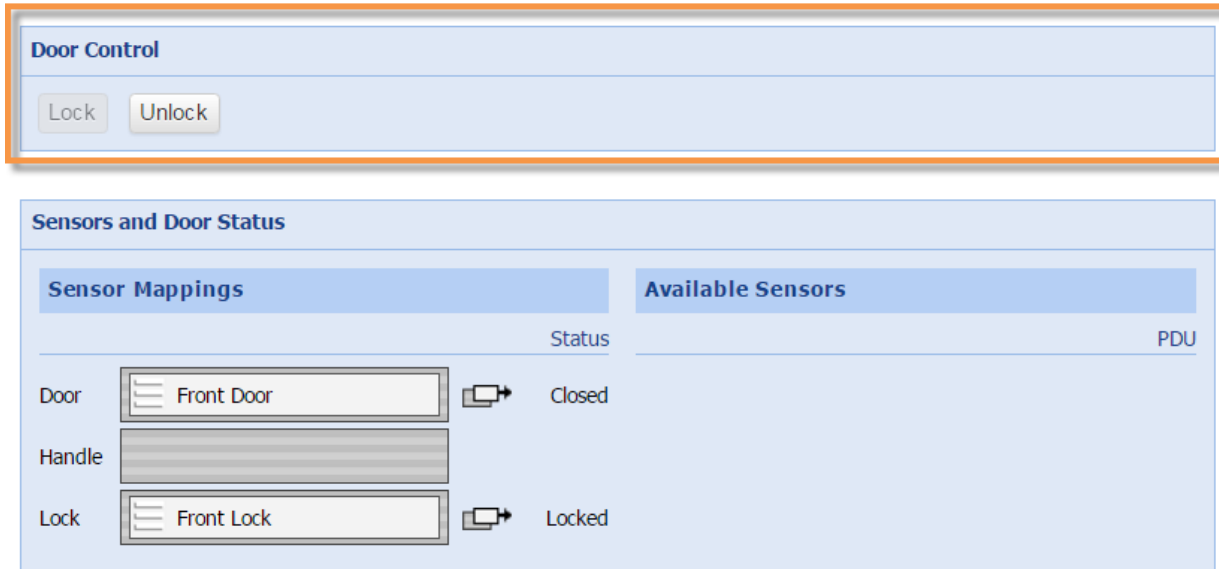
## Unlocking CPI Doors



568



Door control for CPI doors allows only unlocking through Power IQ. To unlock a locked CPI door, click the Unlock button on the door's smart page. If the door is already unlocked, the Unlock button will be disabled.

## Front Door



Sensor Mappings		Available Sensors	
		Status	PDU
Door	Front Door	 Closed	
Handle			
Lock	Front Lock	 Locked	

CPI doors currently do not support locking/relocking through Power IQ.

The global door relock timer and override relock timer are ignored for CPI doors. If a door is unlocked through Power IQ, Power IQ will not attempt to relock the door.

If you attempt to lock a CPI door through Power IQ, a failure message will be displayed.

---

*Note: CPI doors can be set to automatically lock/relock after a user-configured timeout has elapsed through the CPI interface.*

---

## Raritan Electronic Door Locks

Power IQ version 8.0.0 and beyond provides the following enhanced support for Raritan Electronic Door Locks running Raritan's Xerus Firmware v3.6.10 or higher.

This includes support for:

- a. Authorization via keypad connected to a Raritan Facility Item (RFI)
- b. A new Authorization Method that supports authorization at the RFI that is independent of the network availability resulting in a quicker response. The remote authorization via Power IQ is still an option that can be set by the admin. The admin should select one mode of operation.
- c. Authorization rules configured in Power IQ and pushed to the RFIs upon configuration or change.
- d. Automatic push of LDAP and AD changes to the RFIs.

## Requirements to setup to push rules.

### Facility Item

- firmware 3.6.10.5-46551 or newer
- configured to send traps to Power IQ (PIQ)
- door hardware attached

### PIQ

- PIQ configured for Facility Item door authorization
- Door EDM Node
- Door Handle Lock of Facility Item mapped to PIQ Door Lock component
- Card Reader associated to Door (for card auth)
- Keypad associated to Door (for keypad auth)
- User with Key Card (active card assignment)
- User with PIN
- User has Door Control role for door
- User has an access schedule (there is a default schedule to allow all users)

### What pushes rules:

#### Daily Cron Task

- daily Cron task 01:05

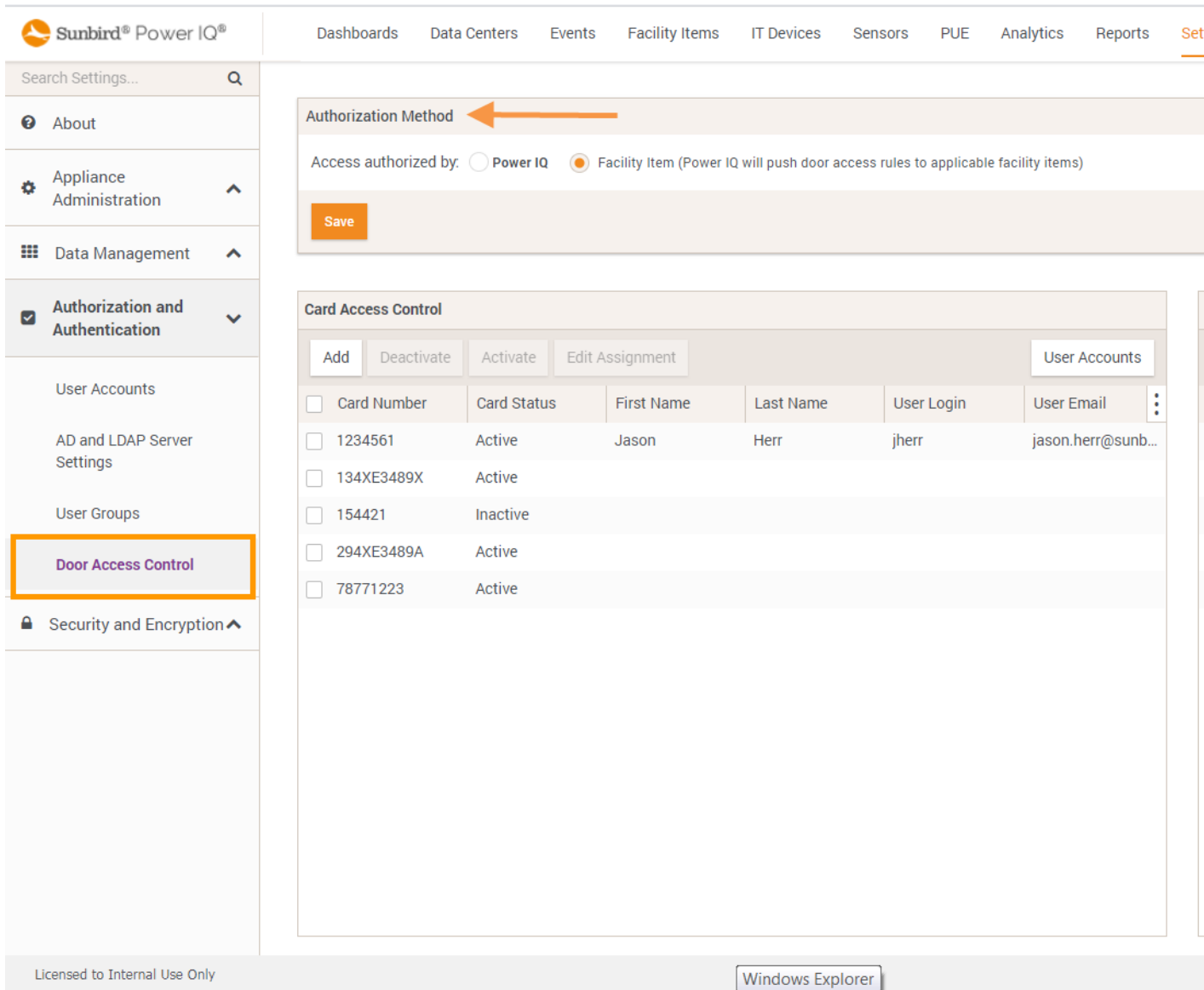
PIQ will send door rules on-demand. Update when any of the following conditions are met:

- The user enables PDU-based authentication
- The PIN is edited, added, or removed from a user(s)
- A keypad to door mapping or card to door mapping is removed or added
- Access scheduling gets modified
- Door control role added or removed from user
- Card is assigned, deactivated or reassigned to user



## Setting the Door Access Control Authorization Method

1. Navigate to Settings >Authorization and Authentication > Door Access Control



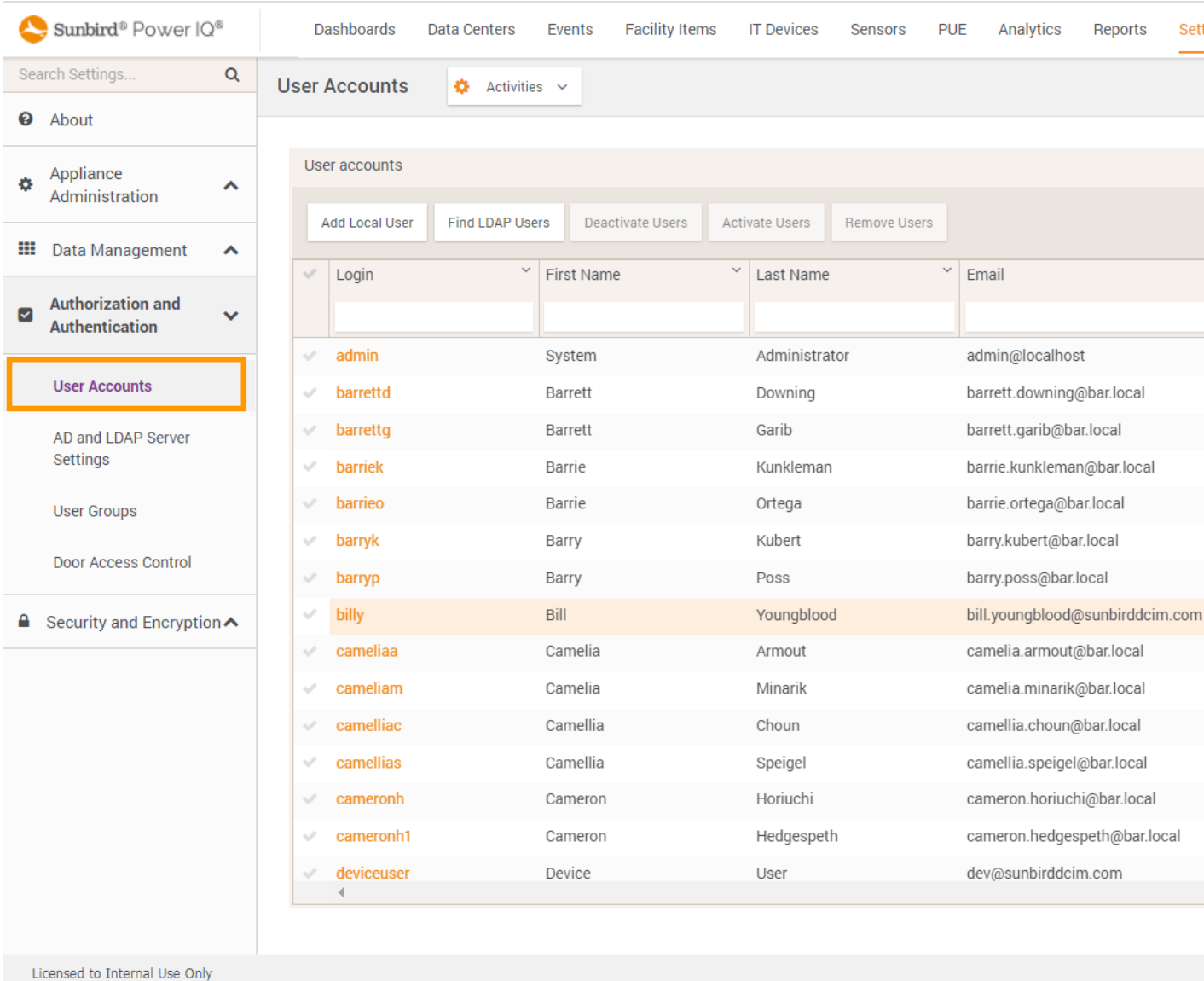
The screenshot shows the Sunbird Power IQ settings interface. The left sidebar contains a navigation menu with the following items: About, Appliance Administration, Data Management, Authorization and Authentication (selected), User Accounts, AD and LDAP Server Settings, User Groups, Door Access Control (highlighted with an orange box), and Security and Encryption. The main content area is titled "Sunbird® Power IQ®" and includes a search bar and a top navigation bar with links for Dashboards, Data Centers, Events, Facility Items, IT Devices, Sensors, PUE, Analytics, Reports, and Settings. The "Authorization Method" section is highlighted with an orange arrow and contains two radio buttons: "Power IQ" (unselected) and "Facility Item (Power IQ will push door access rules to applicable facility items)" (selected). A "Save" button is located below the radio buttons. The "Card Access Control" section is also visible, featuring a table with columns for Card Number, Card Status, First Name, Last Name, User Login, and User Email. The table contains five rows of data, with the first row showing a card number 1234561, status Active, first name Jason, last name Herr, user login jherr, and user email jason.herr@sunb....

Card Number	Card Status	First Name	Last Name	User Login	User Email
1234561	Active	Jason	Herr	jherr	jason.herr@sunb...
134XE3489X	Active				
154421	Inactive				
294XE3489A	Active				
78771223	Active				

2. In the Authorization Method panel, select the appropriate radio button to enable authorization via either Power IQ or the Facility Item (RFI)

# Set or Change the Keypad PIN Code and Assign Keypad PIN Role to Users

1. Navigate to Settings > Authorization and Authentication > User Accounts
2. Select a User by clicking the hyperlink in the list.



The screenshot shows the Sunbird Power IQ interface. The left sidebar is expanded to 'Authorization and Authentication', with 'User Accounts' highlighted. The main content area shows a table of user accounts. The 'billy' user is selected, highlighted in orange. The table has columns for Login, First Name, Last Name, and Email.

✓	Login	First Name	Last Name	Email
✓	admin	System	Administrator	admin@localhost
✓	barrettd	Barrett	Downing	barrett.downing@bar.local
✓	barrettg	Barrett	Garib	barrett.garib@bar.local
✓	barriek	Barrie	Kunkleman	barrie.kunkleman@bar.local
✓	barrieo	Barrie	Ortega	barrie.ortega@bar.local
✓	barryk	Barry	Kubert	barry.kubert@bar.local
✓	barryp	Barry	Poss	barry.poss@bar.local
✓	billy	Bill	Youngblood	bill.youngblood@sunbirdcim.com
✓	cameliaa	Camelia	Armout	camelia.armout@bar.local
✓	cameliam	Camelia	Minarik	camelia.minarik@bar.local
✓	camelliac	Camellia	Choun	camellia.choun@bar.local
✓	camellias	Camellia	Speigel	camellia.speigel@bar.local
✓	cameronh	Cameron	Horiuchi	cameron.horiuchi@bar.local
✓	cameronh1	Cameron	Hedgespeth	cameron.hedgespeth@bar.local
✓	deviceuser	Device	User	dev@sunbirdcim.com

3. Click the "Add Keypad PIN" to set the code (this button is labeled "Change Keypad PIN" when a code was previously set).
4. In the Authorization Keypad PIN codes are associated with a User. The admin can set or change the Keypad PIN code for all users.



**Sunbird® Power IQ®**   Dashboards   Data Centers   Events   Facility Items   IT Devices   Sensors   PUE   Analytics   Reports   Settings

Search Settings...

- About
- Appliance Administration
- Data Management
- Authorization and Authentication**
  - User Accounts**
    - AD and LDAP Server Settings
    - User Groups
    - Door Access Control
  - Security and Encryption

**Details for Bill Youngblood**   Activities

**User Information for billy**

Login: billy  
 First Name: Bill  
 Last Name: Youngblood  
 Email: bill.youngblood@sunbirdcim.com  
 Created: 08/13/20 11:28:04 AM EDT  
 Last Updated: 08/13/20 11:34:45 AM EDT  
 Description: pw Qwerty1234\$

**User Roles**

Select a role to add...

Name	Label	Source
<input type="checkbox"/> Door Control	Lock or unlock doors.	User: billy
<input type="checkbox"/> View	View all PDUs, devices, etc. Read-only.	User: billy
<input type="checkbox"/> View Tag Groups	View tags and tag groups.	User: billy

Page 1 of 1   Displaying 1 - 3 of 3

**User Groups**

Select a group to add...

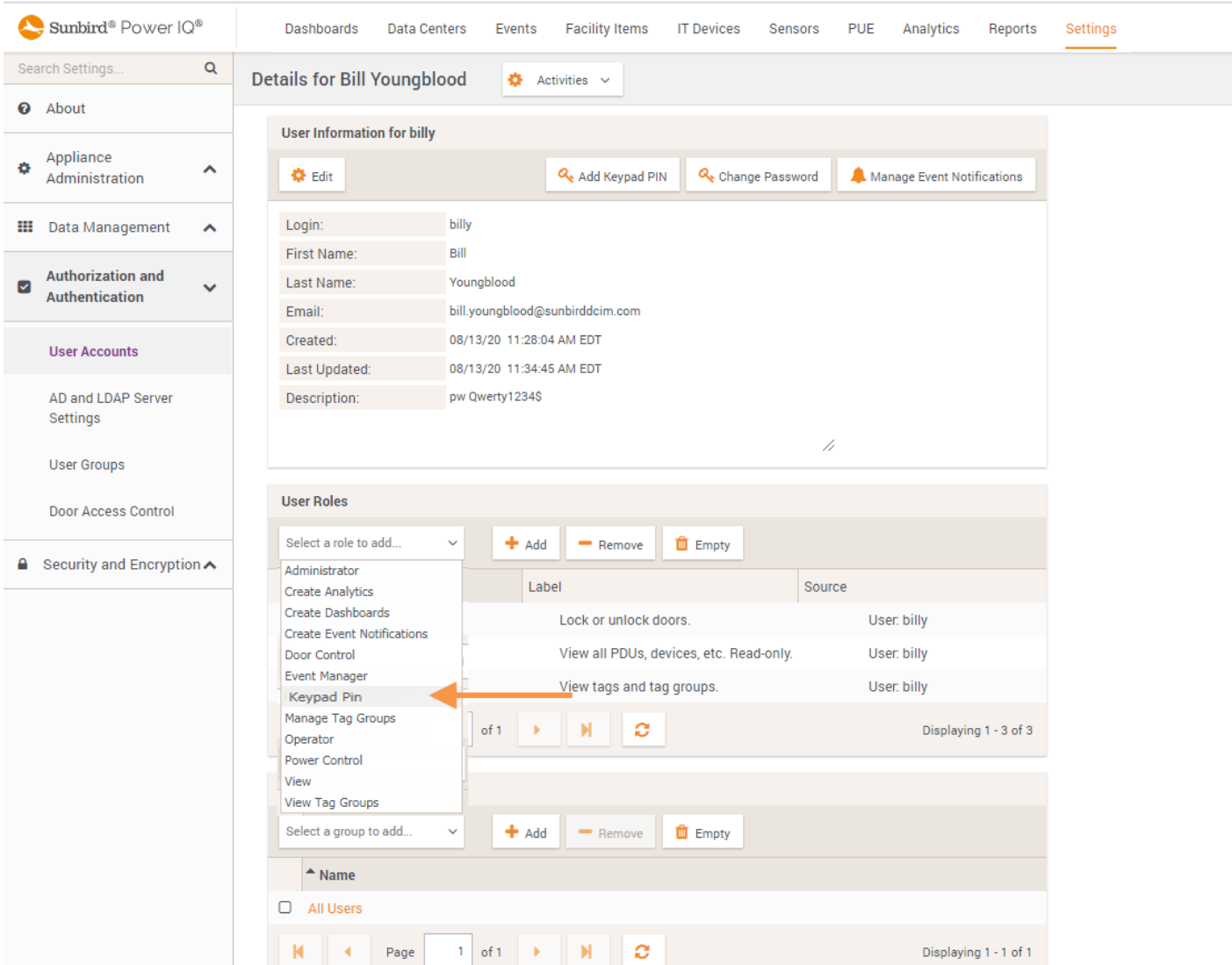
Name
<input type="checkbox"/> All Users

Page 1 of 1   Displaying 1 - 1 of 1

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- To allow individual users to manage their own Keypad PIN codes, assign the Keypad PIN role from the User Roles panel. See [Assigning Roles for User Permissions](#).





**Sunbird® Power IQ®**   Dashboards   Data Centers   Events   Facility Items   IT Devices   Sensors   PUE   Analytics   Reports   Settings

Search Settings...

**Details for Bill Youngblood**   Activities

**User Information for billy**

Login: billy  
 First Name: Bill  
 Last Name: Youngblood  
 Email: bill.youngblood@sunbirdcim.com  
 Created: 08/13/20 11:28:04 AM EDT  
 Last Updated: 08/13/20 11:34:45 AM EDT  
 Description: pw Qwerty1234\$

**User Roles**

Select a role to add...

	Label	Source
Administrator		
Create Analytics		
Create Dashboards		
Create Event Notifications		
Door Control	Lock or unlock doors.	User: billy
Event Manager	View all PDUs, devices, etc. Read-only.	User: billy
Keypad Pin	View tags and tag groups.	User: billy
Manage Tag Groups		
Operator		
Power Control		
View		
View Tag Groups		

of 1        Displaying 1 - 3 of 3

Select a group to add...

**Name**

All Users

Page 1 of 1        Displaying 1 - 1 of 1

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## Assign Door Control Role to Users and Groups

The site admin can assign the Door Control Role to Users or Groups. The Role can be assigned globally from Setting > Authorization & Authentication as described above, or you can grant the Role locally to a specific Door. Users with the Door Control Role are authorized to Lock/Unlock doors.

To assign local privileges:

1. Click the Data Centers tab on the Power IQ main tool bar.
2. Select the Door (note, this process can be applied to any object in the hierarchy).
3. Click the Actions button in the upper right corner and select the Edit Permissions option



Sunbird® Power IQ®   Dashboards   **Data Centers**   Events   Facility Items   IT Devices   Sensors   PUE   Analytics   Reports   Settings

**Data Centers**

+ Add   - Remove   Refresh   Import/Export

- APAC
- CALA
- EMEA
- Europe
- My Region
- My Region
- North America
- USA
  - Paris
    - Raleigh, NC
      - 192.168.46.221 - 1
        - Suite 130
          - Lab - 43 subnet
          - Lab - 46 subnet
          - Office
          - Server Room
            - 192.168.42.211
            - 192.168.42.52
            - Demo Rack
            - Rack 1
            - Rack 2
              - 192.168.46.186 - 66255
                - Front Door**
                  - G1
                  - Hudson Slave 1
                  - Hudson Slave 2

## Front Door

**Door Control**

Lock   Unlock

**Sensors and Door Status**

| Sensor Mappings  | Available Sensors |
|--|-------------------|
| Door: <input type="text" value="Front Door"/> → Closed | PDU               |
| Handle: <input type="text" value=""/>                  |                   |
| Lock: <input type="text" value="Front Lock"/> → Locked |                   |

**Door**

Name:

External Key:

An external key is a unique identifier of this object that is used when importing and exporting enterprise relationships through a CSV file.

Override Relock Timer:  seconds. 0 is disabled.

Placement:  [Manage door placements](#)

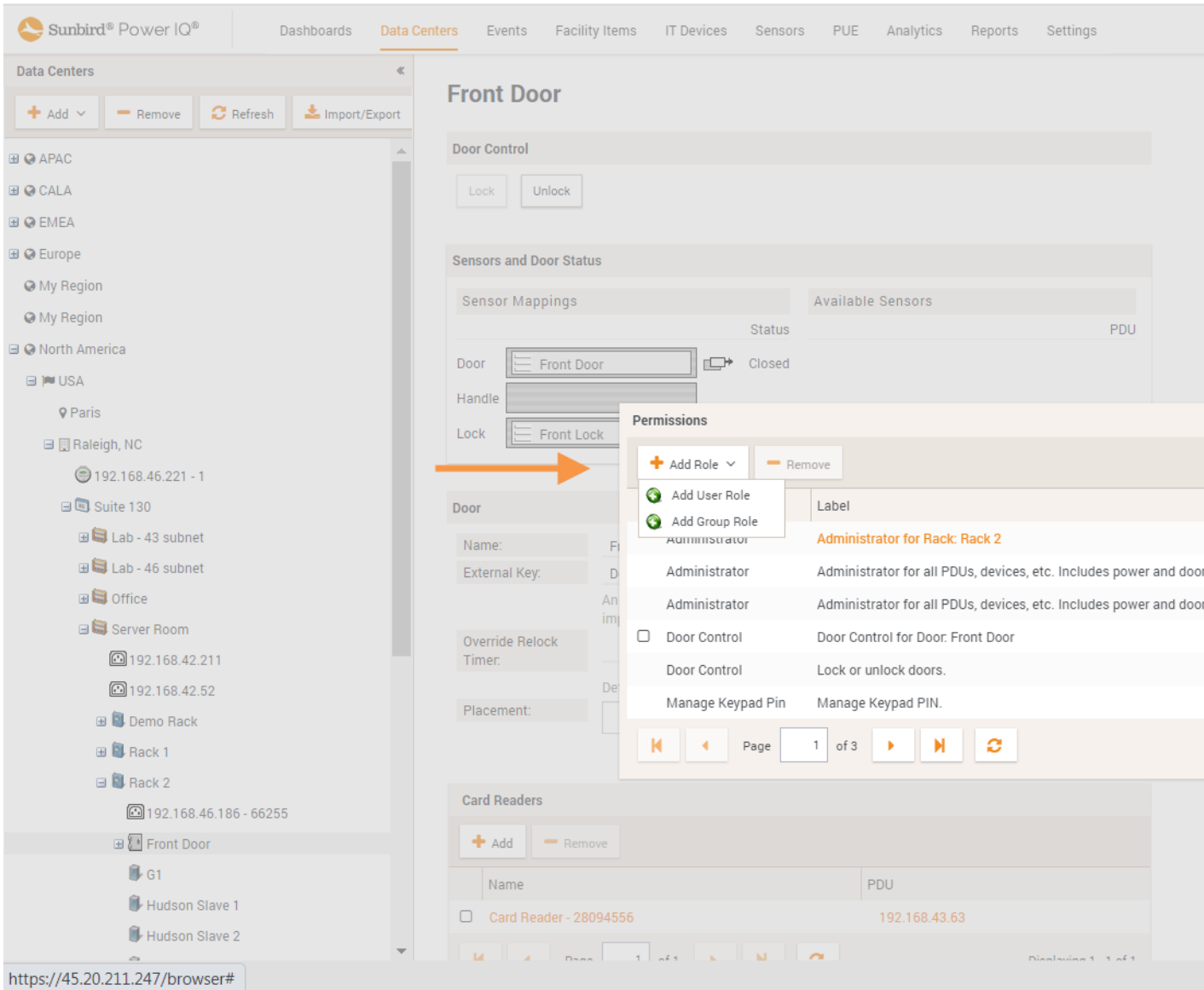
**Card Readers**

+ Add   - Remove

| Name  | PDU           |
|---|---------------|
| <input type="checkbox"/> Card Reader - 28094556 | 192.168.43.63 |

4. This will open the Permissions dialog.

5. Click the Add Role button



The screenshot shows the Sunbird Power IQ interface. On the left is a navigation tree for 'Data Centers' with a list of locations including APAC, CALA, EMEA, Europe, My Region, North America, USA, Paris, Raleigh, NC, and various subnets and racks. The main area is titled 'Front Door' and contains sections for 'Door Control' (with Lock and Unlock buttons), 'Sensors and Door Status' (with a table for Sensor Mappings and Available Sensors), and 'Card Readers' (with an Add button and a table listing a Card Reader - 28094556). A 'Permissions' modal is open, showing a table of roles and their descriptions. An orange arrow points to the '+ Add Role' button in the modal's header.

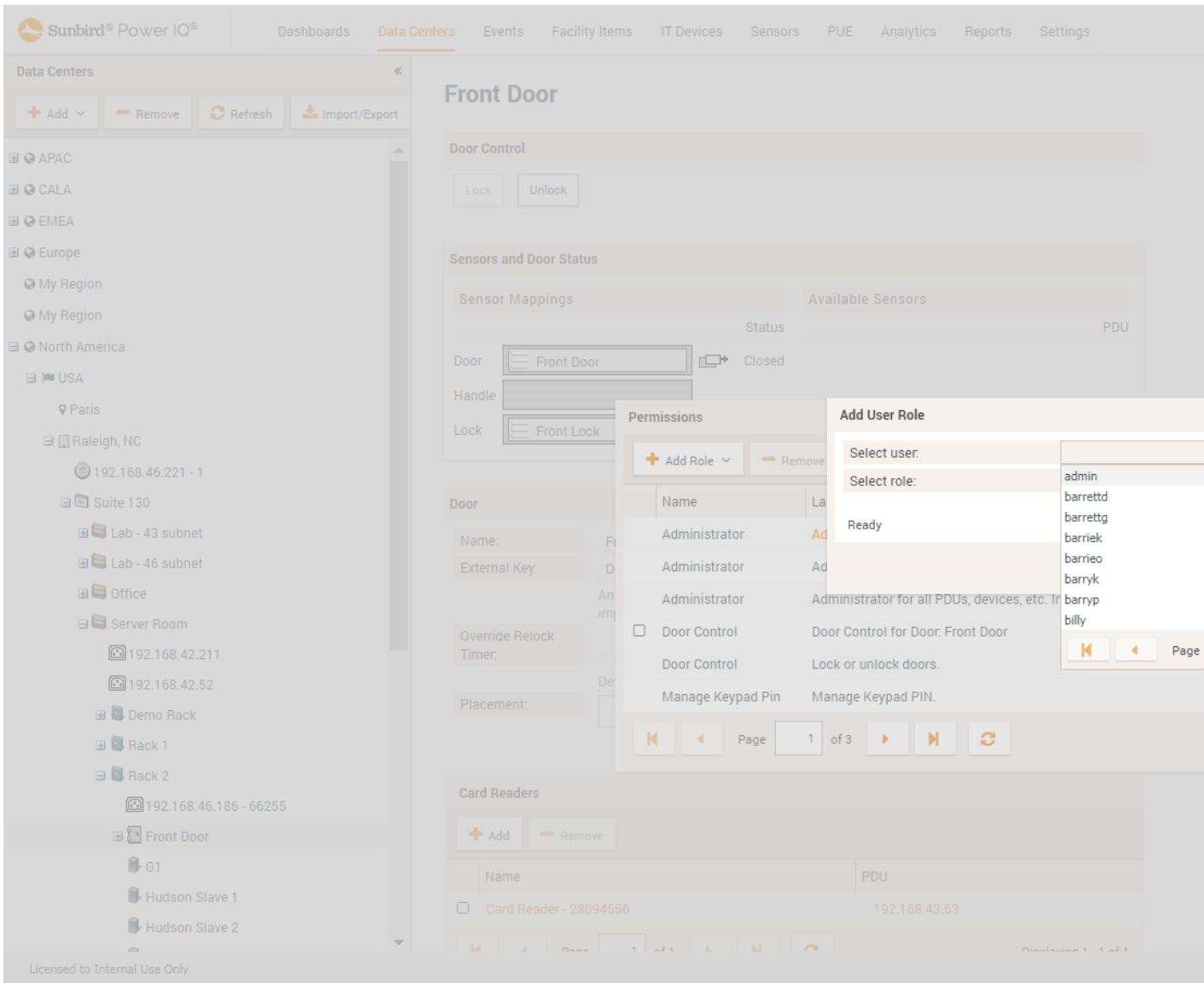
| Role                                       | Label  |
|--|--|
| Administrator                              | Administrator for Rack: Rack 2   |
| Administrator                              | Administrator for all PDUs, devices, etc. Includes power and door control. |
| Administrator                              | Administrator for all PDUs, devices, etc. Includes power and door control. |
| <input type="checkbox"/> Door Control      | Door Control for Door: Front Door  |
| <input type="checkbox"/> Door Control      | Lock or unlock doors.  |
| <input type="checkbox"/> Manage Keypad Pin | Manage Keypad PIN.   |

6. You can select whether you want to add a Role to a User or Group.





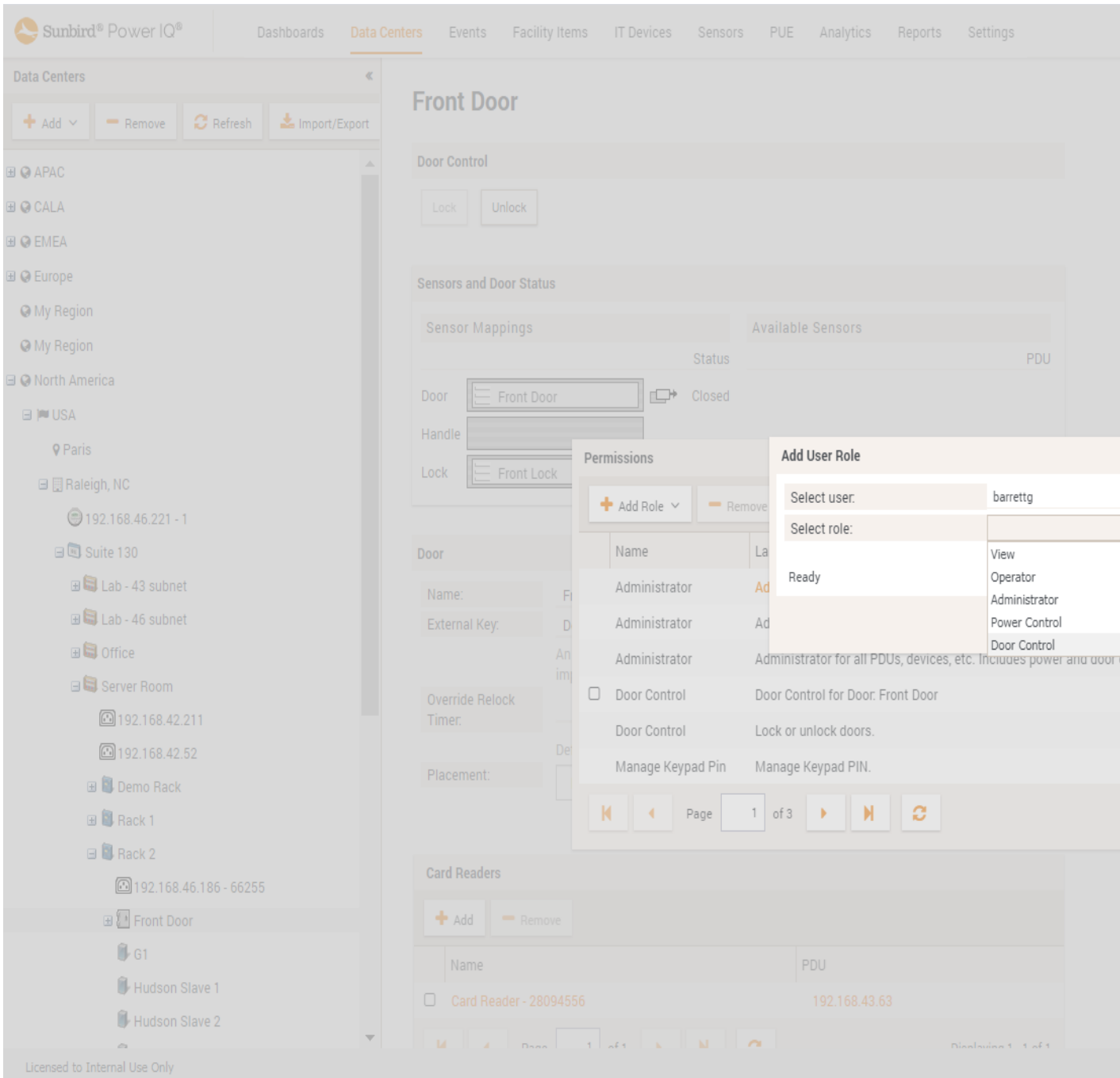
7. Select the User or Group from the list box



The screenshot shows the Sunbird Power IQ interface for configuring a 'Front Door'. The left sidebar shows a tree view of data centers, including APAC, CALA, EMEA, Europe, My Region, North America, USA, Paris, Raleigh, NC, and various subnets and racks. The main content area is titled 'Front Door' and includes sections for 'Door Control', 'Sensors and Door Status', and 'Card Readers'. An 'Add User Role' dialog box is open, showing a list of users to select from. The dialog has two tabs: 'Permissions' and 'Add User Role'. The 'Add User Role' tab is active, showing a 'Select user:' field with a dropdown menu containing the following users: admin, barrettd, barrettg, barriek, barriego, barryk, barryp, and billy. Below the user list are navigation buttons: a right arrow, a left arrow, and a 'Page' indicator showing 'Page 1 of 3'.



8. Select the Door Control role from the list of permissions



The screenshot shows the Sunbird Power IQ interface. The left sidebar lists various data centers and regions, with 'Front Door' selected. The main panel displays the 'Front Door' configuration, including 'Door Control' (Lock/Unlock buttons), 'Sensors and Door Status', and 'Card Readers'. A 'Permissions' modal is open, showing a list of roles. The 'Door Control' role is selected, which is described as 'Door Control for Door: Front Door'.

| Name                                  | Description  |
|---------------------------------------|--|
| Administrator                         | Administrator for all PDUs, devices, etc. Includes power and door control. |
| Administrator                         | Administrator for all PDUs, devices, etc. Includes power and door control. |
| Administrator                         | Administrator for all PDUs, devices, etc. Includes power and door control. |
| <input type="checkbox"/> Door Control | Door Control for Door: Front Door  |
| Door Control                          | Lock or unlock doors.  |
| Manage Keypad Pin                     | Manage Keypad PIN.   |

9. Click the Add button to add the Role.

## Associate Door, Lock and Handle Sensors

Administrators can associate Door, Lock and Handle Sensors via the GUI in the Data Centers tab.



1. Click the Data Centers tab on the Power IQ main tool bar.
2. Select a Door.

Drag and drop the appropriate available sensor to the appropriate door, lock or handle box.

## Associate Keypads with One or More Doors

Administrators can associate Keypads with Doors via the GUI in the Data Centers tab or in bulk via csv import.

1. Click the Data Centers tab on the Power IQ main tool bar.
2. Select a Door.



3. Click “Add” in the keypad panel. This enables the keypad to unlock a door when correctly authorized via a user.



Data Centers

+ Add - Remove Refresh Import/Export

- raleigh
- 4A
- 3A
  - 192.168.46.109
  - 3A door**
    - SouthCo Door
    - SouthCo Handle
    - SouthCo Lock
    - Card Reader - 1GE2900028-1
    - Card Reader - 1GE2900028-2
    - Door 3
    - Door 4
    - Door Handle Lock 3
    - Door Handle Lock 4
    - Door Lock 3
    - Door Lock 4
    - Emka Agent E Door
    - Emka Agent E Handle
    - Emka Agent E Lock
    - Keypad - 1GE2900028-0

### 3A door

Door Control

Lock Unlock

Sensors and Door Status

| Sensor Mappings |                       | Available Sensors   |                |
|-----------------|-----------------------|---------------------|----------------|
|                 | Status                |                     | PDU            |
| Door            | SouthCo Door Closed   | Door 3              | 192.168.46.109 |
| Handle          | SouthCo Handle Closed | Door 4              | 192.168.46.109 |
| Lock            | SouthCo Lock Locked   | Door Handle Lock 3  | 192.168.46.109 |
|                 |                       | Door Handle Lock 4  | 192.168.46.109 |
|                 |                       | Door Lock 3         | 192.168.46.109 |
|                 |                       | Door Lock 4         | 192.168.46.109 |
|                 |                       | Emka Agent E Door   | 192.168.46.109 |
|                 |                       | Emka Agent E Handle | 192.168.46.109 |
|                 |                       | Emka Agent E Lock   | 192.168.46.109 |

Door

Name: 3A door

External Key: Door -- 2

An external key is a unique identifier of this object that is used when importing and exporting enterprise relationships through a CSV file.

Override Relock Timer: \_\_\_\_\_ seconds. 0 is disabled.  
Default: disabled

Placement:  [Manage door placements](#)

Card Readers

+ Add - Remove

| Name  | PDU            |
|---|----------------|
| <input type="checkbox"/> Card Reader - 1GE2900028-1 | 192.168.46.109 |

Page 1 of 1  Displaying 1 - 1 of 1

Keypads

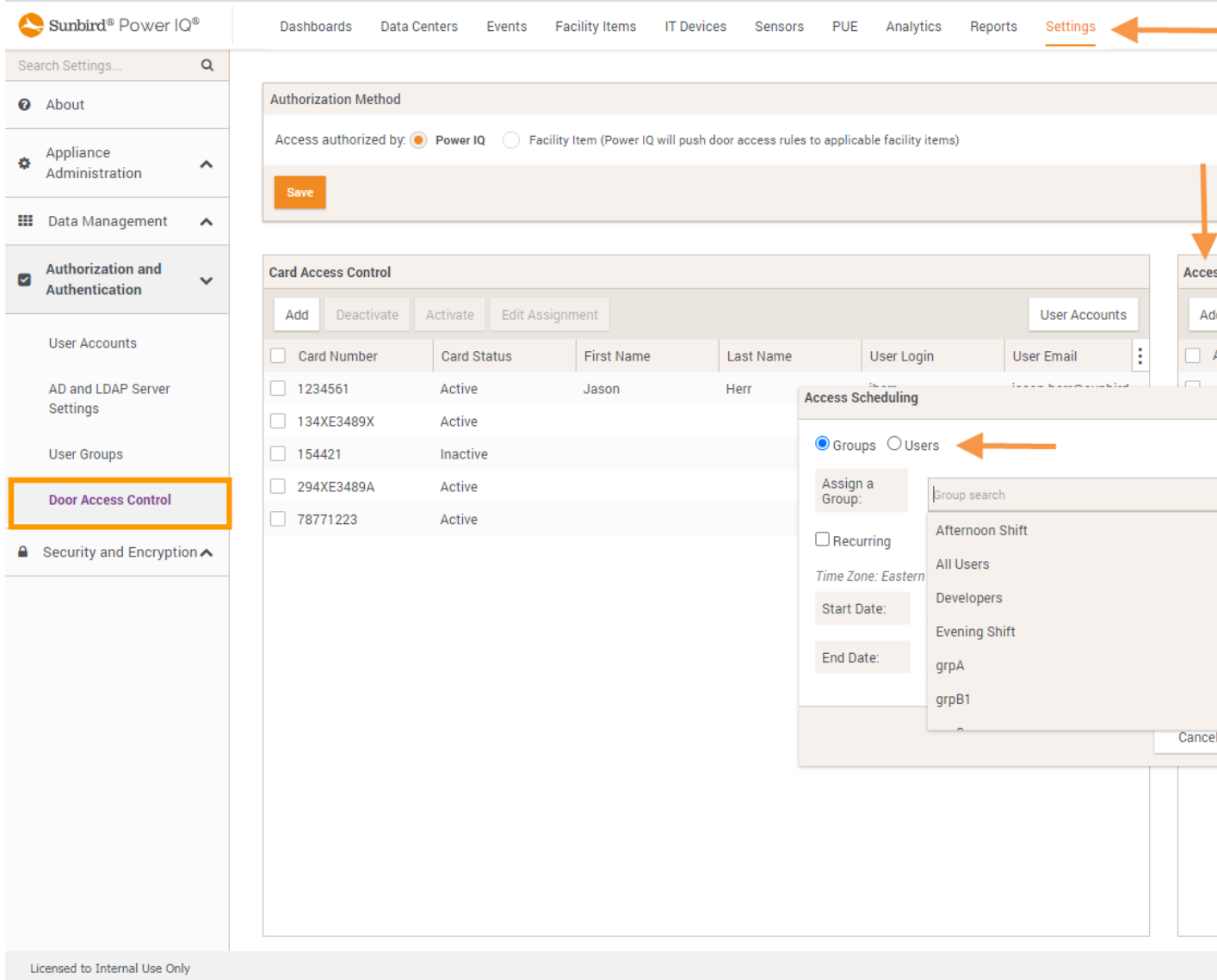
+ Add - Remove

| Name   | PDU            |
|--|----------------|
| <input type="checkbox"/> Keypad - 1GE2900028-0 | 192.168.46.109 |

## Assign Users and Groups Access Schedules

The Site Administrator can assign one or more Access Schedules to users and groups to control the times access is permitted.

1. Navigate to Settings > Authorization and Authentication > Door Access Control
2. Select the "Add" button in the Access Scheduling sub panel
3. Select Groups or Users, then select the Group or User from the drop down list.



The screenshot shows the Sunbird Power IQ Settings interface. The left sidebar has a menu with 'Door Access Control' highlighted. The main content area shows the 'Authorization Method' section with 'Power IQ' selected. Below it is the 'Card Access Control' section with a table of card entries. An 'Access Scheduling' modal window is open, showing options for 'Groups' (selected) and 'Users', a search field for groups, and a list of groups including 'Afternoon Shift', 'All Users', 'Developers', 'Evening Shift', 'grpA', and 'grpB1'. A 'Recurring' checkbox is also visible.

**Authorization Method**

Access authorized by:  Power IQ    Facility Item (Power IQ will push door access rules to applicable facility items)

**Card Access Control**

| Card Number                         | Card Status | First Name | Last Name | User Login | User Email |
|-------------------------------------|-------------|------------|-----------|------------|------------|
| <input type="checkbox"/> 1234561    | Active      | Jason      | Herr      |            |            |
| <input type="checkbox"/> 134XE3489X | Active      |            |           |            |            |
| <input type="checkbox"/> 154421     | Inactive    |            |           |            |            |
| <input type="checkbox"/> 294XE3489A | Active      |            |           |            |            |
| <input type="checkbox"/> 78771223   | Active      |            |           |            |            |

**Access Scheduling**

Groups    Users

Assign a Group:

Recurring

Time Zone: Eastern

Start Date:

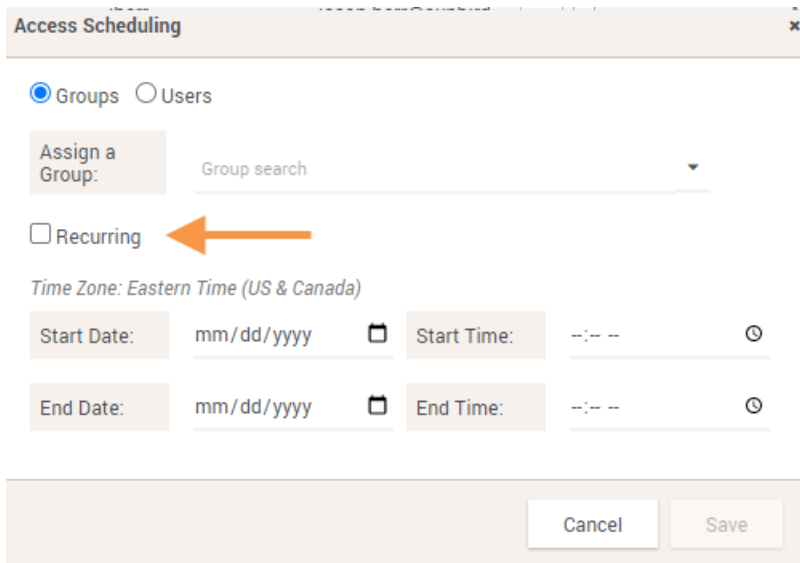
End Date:

- Afternoon Shift
- All Users
- Developers
- Evening Shift
- grpA
- grpB1

Cancel

4. To create a recurring schedule select the "Recurring" check box and enter the Start and End Dates and Times.


5. Click Save



**Access Scheduling**

Groups  Users

Assign a Group:

Recurring 

Time Zone: Eastern Time (US & Canada)

Start Date:   Start Time:

End Date:   End Time:

---

*Note: Raritan firmware can handle 64 rules. Each Schedule for each User is a Rule. For example, 5 Users with one Schedule each equates to 5 Rules. Additionally Raritan firmware supports Weekly Schedules only.*

---



# Chapter 17: Analytics

## What are Power IQ Analytics?

The Analytics tab allow you to create and view custom reports based on Power IQ's knowledge of your data center and the power measurements it takes.

Reports are created as a way to organize charts. See [Adding Reports to the Analytics Page](#).

Each report can contain one or more charts. There are two chart types: Device and Health. See [Creating a Chart](#).

Device charts show power measurements of your devices. See [Device Chart Settings](#).

Health charts show connectivity and event statuses of your PDUs. See [PDU Health Chart Settings](#).

This list contains some examples of the types of information you can include in charts:

- The Active Power consumed by Test Rack #2 over the past hour.
- How many Kilowatt Hours were used by Rows A, B and C in the Data Center last month.
- If power costs \$0.062 per kWh, what did the IT server room cost to power last year?
- What is the health status of all PDUs in the system, based on connectivity and events received?

You must configure an Enterprise Data Model before using Analytics. The Enterprise Data Model populates the Data Center tab with a hierarchical representation of your data center. See [Enterprise Relationships and the EDM](#).





## Adding Reports to the Analytics Page

The analytics page can include multiple report pages. A report page is a collection of one or more charts. Creating multiple reports is a good way to organize the Analytics information by category or specific need.

1. Click Add in the Reports column and enter a name for the report.
2. In the Reports toolbar, select the Share This Report checkbox to make the report and charts public.

To view a report:

1. In the Analytics tab, select a report in the Reports column. The report opens in the main section of the page.
2. If the report has been shared by another user, you cannot edit it. Shared reports are marked as "Shared by user-name."



## Sharing Reports on the Analytics Page

Choose to share a report when you want to make it public. Sharing reports gives other Power IQ users access to the report, and the charts it contains.

Users must have the View and the Create Analytics roles assigned to view your shared reports.

Reports that are shared are marked in the list as "shared by you." Reports that have been shared by other users are marked as "shared by username."

The data that displays in a report is based on each individual user's permissions in Power IQ. If another user does not have permission to see information about a rack or datacenter, for example, that you have shared a report about, the user will not see the data.

Users that you share a report with cannot edit your report. You cannot edit reports that you did not create.

1. In the Analytics tab, select a report on the left side of the page.
2. In the Reports toolbar, select the Share This Report checkbox to make the report and charts public.
3. In the Analytics tab, select a report on the left side of the page.
4. In the Reports toolbar, deselect the Share This Report checkbox to remove the report from public view.



## Creating a Chart

You must add a report before you can create a chart. See [Adding Reports to the Analytics Page](#).

1. In the Analytics tab, select a report on the left side of the page.
2. Click Add Chart, then select Device Chart or Health Chart.
3. Device charts show power measurements of your devices. See [Device Chart Settings](#).
4. Health charts show connectivity and event statuses of your PDUs. See [PDU Health Chart Settings](#).
5. You can change the location of any chart by clicking on the title bar of the chart and dragging it to its new position.



## Configuring Charts

Configure a chart to select the data you want to analyze.

Charts created in the Analytics tab can only be viewed in the Analytics tab. Charts configured in the Dashboards tab can be viewed in the Dashboards tab, or in a Dashboard slide show. See [Dashboard](#).

- For device chart details, see [Device Chart Settings](#).
- For PDU health chart details, see [PDU Health Chart Settings](#).



## Device Chart Settings

A device chart displays power measurements for the devices in your data centers. Devices must be mapped to rack PDU outlets or circuits in the EDM before the data can be charted. See [Creating Your EDM](#).

You can configure a device chart on the Analytics tab or on the Dashboards tab.

To chart facility items, see [Facilities Chart Widget](#).

1. In the Analytics tab, select a Report. The charts contained in the Report open. On the chart you want to configure, click the Settings icon. See [Creating a Chart](#) for details on adding a new chart.

**OR**

2. In the Dashboards tab, add a device chart widget, then click the Settings icon in the widget.

The Device Chart Settings dialog appears.

3. In the Measurement field, select the type of measurement you want to analyze from the drop-down list.

The measurement is represented on the y-axis of the chart.

See [Device Chart Measurements](#).

4. In the Time Selection field, select Period or Range.
  - a. Select Period to show constantly updated measurement, such as power consumption over the Past hour, Past week, Past month, and so on. Select the time period from the drop-down list. See [What's the difference between "Past" and "Last" time periods?](#)
  - b. Select Range to show measurements from a custom Start Date and End Date. Select the start and end dates using the calendar dialogs.

The time selection is represented on the x-axis of the chart. Your time selection will affect the available selections for Granularity.

5. In the Granularity field, if available, select the level of granularity of data to chart.
  - a. If you select Period for your time selection, your choices for Granularity will be Hourly or Poll Interval. Hourly will show one data point per hour for the time period the chart includes, when the time period is 24 hours or longer. Poll Interval will show one data point per poll interval for the time period the chart includes. Hourly is the default selection. The Poll Interval must be set to five minutes or longer to use Poll Interval granularity.
  - b. If you select Range for your time selection, your choice for Granularity will be Automatic or Archive. Automatic is the default selection. Select Archive for data from only the archive tables. If you select Archive, user-configurable time selectors will appear next to the selectors for the start and end dates. The date is displayed in mm/dd/yyyy format, with the default start date being the previous day and the default end date being the current day (i.e., yesterday and today respectively). The time is displayed in the 24-hour format, and the default times are based on the current system time.
6. In the Line Configuration field, select an option to determine how many lines are on a chart, and how the lines are configured.
  - a. Select "Manually define" to choose the data for each line individually. You can add data from different sections of the data center to the same chart with this option. See [Manually Define Individual Device Chart Lines](#). Click the Individual Lines (Advanced) tab to configure the lines. Note that if you select to manually define lines, the options in the Series field will not be available.



- b. Select "Automatically define" then select a node from your enterprise data model in the Show field to show one line of data in the chart.
7. In the Node field, select the desired level in the EDM hierarchy.
8. In the Series field, select from the following options: Selected Node, Children, or Outlets. Selected Node is the default. Select the Children option to view one line of data per child of the location selected in the Node field. The Outlets option will show one line per outlet and is only available as an option if you are charting a single rack or facility item, as selected in the Node Field.

For example, selecting Children when a data center is selected in the Node field may show one line per room. Parent-child relationships are determined by the structure of your enterprise data model, as configured in the Data Centers tab.

When charting outlets, the series label on the chart will display the device name (when available), outlet name, and facility item label or IP address.

---

*Note: Humidity and Temperature measurements cannot be represented as one line per child. To chart one line per humidity or temperature sensor, select "Manually define" in the Line Configuration field.*

---

9. In the External Key field, enter the external key of the PDU to filter the chart's data by that value.
10. In the Custom Fields 1 and 2, which may be renamed in your system, enter a PDU custom field value to filter the chart's data by that value.
11. Select Minimum, Maximum, or Average to specify whether you want the lowest values, highest values, or an average of the data for the measurement you selected. Min/Max/Average is not available for all measurements.
12. Click View Matching PDUs to view the list of PDUs to be included in the chart data.
13. The text in the Name field displays as the chart title. Select the Auto Name checkbox to allow the name to configure automatically, based on the criteria of the chart. Deselect the Auto Name checkbox to enter a name manually.
14. The Include Legend checkbox is enabled by default, and a chart legend for the data will be included. Deselect the Include Legend checkbox to remove the legend.
15. Removing the legend can make a chart more readable, depending on how many lines of data are included.
16. Click OK to save the settings and view the chart.



## Manually Define Individual Device Chart Lines

You can manually define individual device chart lines to choose the data for each line individually.

You can add data from different sections of the data center to the same chart with this option.

See [Device Chart Settings](#) to start the chart configuration. In the Chart Settings, select "Manually define lines" to enable the Individual Lines (Advanced) tab.

1. In the Individual Lines (Advanced) tab, select a line in the Lines column.
2. By default there is one line, called Power IQ, that represents the whole system.
3. In the "Select what you want to see on this line" field, click the browse button, then select the data center node you want to chart on this line. Expand or collapse the nodes by clicking the plus and minus signs. The name of the node selected displays in the field at the bottom on the dialog. Click Select Node to save the line.
4. To add more lines, click Add, then select the line and repeat step 2 to configure it.
5. To filter a line to a more granular level, select the line in the Lines column, then enter your criteria in the fields in the Filter by Device Properties section.

For example, to configure a chart that includes 1 line per rack or row for a certain customer, add 1 line for each rack or row, then enter the name of the customer in the Customer Name field of each line.

---

*Note: Filtering for Device Type, Customer, Custom Field 1 and Custom Field 2 will include any match that includes your search term, not just exact matches. For example, "ABC" will include "ABC" and "ABC123".*

---

6. The text in the Name field displays as the line name in the legend of the chart, when legends are enabled. Select the Auto Name checkbox to allow the name to configure automatically, based on the criteria of the line. Deselect the Auto Name checkbox to enter a name manually.
7. Click the Chart Settings tab to finish the other chart configurations. See [Device Chart Settings](#).
8. Click Save.



## What's the difference between "Past" and "Last" time periods?

A Past measurement indicates the selected period of time up to the current moment.

**For example:**

If you view a device chart on Tuesday, and the period is set to Past Week, the chart includes data from last Tuesday through this Tuesday.

A Last measurement indicates the most recent completed period of time.

**For example:**

If you view a device chart on Tuesday, and the period is set to Last Week, the chart includes data from last Sunday through last Saturday. The chart shows the last full week.





## Device Chart Measurements

Device charts can be configured for many kinds of measurements.

### Power Reading Charts:

- Active Power (W)
- Current (amp)
- IT Energy (kWh)
- CO2 Footprint (CO2 Kg)
- IT Energy Cost (\$ or other currency)
- Total Energy Including Cooling (kWh)
- Total Energy Cost Including Cooling (\$ or other currency)

### Temperature Charts:

- Measurement taken as degrees Celsius or Fahrenheit, based on system setting in Settings > Application Settings > Language and Locale Settings.
  - Inlet Temperature
  - Outlet Temperature
  - Outside Air Temperature

### Humidity Charts:

- Measurement taken as percentage humidity.
  - Inlet Humidity (%)
  - Outlet Humidity (%)
  - Outside Air Humidity (%)

### Air Flow and Pressure Charts:

- Measurements taken as meters per second for air flow, and pascals for air pressure.
  - Air Flow (m/s)
  - Air Pressure (Pa)

### Vibration Charts:

- Vibration (g)



## Charting Archive Data Using the Device Chart (BETA)

---

*Note: The data archive is an exciting and powerful beta feature that may require additional resources dedicated to Power IQ. Please contact Sunbird Technical Support at [tech@sunbirdcim.com](mailto:tech@sunbirdcim.com) or via the Sunbird Support Portal with your system logs before enabling this feature to ensure a graceful implementation.*

---

In Power IQ, you can use a device chart to display power and environmental measurements for the devices in your data centers from the data archive.

---

*Note: Devices must be mapped to rack PDU outlets or circuits in the EDM before the data can be charted. See [Creating Your EDM](#) on page 410 for more information.*

---

---

*Note: The Data Archive feature must be enabled before you can chart archived data. See [Enabling and Configuring the Data Archive \(BETA\)](#) on page 404 for more information.*

---

You can configure a device chart on the Analytics tab and on the Dashboards tab. For more information, see [Device Chart Settings](#) on page 589.

To configure a device chart to chart archive data:

1. In the Analytics tab, select a Report. The charts contained in the Report open. On the chart you want to configure, click the Settings icon. See [Creating a Chart](#) on page 587 for details on adding a new chart.

**OR**

2. In the Dashboards tab, add a device chart widget, then click the Settings icon in the widget.

The Device Chart Settings dialog appears. See [Device Chart Settings](#) on page 589 for more information.

3. In the Measurement field, select the type of measurement you want to analyze from the dropdown list.

The measurement is represented on the y-axis of the chart.

See [Device Chart Measurements](#) on the previous page for more information.

4. In the Time Selection field, select Range to show measurements from a custom Start Date and End Date. Select the start and end dates using the calendar dialogs. Note that charting archive data is limited to a time range of 24 hours or less.

The time selection is represented on the x-axis of the chart.

5. In the Granularity field, select Archive for data from only the archive tables. User-configurable time selectors will appear next to the selectors for the start and end dates. The date is displayed in mm/dd/yyyy format, with the default start date being the previous day and the default end date being the current day (i.e., yesterday and today respectively). The time is displayed in the 24-hour format, and the default times are based on the current system time.

6. In the Line Configuration field, select an option to determine how many lines are on a chart, and how the lines are configured.

- a. Select "Manually define" to choose the data for each line individually. You can add data from different sections of the data center to the same chart with this option. See [Manually Define Individual Device Chart](#)

**Lines on page 591.** Click the Individual Lines (Advanced) tab to configure the lines. Note that if you select to manually define lines, the options in the Series field will not be available.

- b. Select "Automatically define" then select a node from your enterprise data model in the Show field to show one line of data in the chart.
7. In the Node field, select the rack, PDU, or device for the node to be charted.
8. In the Series field, select from the following options: Selected Node, Children, or Outlets. Selected Node is the default. Select the Children option to view one line of data per child of the location selected in the Node field. The Outlets option will show one line per outlet and is only available as an option if you are charting a single rack or facility item, as selected in the Node Field.

---

*Note: Select "Outlets" for the Series option if you wish to chart the outlets of the PDUs in the Rack, on the PDUs, or associated with the device that you selected. When charting outlets, the series label on the chart will display the device name (when available), outlet name, and facility item label or IP address.*

---

For example, selecting Children when a data center is selected in the Node field may show one line per room. Parent-child relationships are determined by the structure of your enterprise data model, as configured in the Data Centers tab.

When charting outlets, the series label on the chart will display the device name (when available), outlet name, and facility item label or IP address.

---

*Note: Humidity and Temperature measurements cannot be represented as one line per child. To chart one line per humidity or temperature sensor, select "Manually define" in the Line Configuration field.*

---

9. In the External Key field, enter the external key of the PDU to filter the chart's data by that value.
10. In the Custom Fields 1 and 2, which may be renamed in your system, enter a PDU custom field value to filter the chart's data by that value.
11. Select Minimum, Maximum, or Average to specify whether you want the lowest values, highest values, or an average of the data for the measurement you selected. Min/Max/Average is not available for all measurements.
12. Click View Matching PDUs to view the list of PDUs to be included in the chart data.
13. The text in the Name field displays as the chart title. Select the Auto Name checkbox to allow the name to configure automatically, based on the criteria of the chart. Deselect the Auto Name checkbox to enter a name manually.
14. The Include Legend checkbox is enabled by default, and a chart legend for the data will be included. Deselect the Include Legend checkbox to remove the legend.
15. Removing the legend can make a chart more readable, depending on how many lines of data are included.
16. Click OK to save the settings and view the chart.



**Chart Settings** Individual Lines (Advanced)

Measurement:

Time Selection:

Period

Range

Start Date:

End Date:

Granularity:  Automatic  Archive

\* Archived granularity is limited to a date range interval of 24 hours or less.

Line configuration:  Automatically define  Manually define

Node:

Series:  Selected Node  Children  Outlets

**Filter by Rack PDU Properties**

External key:

Test 1:

Custom Field 2:

[View Matching PDUs](#)

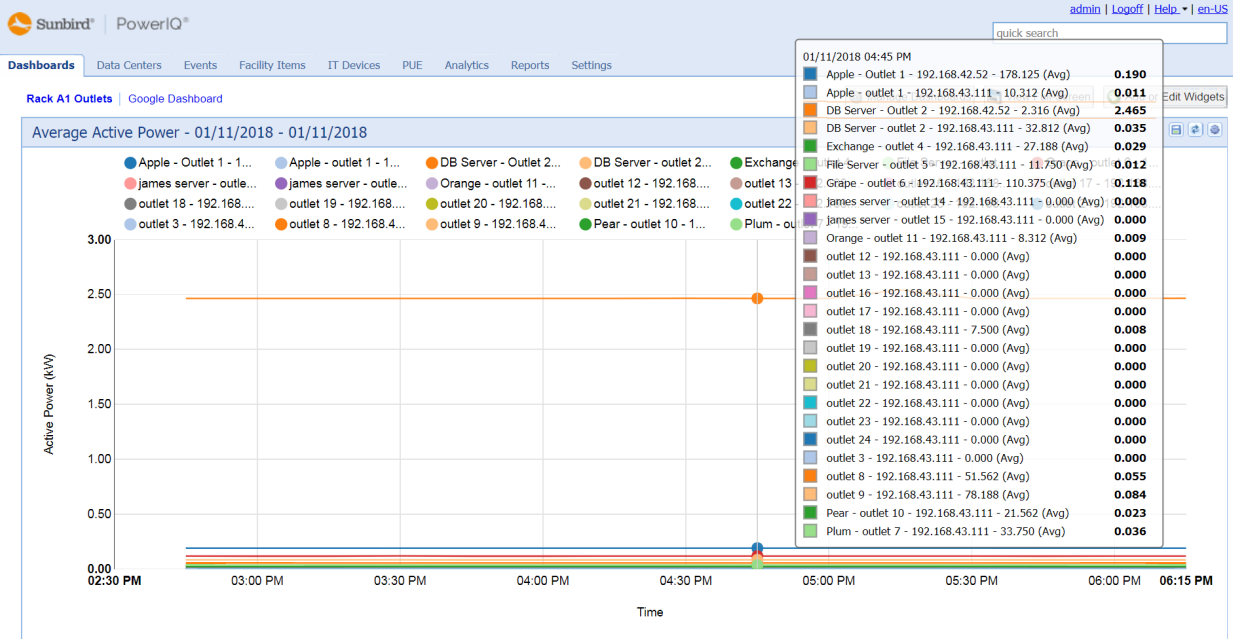
Min/Max/Average:  Minimum  Maximum  Average

Name:   Auto Name

Include Legend:

## Example Chart Using Archive Data

The following is an example Average Active Power chart, charting outlets from the data archive:



## PDU Health Chart Settings

A PDU health chart displays connectivity and event statuses of your PDUs.

You can configure a PDU health chart on the Analytics tab or on the Dashboards tab.

1. In the Analytics tab, select a Report. The charts contained in the Report open. On the chart you want to configure, click the Settings icon. See [Creating a Chart](#) for details on adding a new chart.

**OR**

2. In the Dashboards tab, add a PDU health chart widget, then click the Settings icon in the widget. See [PDU Health Chart Widget](#).

The Health Chart Settings dialog appears.

3. Click the Settings icon.
4. Enter a name for the chart in the Title field in the Basics section.
5. In the Data From field, select All to include all PDUs in the system in the chart. Select Data Center or other section of the data center to filter the next field's selections. For example, select Racks to filter the Contained In field to include the racks in your system.
6. In the Contained In field, select the location of the PDUs you want to include in the Health chart.
7. In the Options section, select the health measurement.
8. Select Overall Health to view a health chart that combines connectivity and active events to create an overall health status of the selected PDUs.
9. Select Event Health Only to exclude connectivity from the health status.
10. Select Connectivity Health Only to exclude active events from the health status.
11. Click Save.



## Overall PDU Health

Overall health in a PDU Health Chart comprises both connectivity health and active events health. The overall health is determined based on these criteria:

| Color Code | Meaning     | Criteria   |
|------------|-------------|--|
| Green      | Good        | A PDU is in good overall health if both its connectivity health is good and its active events health is good. This indicates no unsuccessful polls, and no active warning or critical severity events.   |
| Yellow     | Warning     | A PDU is in warning level overall health if either its connectivity health is warning, or its active events health is warning, but neither is critical. This could indicate a warning level active event and good connectivity.  |
| Red        | Critical    | A PDU is in critical overall health if either its connectivity health is critical or its active events health is critical. The overall health is critical even when only one of these categories is critical.  |
| Gray       | Maintenance | A PDU is in maintenance mode if both its connectivity health and active events health indicates the PDU is in maintenance. A PDU in maintenance mode is not polled and its traps are not acknowledged. This mode is helpful for preventing a PDU from generating connectivity loss events in Power IQ. |

*Note: Decommissioned facility items are not included in the PDU Health Chart.*

## Exporting Charts

Export a chart to save the chart data to a .CSV file.

1. In the Analytics tab, select a Report.
2. The charts contained in the Report open. Click the Export icon in the chart.
3. Use the dialog that appears to save the file.





# Chapter 18:PUE - Power Usage Effectiveness

Power Usage Effectiveness (PUE) is the ratio of the total amount of power used by a data center to the power delivered to actual IT equipment. An ideal PUE is 1.0.

$$\text{PUE} = \frac{\text{Total Facility Power}}{\text{IT Equipment Power}}$$

Power usage for anything that is not a computing device, such as lighting and cooling, is considered facility power usage.

Power IQ measures total power and IT power based on the flags set for each inlet, outlet or circuit. Flags indicate whether the kilowatt hours measured count toward total power, IT power, both, or neither. See [Set PUE Flags](#) and [What PUE Flags Does Power IQ Set Automatically?](#).

Power IQ sums up the measured values on a daily and monthly basis, then uses the values to calculate PUE. Both daily and monthly PUE calculations are offered. Power IQ does a rollup of daily measurements on the first day of each month, using the previous month's data, to create a monthly PUE calculation for each data center. You can adjust the monthly sums for total power and IT power as needed after the rollup.

All data represents the PUE flags and EDM configuration as set when the data was collected.

Power IQ displays the PUE calculations in several ways.

- [List PUE Calculations and Adjustments](#): a list of the monthly PUE calculations for each data center that enables you to enter offset values to adjust the monthly total power and IT power readings.
- [PUE Trend Chart Widget](#): a dashboard chart that shows PUE calculations over time.
- [Latest PUE Reading Gauge Widget](#): a dashboard gauge that shows your latest PUE reading and where it falls within the thresholds set.

## Requirements for PUE

PUE calculations can begin once your system is set up to include:

- Enterprise data model (EDM) is configured and includes the objects you want to flag as part of the PUE calculation. See [Enterprise Relationships and the EDM](#).
- Objects are flagged as Total Power and IT Power. See [Set PUE Flags](#).



## Set PUE Flags

You must identify the sources of IT power and total power using flags. Power IQ uses the flags to determine which readings to use in the PUE calculation.

**IMPORTANT:** When setting Total Power, make sure not to flag the same power more than once. Set the flag at the highest level source only.

- Total Power:

Set the flag for Total Power if the object supplies power to the data center. Avoid double-flagging Total Power in the stream. For example, flagging Total Power on a standalone meter AND the inlet to a downstream floor PDU would double-flag the same energy.

Best practice is to measure Total Power at the main line in to the data center. For example, if you have a standalone meter, flag it as Total Power.

Another method is to search for circuits of your Power IQ managed facility items, such as floor PDUs, power panels, UPS, and so on, and flag the highest level sources as Total Power.

Power IQ does not automatically flag Total Power.

IT Power:

- Set the flag for IT Power if the object supplies power for computing purposes only.
  - Outlets on Rack PDUs
  - Inlets on Rack PDUs without outlet meters
- Power IQ automatically flags rack PDUs as IT Power.

See [What PUE Flags Does Power IQ Set Automatically?](#).

1. In the PUE tab, use the search criteria to list the objects you want to flag.
2. Type: Circuits, Outlets, or Inlets.
3. Filter by Node: Select an EDM node.
4. Flagged as Total: Filters objects by their Total Power flag status.
5. Flagged as IT: Filters objects by their IT Power flag status.
6. Click Search.
7. In the search results list, select the checkboxes under the Total and IT columns for each object to flag it.

---

*Note: Use the All Total and All IT icons to automatically flag all objects in the search results, or to remove a flag from all objects in the search results.*

---



## What PUE Flags Does Power IQ Set Automatically?

Power IQ does not automatically flag for Total power.

Power IQ automatically sets some PUE flags for IT power.

| When you upgrade to 4.1 or later:         |                     |
|---|---------------------|
| Object                                    | Flagged as IT Power |
| Rack PDU or inline meter with outlets     | outlets             |
| Rack PDU and inline meter without outlets | inlets              |

| When you add a new object :   |                     |
|---|---------------------|
| Object  | Flagged as IT Power |
| Rack PDU or inline meter with outlets   | outlets             |
| Rack PDU or inline meter without outlets  | inlets              |
| Floor PDU, Power Panel, Standalone Meter, UPS, CRAC<br>Note: These facility items are added as PDUs, and supported using Dynamic Plugins. See <a href="#">Dynamic Plugins</a> . | none                |

## List PUE Calculations and Adjustments

The PUE tab displays the monthly rollup PUE calculations for each data center. Monthly data comes from a rollup conducted on the first of each month, using the previous month's data. You can adjust the monthly values for Total Power and IT Power for the month.

- Adjustments can be positive or negative Kilowatt hours.
  - Daily values are not displayed, and they cannot be adjusted.
  - Adjustments made will affect all PUE charts in the dashboard that use monthly data.
1. In the PUE tab, choose Activities > List PUE Calculations. The list includes a line for each month of data for each data center in your EDM.
  2. Enter the number of Kilowatt hours for adjustments to Total Power or IT Power in the fields provided. Use a "-" sign to make a negative adjustment to the number of hours.
    - Total kWh Adj: Adjustment to Total Power
    - IT kWh Adj: Adjustment to IT Power



# Chapter 19: Reports and Tags

The Reports tab allows users to create reports and administer tags.

The reporting feature supports the following reports: Power\Energy, Temperature, and Rack Failover simulation.

Through the Activities menu, users can create and administer Tag Groups and the available Tags for those groups.

You choose the rows and columns you want to include, and how rows are grouped and filtered.

Filters can employ the tags assigned to EDM nodes to determine which PDUs and IT device readings are included in the reports.

See [Creating a Report](#).

Reports are only available to the user who creates them. The data included is limited to the user's permissions to view objects in the EDM. If you do not have permission to view Data Center 1, for example, no data about Data Center 1, or any room, rack and so on contained by it, will be included in your reports.

Reports you create can be emailed to anyone you like. Set up a schedule for the report to be run and emailed, or send an exported report by email. See [Schedule a Report](#) and [Exporting a Report to PDF or CSV](#).

Once a report has been run, the output is saved in the Report History. Report runs are kept in the report history until a report is deleted.



## Creating a Report

Create a report to set the parameters of the data you want included. You can choose the rows and columns to include, and specify sorting and filtering.

Power IQ supports five types of reports:

- *Creating a Power/Energy Report* on the facing page
- *Creating a Temperature Report* on page 610
- *Creating a Rack Capacity and Failover Report* on page 612
- *Creating a Door Security Status Report* on page 618
- *Creating a Door Security Audit Report* on page 621



## Creating a Power/Energy Report

1. In the Reports tab, click New Report, and select Power/Energy Report.
2. Enter a name for the report in the dialog and click OK. You can change it later if needed.
3. The Preview/Edit page appears. In the Report Details section, select the data you want in the report rows.
  - Row for each:
    - Time: each row is a time period. Select Day, Week, Month, or Year
    - Tag: each row is a tag from the selected tag group. Select a Tag Group. See [Adding Tag Groups and Tags](#).
    - EDM Node: each row is a node in your data center, as configured in your EDM. Select Data Center, Floor, Room, Aisle, Row, Rack, PDU, or Device.
  - Data from:
    - PDUs: readings are taken from the PDU inlets.
    - Devices: readings are taken from the PDU outlets or circuits mapped to the IT device.
    - Racks: readings are taken from the rack power data.
  - Summary Function:
    - None
    - Sum
    - Minimum
    - Maximum
    - Average
  - Sort direction:
    - Ascending or Descending. Rows will be sorted by the Time, Tag, or EDM Node, unless you choose a measurement in Sort by measure. The Sort by measure field becomes active after you add a measurement.
    - Sort by measure: Select the measurement as defined for the report columns. Select None to sort by the Time, Tag, or EDM Node.
    - None, Energy, Average Active Power, Minimum Active Power, or Maximum Active Power, depending on the column settings.
  - Time range:
    - Period: Select a time period to limit the data included in the report.
      - Yesterday – the day before today.
      - Past Week – would be to count back exactly a week from now
        - For example: If you view a device chart on Tuesday, and the period is set to Past Week, the chart includes data from last Tuesday through this Tuesday.
      - Last Week – the calendar week preceding the present week.
        - For example: If you view a device chart on Tuesday, and the period is set to Last Week, the chart includes data from last Sunday through last Saturday. The chart shows the last full week.
      - Last Month – Starts at 12:00:00 a.m. the month before the current month and continues for n months. (The range does not include the current month.)
      - Year to Date – is a period, starting from the beginning of the current year and continuing up to the present day.





- Past Year – means the 365 days preceding today. For example, if it was 14th Feb, 2016 today, then the past year would mean the time between 15th Feb, 2015 and 14th Feb, 2016
  - Last Year - "Last year" refers to the previous calendar year.
  - Custom: Select a custom date range. Use the calendar tool to select a beginning and ending date.
4. Click Save.
  5. In the Report Columns section, select the readings you want to include in the report columns. Click Add, then select Energy or Active Power in the Measure field and specify one statistic type, if available, in the Statistic field. Repeat to add multiple measurements for a multi-column report.
    - Energy: Readings are kilowatt hours. Data comes from daily rollups. No statistic options are available for this reading.
    - Active Power: Readings are active power in kilowatts. Data comes from daily rollups.
    - Three statistic types are available: Average, Maximum and Minimum.
  6. In the Tag Filters section, select tags to filter what sources of data are included in the report. Only data from tagged sources is included. Click Add, then select Tag Group and Tag. Repeat to add more tag filters. If multiple tag filters are applied to a report, an object must have all the tags in order to be included in the report.
  7. Click Run Now to run the report. See [Schedule a Report](#) for adding scheduled email delivery.



## Creating a Temperature Report

A temperature report shows inlet/outlet temperatures at a rack level. Therefore, the row of the report is always racks and cannot be configured.

Temperature units are either degrees Celsius or Fahrenheit, based on system settings in Settings > Application Settings > Language and Local Settings.

Users without View permissions or a role that includes View permissions for certain racks cannot retrieve the temperature data from those racks when running the temperature report. See [Assigning Roles for User Permissions](#).

1. In the Reports tab, click New Report, and select Temperature Report.
2. Enter a name for the report in the dialog and click OK. You can change it later if needed.

The Preview/Edit page appears.

3. In the Report Details section, select how you want the data to be presented.
4. Summary Function:
  - None
  - Average
  - Minimum
  - Maximum
5. Ascending or Descending. The report is sorted by the rack names, unless you choose a measurement in Sort by measure. The Sort by measure field becomes active after you add a measurement.
6. Sort by measure: Select the measurement as defined for the report columns. Select None to sort by rack names.
7. None, Average Inlet Temperature, Minimum Inlet Temperature, Maximum Inlet Temperature, Average Outlet Temperature, Minimum Outlet Temperature, or Maximum Outlet Temperature, depending on the column settings.
8. Time range:
  - Period
    - Yesterday – the day before today.
    - Past Week – would be to count back exactly a week from now
      - For example: If you view a device chart on Tuesday, and the period is set to Past Week, the chart includes data from last Tuesday through this Tuesday.
    - Last Week – the calendar week preceding the present week.
      - For example: If you view a device chart on Tuesday, and the period is set to Last Week, the chart includes data from last Sunday through last Saturday. The chart shows the last full week.
    - Last Month – Starts at 12:00:00 a.m. the month before the current month and continues for n months. (The range does not include the current month.)
    - Year to Date – is a period, starting from the beginning of the current year and continuing up to the present day.



- Past Year – means the 365 days preceding today. For example, if it was 14th Feb, 2016 today, then the past year would mean the time between 15th Feb, 2015 and 14th Feb, 2016
  - Last Year - "Last year" refers to the previous calendar year.
  - Custom: Select a custom date range. Use the calendar tool to select a beginning and ending date.
9. Click Save.
  10. In the Report Columns section, select the readings you want to include in the report columns. Click Add, then select a temperature type in the Measure field, and a statistic type in the Statistic field. Repeat to add multiple measurements for a multi-column report.
  11. Measure: Inlet Temperature or Outlet Temperature.
  12. Statistic: Average, Maximum or Minimum.
  13. In the Tag Filters section, select tags to filter what sources of data are included in the report. Only data from tagged sources is included. Click Add, then select Tag Group and Tag. Repeat to add more tag filters. If multiple tag filters are applied to a report, an object must have all the tags in order to be included in the report.
  14. Selected tags filter out not only racks but also temperature sensors, based on whether their parent nodes match the selected tags.
  15. Click Run Now to run the report. See [Schedule a Report](#) for adding scheduled email delivery.



## Creating a Rack Capacity and Failover Report

A Rack Capacity and Failover Report shows which rack PDUs may completely lose power when one of the two redundant power sources fails or is turned off for maintenance.

The information in the report is organized by rack. For details on the data included in the report, see *Information Available in the Rack Capacity and Failover Report* on page 614.

PDUs can be paired if they have the same number of inlets and circuit breakers and the same capacity ratings. In cases where two PDUs meet this criteria, they will be automatically paired; you do not have to manually pair them. In cases where more than two PDUs meet this criteria, the PDUs may be paired automatically or you can pair the PDUs by applying the appropriate tags to the PDUs. A PDU must have at least one inlet to be included in the report. For more information, see *Pairing PDUs for Rack Capacity and Failover Reports* on page 614.

---

*Note: The report does not provide notification for loss of power but rather should be used to help you preemptively identify PDUs that are vulnerable in a failover simulation. This report makes assumptions about supported devices and should not be used as the sole basis for the design of an effective failover plan. For more information, see *Assumptions About Supported Racks* on page 616.*




---

1. In the Reports tab, click New Report, and select Rack Capacity and Failover Report. Enter a name for the report in the dialog and click the OK button. You can change it later if needed.




The Report Details page appears.


**Preview/Edit**


 Edit
  Run Now
  Delete


**Report Details**


Title:



Location:  

Sort Rack by:  




Rack Sort Direction:  

Pair Utilization Sort:  

Time Range:  Period  

Custom   to  

**Schedules**

 Add
  Edit
  Remove

| Frequency | Day | Attachment | Email to |
|-----------|-----|------------|----------|
|           |     |            |          |

2. In Location, click the browse button to select the EDM node containing the racks you want to analyze. You can select EDM nodes from Data Center to Row.
3. In Sort Rack by, select one of the following options:
  - a. Rack Name
  - b. Rack Utilization (rack power utilization for rack-level analysis)
  - c. Failover Utilization (rack failover utilization, for failover analysis similar to the previously available reports)
4. In Rack Sort Direction, select Descending or Ascending.
5. In Pair Utilization Sort, select Descending or Ascending.
6. In Time Range, select a period of time or set a custom range of dates. By default, this field is set to Last Complete Poll. For more information, see *Data Sources for Each Time Range* on page 617.
7. Click the Save button.
8. Click the Run Now button to run the report. See *Schedule a Report* on page 627 for adding scheduled email delivery.

---

*Note: To Edit the report details, click the Edit button on the report page. Make your edits on the Report Details page and click the Save button.*

---

## Pairing PDUs for Rack Capacity and Failover Reports

PDUs can be paired if they have the same number of inlets and circuit breakers and the same capacity ratings.

In cases where two PDUs meet this criteria, they will be automatically paired; you do not have to manually pair them.

In cabinets with more than two rack PDUs, the PDUs may be paired automatically (randomly) or explicitly by tagging the PDUs with Failover Pair tags and Source tags.

The tag groups Failover Pair and Source are available by default in Power IQ 5.2 and later.

When there are more than two PDUs in a rack, specific PDUs can be paired together by tagging the PDUs with the same tag from the Failover Pair tag group. Tags in the Failover Pair tag group can be created by users.

Tags in the Source tag group can be created by users and indicate left versus right column placement in the report (from left to right based on alphabetical order). For example, a PDU tagged with Alpha will be in the left column, and a PDU tagged with Beta will be in the right column.

For more information on tagging, see *Adding Tag Groups and Tags* on page 636.

## Information Available in the Rack Capacity and Failover Report

The following topics summarize the information available in the Rack Capacity and Failover Report.

### Rack Summary

A Rack Summary is located at the top of each rack section in the Rack Capacity and Failover Report. The Rack Summary displays the following information:

- Capacity (kW)
- Load (kW)
- Utilization

---

*Note: Capacity can be set by the user in the Rack Details page (accessible from the Data Centers tab) or via CSV Import by entering the appropriate value(s) in the Capacity column in the CSV file.*

---

### Rack PDU Capacity and Failover Information

The Rack Capacity and Failover Report displays the following PDUs in their own sub-sections:

- Paired (matched, compatible) PDUs within a single rack
- Single (mismatched, non-pairable, non-compatible) PDUs
- Transfer switches and multi-inlet PDUs

In addition to a Failover Simulation column that provides load and utilization information, each sub-section includes the following information for each PDU:

- Type (indicating if the reading is for an inlet, inlet pole, or a circuit breaker)
- Capacity (A)
- Load (A)
- Utilization



In the Failover Simulation column, the report shows the sum of the two PDU load values and compares it to the capacity of either one. When capacity is exceeded, the value is highlighted in red. When the load is within 80% of the capacity, the value is highlighted in yellow.

A section with an unpaired PDU will only show information for that PDU. Blank values will be displayed for Load and Utilization in the column where the second paired PDU typically would be located as well as in the Failover Simulation column. A note clarifying the reason why the PDU is not paired also will be displayed. For example: "Unpaired because: A matching PDU for failover simulation was not found on the rack."

When a rack PDU has three-phase inlets, the report shows a row for each line and a row for each circuit breaker when available.

---

*Note: A row indicating the highest utilization is available only for paired PDUs.*

---

---

*Note: A PDU must have at least one inlet to be included in the report.*

---

---

*Note: Non-PDU facility items and environmental monitoring systems are not supported in this report.*

---



## Assumptions About Supported Racks

Supported racks in the Rack Capacity and Failover Report are assumed to follow these guidelines.

- The load of the servers is split between the two rack PDUs
- IT Devices in the rack have an even number of cords. Half of the cords are connected to one PDU, and the other half are connected to the other PDU
- For 3-phase rack PDUs, IT Devices are connected to the same phase legs on both rack PDUs

The report disclaimer, included at the bottom of each Rack Capacity and Failover Report, details further assumptions and conditions regarding the accuracy and use of the report.

### Report Disclaimer

For 3-phase Rack PDUs, a device is assumed to be connected to the same phase legs on both PDUs. This report may not be accurate for racks with Rack PDUs that lost connectivity, lost power, or were decommissioned during the time period selected for the report. Reports that specify a time range use average amp readings, while reports with Last Complete Poll use a recent reading. The report does not report peak loads such that while the report may indicate that on average your rack would pass a failover situation, it cannot indicate that it will always pass. In general, this report relies on data collected in the past under a set of conditions. If these conditions change, this report will no longer be accurate. This report should not be used as the sole basis for the design of an effective failover plan.





## Data Sources for Each Time Range

A different data source is used for each time range selection in the reports. The time range is set when you create or edit a report. For more information on setting the time range for a Rack Capacity and Failover Report, see *Creating a Rack Capacity and Failover Report* on page 612.


| Time Interval   | Data Source   |
|---|---|
| Last Complete Poll  | Raw readings from the last completed poll cycle: inlet current and circuit breaker current  |
| Yesterday<br>Custom range that is 1 or 2 days long  | Hourly rollups: Inlet average current and circuit breaker average current<br>For each PDU, the average of all the hourly readings for the time period is displayed in the report. |
| Last Week<br>Past Week<br>Last Month<br>Past Month<br>Month to Date<br>Custom range that is greater than 2 days and less than or equal to 62 days | Daily rollups: Inlet average current and circuit breaker average current<br>For each PDU, the report shows the average of all the daily readings for the time period.             |
| Last Year<br>Past Year<br>Year to Date<br>Custom range greater than 62 days   | Monthly rollups: Inlet average current and circuit breaker average current<br>For each PDU, the report shows the average of all the daily readings for the time period.           |

## Creating a Door Security Status Report

The Door Security Status report provides security status information for doors within a specific location and its children and at the current date and time. This information is sorted into sections by the door space type (based on EDM parent node) and name, with a separate row for each door included in the report.

Preview/Edit

[Edit](#)
[Run Now](#)
[Delete](#)
[Export](#)


Reported: 2016/10/31 02:19 PM

### Sample Door Security Status Report

**Date:** 2016/10/31  
**Time:** 02:19 PM  
**Location:** London

| Space |         | Door               |           | Status |        |                 |
|-------|---------|--------------------|-----------|--------|--------|-----------------|
| Type  | Name    | Name               | Placement | Door   | Handle | Electronic Lock |
| Row   | Room A  | Room A Door        |           | —      | —      | —               |
| Rack  | Rack 1A | Rack 1A Front Door | Front     | Closed | Closed | Locked          |
| Rack  | Rack 1A | Rack 1A Rear Door  | Back      | Closed | Closed | Locked          |
| Rack  | Rack 2A | Rack 2A Back Door  |           | Closed | Closed | Locked          |
| Rack  | Rack 2A | Rack 2A Front Door |           | Closed | Closed | Locked          |

\*\* The statuses in this report are as of last successful PDU communication.

The Door Security Status report displays only the doors in the selected location that you have View permissions for.

The report includes the following columns:

- The Space column lists the type of space (Data Center, Floor, Room, Aisle, Row, or Rack) and its name.
- The Door column identifies each door included in the report and its placement (Front or Back). If placement has not been set for the door, the placement cell will be blank.
- The Status column lists the statuses for each door, handle, and electronic lock. The following statuses are supported: Locked/Unlocked and Open/Closed. If no sensor is mapped to the component, a dash (—) will be displayed.

The data in the report can be exported to PDF or CSV.

---

*Note: If there are no doors in the selected location, the report will display a message indicating that no doors have been found.*

---




*Note: The statuses in this report are as of the last successful PDU communication.*

---

1. In the Reports tab, click New Report > Door Security – Status Report. Enter a name for the report in the dialog and click OK. You can change it later if needed.


The Preview/Edit page appears. In the Report Details section, select the data you want to include.


**Preview/Edit**

 Edit  Run Now  Delete




**Report Details**

Title:


Location:  



**Schedules**

 Add  Edit  Remove

| Frequency | Day | Attachment | Email to |
|-----------|-----|------------|----------|
|-----------|-----|------------|----------|

- In Location, click the browse button () to select the EDM node containing the doors you want to include in the report. You can select from the following EDM nodes: Data Center, Floor, Room, Aisle, Row, or Rack. Click the Select Node button in the dialog to make your selection.

**Select Node**

- Power IQ
  - London
    - Room A
      - Rack 1A
      - Rack 2A

3. Back on the Preview/Edit page, click the Save button.
4. Click the Run Now icon to run the report. See *Schedule a Report* on page 627 for adding scheduled email delivery.

---

*Note on Editing and Deleting Reports: To Edit the Report Details, click the Edit button on the report page. Make your edits on the Preview/Edit page and click the Save button. To delete the report, click the Delete icon on the Preview/Edit page.*




---




## Creating a Door Security Audit Report

The Door Security Audit Report provides door, door handle, and card reader access summaries for doors for a specific location and date range. This information is sorted into sections by the door space type (based on EDM parent node) and name, with a separate row for each request logged in the report.

Preview/Edit

 Edit
  Run Now
  Delete


Reported: 2016/10/31 04:30 PM

### Sample Door Security Audit Report

---

**Date Range:** 2016/10/24 – 2016/10/31  
**Location:** London

#### Rack: "Rack 1A" - Door: "Rack 1A Front Door" (Front)

| Date Time              | User  | Requested Action | Access Summary  |
|------------------------|-------|------------------|---|
| 2016/10/27 02:26:50 PM | admin | Unlock           | A failed request to unlock door "Rack 1A Front Door" was sent by admin. |
| 2016/10/28 11:32:19 AM | admin | Unlock           | A failed request to unlock door "Rack 1A Front Door" was sent by admin. |
| 2016/10/28 11:32:29 AM | admin | Unlock           | A failed request to unlock door "Rack 1A Front Door" was sent by admin. |
| 2016/10/28 11:32:39 AM | admin | Unlock           | A failed request to unlock door "Rack 1A Front Door" was sent by admin. |

Each request log is time- and date-stamped and indicates the user who initiated the request and an access summary.






*Note: For doors accessed physically (when the request is not initiated in Power IQ), the Requested Action and User columns will remain blank.*




1. In the Reports tab, click New Report > Door Security – Audit Report. Enter a name for the report in the dialog and click OK. You can change it later if needed.

The Preview/Edit page appears. In the Report Details section, select the data you want to include.



**Reports**
⚙️ Activities
**Reports**
+ New Report

-  **\*\* Sample PDU power \*\***
-  **\*\* Sample Rack Capacity and Fa**
-  **\*\* Sample Temperature report \*\***
-  **New Audit**
-  **new temp**

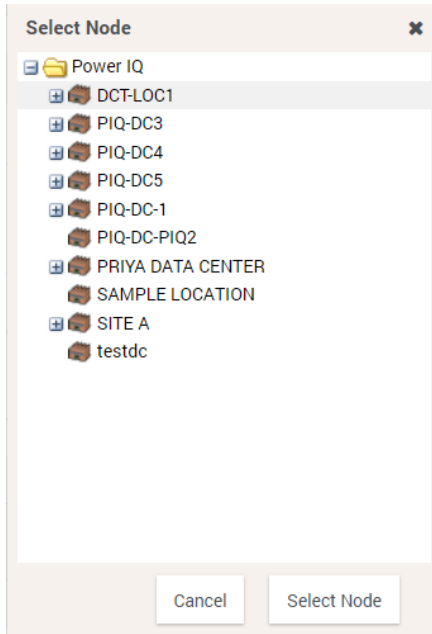
**Preview/Edit**
 Edit    Run Now    Delete
**Report Details**
**Title:** Sample Door Security Audit Report

**Location:** Power IQ ...
**Time Range:**  Period Past Week ▼  
 Custom ▼ to ▼
 Save
**Schedules**
 Add    Edit    Remove

| Frequency | Day | Attachment | Email to |
|-----------|-----|------------|----------|
|           |     |            |          |



- In Location, click the browse button (📁) to select the EDM node containing the doors you want to include in the report. You can select from the following EDM nodes: Data Center, Floor, Room, Aisle, Row, or Rack. Click the Select Node button in the dialog to make your selection.



- Back on the Preview/Edit page, in Time Range, select a period of time or set a custom range of dates. By default, this field is set to Past Week.
  - Period
    - Yesterday – the day before today.
    - Past Week – would be to count back exactly a week from now
      - For example: If you view a device chart on Tuesday, and the period is set to Past Week, the chart includes data from last Tuesday through this Tuesday.
    - Last Week – the calendar week preceding the present week.
      - For example: If you view a device chart on Tuesday, and the period is set to Last Week, the chart includes data from last Sunday through last Saturday. The chart shows the last full week.
    - Last Month – Starts at 12:00:00 a.m. the month before the current month and continues for n months. (The range does not include the current month.)
    - Year to Date – is a period, starting from the beginning of the current year and continuing up to the present day.
    - Past Year – means the 365 days preceding today. For example, if it was 14th Feb, 2016 today, then the past year would mean the time between 15th Feb, 2015 and 14th Feb, 2016





- Last Year - "Last year" refers to the previous calendar year.
  - Custom: Select a custom date range. Use the calendar tool to select a beginning and ending date.
- 4. Click the Save button.
- 5. Click Run Now to run the report. See *Schedule a Report* on page 627 for adding scheduled email delivery.

---

*Note: The data in the Door Security Audit report can be exported as a PDF file only.*

---

*Note on Editing and Deleting: To Edit the Report Details, click the Edit icon on the report page. Make your edits on the Preview/Edit page and click the Save button. To delete the report, click the Delete icon on the Preview/Edit page.*

---



## Run a Report

1. In the Reports tab, select the report in the Tabular Reports list. The last-run version of the report displays.
2. Click Run Now. A status message displays while the report generates.

The new report appears in the Preview/Edit section.

3. Verify the report version by looking to the Report History column listing all versions of the report. Click other report versions to view.



## Schedule a Report

You can schedule a report to run at a selected interval. Scheduled reports are run after 1:30am on the day scheduled. The report is emailed to the recipient list shortly after the report run completes.

Scheduled report runs also appear in the Report History section in the Reports tab.

1. In the Reports tab, select the report you want to schedule.
2. Click **Edit**.
3. In the Schedules section at the bottom of the report parameters, click **Add**. A report may have more than one schedule.
4. In the Report Schedule dialog, set the schedule parameters:
  - **Email to:** Enter the email addresses for all recipients of the report.
  - **Frequency:** Select **Daily**, **Weekly**, or **Monthly**. For **Weekly** or **Monthly**, specify the day or date.
  - **Attachment:** Select the file type for the report, **CSV** or **PDF**.
5. Click **Save**.



## Exporting a Report to PDF or CSV

You can export most report data to either a PDF or CSV file.

Failover reports can only export to PDF.

1. In the Reports tab, select the report you want to export.
2. Choose Export > PDF or CSV.
3. Save or open the file. Choices depend on your browser.

---

*Note: If opening a temperature report in CSV with Microsoft applications, such as Excel, a redundant character appears prior to the degree symbol. This character is resulted from the default Microsoft encoding and can be ignored.*

---



## Report Examples

- [Monthly Energy Report for One Internal Customer with Scheduled PDF Delivery](#)
- [Data Center Power Report for Past Week](#)
- [Load for All B-Side PDUs for Last Month](#)



## Monthly Energy Report for One Internal Customer with Scheduled PDF Delivery

This report shows how to create a monthly energy usage report for a customer, and schedule it for email delivery each month.

**Preview/Edit**

Edit ▶ Run Now ⊘ Delete
Export ▼

Reported: 2014/06/10 05:20 PM

### Monthly IT Energy

**Customer** IT  
**Date Range** 2014/05/01 – 2014/05/31

| Device | kWh     |
|--------|---------|
| EPIQ4  | 124.113 |
| EPIQ3  | 97.929  |
| EPIQ2  | 81.217  |
| EPIQ1  | 49.231  |

Required Tagging:

- Add a Tag Group for Customer, with tags for each customer's name. See [Adding Tag Groups and Tags](#).
- Assign the customer name tag to each IT device in your EDM. See [Assign Tags in the Data Centers Tab](#).

**Report Details**

Title:

Row for each: Edm Node ▼      Sort direction: Ascending ▼

Device ▼      Sort by measure: None ▼

Data from: Devices ▼

Time Range:  Period Last Month ▼

Custom  ▼ to  ▼

✔ Save

### Report Columns

 Add  Remove




|                          | Measure |  |
|--------------------------|---------|--|
| <input type="checkbox"/> | Energy  |  |

### Tag Filters

 Add  Remove

|                          | Tag Group | Tag |  |
|--------------------------|-----------|-----|--|
| <input type="checkbox"/> | Customer  | IT  |  |

### Schedules

 Add  Edit  Remove

|                          | Frequency | Day | Attachment | Email to      |
|--------------------------|-----------|-----|------------|---------------|
| <input type="checkbox"/> | Monthly   | 5th | pdf        | IT@sample.com |



## Data Center Power Report for Past Week

This report shows how to quickly find the past week power for your data centers.

**Preview/Edit**

Edit Run Now Delete Export

Reported: 2014/06/10 04:07 PM

### Power by Datacenter Past Week

**Date Range** 2014/06/03 – 2014/06/09

| Data Center | kW      |
|-------------|---------|
| Raleigh DC  | 166.719 |

Required Tagging:

- None.

**Report Details**

Title:

Row for each:

Sort direction:

Sort by measure:

Data from:

Time Range:  Period   Custom  to



### Report Columns

 Add  Remove

|                          |              |           |  |
|--------------------------|--------------|-----------|--|
| <input type="checkbox"/> | Measure      | Statistic |  |
| <input type="checkbox"/> | Active Power | None      |  |

### Tag Filters

 Add  Remove

|  |           |     |  |
|--|-----------|-----|--|
|  | Tag Group | Tag |  |
|--|-----------|-----|--|

### Schedules

 Add  Edit  Remove

|  |           |     |            |          |
|--|-----------|-----|------------|----------|
|  | Frequency | Day | Attachment | Email to |
|--|-----------|-----|------------|----------|



## Load for All B-Side PDUs for Last Month

This report shows how you could find the kW load on all B-side PDUs for the last month.

**Preview/Edit**

Edit
Run Now
Delete
Export

Reported: 2014/06/10 04:13 PM

### Load for B-Side PDUs - Last Month

**PDU Type** B Side  
**Date Range** 2014/05/01 – 2014/05/31

| PDU             | kW      |
|-----------------|---------|
| PX-3370-SysTest | 125.984 |
| px130lab0501    | 48.703  |
| px130lab0502    | 38.961  |

Tagging Required:

- Add a Tag Group: PDU Type, with tags for A-Side and B-Side. See [Add Tag Groups and Tags](#).
- Assign the B-Side tag to each PDU. See [Assign Tags in the Data Centers Tab](#).

**Report Details**

Title:


Row for each:  
 Sort direction:

Sort by measure:

Data from:

Time Range:  Period 
 Custom  to

### Report Columns

 Add  Remove




|                          |              |  |
|--------------------------|--------------|--|
| <input type="checkbox"/> | Measure      |  |
| <input type="checkbox"/> | Active Power |  |

### Tag Filters

 Add  Remove

| Tag Group                | Tag      |        |
|--------------------------|----------|--------|
| <input type="checkbox"/> | PDU Type | B Side |

### Schedules

 Add  Edit  Remove

| Frequency | Day | Attachment | Email to |
|-----------|-----|------------|----------|
|           |     |            |          |



## Adding Tag Groups and Tags

Adding tag groups and tags is the first step toward using filtering by tag in reports.

Tag groups and tags help you categorize objects in your data center. When you filter by tag in a report, the report automatically includes readings from only the tagged objects. If multiple tag filters are applied to a report, an object must have all the tags in order to be included in the report.

Some examples of tag groups are Customer, Department, PDU Type, or Device Type. See [Tag Example: Report on Racks by Customer Tag](#).

Tags must be added before you can assign them to EDM nodes. See [Assign Tags in the Data Centers Tab](#).

| Tag Groups                        |      |
|-----------------------------------|------|
| Name ▲                            | Tags |
| <input type="checkbox"/> Customer | 5    |
| <input type="checkbox"/> Mission  | 1    |
| <input type="checkbox"/> Service  | 5    |
| <input type="checkbox"/> UPS Name | 2    |

| Tags                                     |              |
|--|--------------|
| Name ▲                                   | Tagged Items |
| <b>Tag Group: Customer</b>               |              |
| <input type="checkbox"/> Commercial Bank | 1            |
| <input type="checkbox"/> Investment Bank | 1            |
| <input type="checkbox"/> Online Banking  | 4            |
| <input type="checkbox"/> Retail Bank     | 2            |
| <input type="checkbox"/> loan dept       | 0            |
| <b>Tag Group: Mission</b>                |              |
| <input type="checkbox"/> HR              | 1            |
| <b>Tag Group: Service</b>                |              |
| <input type="checkbox"/> E-Mail          | 1            |
| <input type="checkbox"/> On Line Reg     | 0            |
| <input type="checkbox"/> Payroll         | 0            |

1. In the Reports tab, choose Activities > Tags and Tag Groups.
2. In the Tag Groups section, click Add, then add the names of a group of tags you want to add. Click Add.

### Example

If you plan to tag by customer name, add a Tag Group called Customer.

3. In the Tags section, click Add, then select the Tag Group you want to add tags to, and enter the tag name in the Name field. Click Add.

### Example

If you have a Tag Group called Customer, enter your customer names as the Tags in that group.

4. Next step: Assign the tags to EDM nodes. See [Assign Tags in the Data Centers Tab](#).

## Tag Example: Report on Racks by Customer Tag

In a colocation facility, you may want to track racks by customer.

- Add a tag group called Customer.
- Add tags for each customer name.
- Assign the correct customer name tag to the racks in the EDM that the customer owns.

In tabular reports, there are two ways to use tags.

- Create a report with the Row for Each as Tag, then select Tag Group: Customer, and Tag: "Customer Name". When the report runs, you see one row of data for each customer.

### OR

- Create a report with the Row for Each as Time or EDM Node. Add a Tag Filter, for example, using Tag Group: Customer, then selecting Tag: Customer Name of your choice. When the report runs, you see one row of data for each time or node, but the data is filtered to include only nodes tagged with the specified customer name.



## Migrating Existing Data to Tags

You can migrate some existing data in your EDM to tags.

- Data Centers, PDUs and IT Devices: Custom Field 1 and Custom Field 2
- IT Devices: Customer and Device Type

You can find these fields on the Data Center, IT Device, and PDU objects in the Data Centers tab.

Migration creates tag groups from the field names, and creates tags from the data in the fields. Migration also applies the newly created tags to the EDM nodes where they were originally entered.

---

*Note: Migration does not remove the data from the original fields. The original fields are not linked to the new tags in any way, so if you choose to maintain both data locations, you must do so manually. The best practice is to maintain this data as tag groups and tags, going forward.*

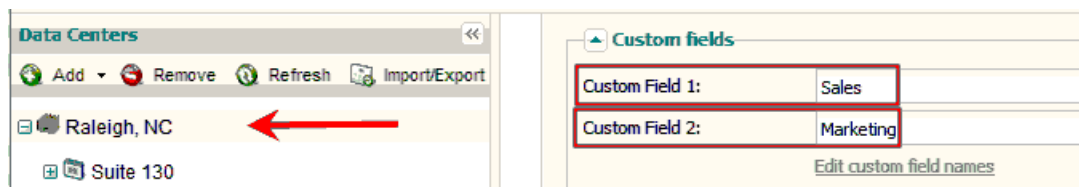
---

See [Migrate Custom Field Data](#) for instructions to do the migration.

IT Devices, Data Centers, and PDUs:

- Each IT Device, Data Center and PDU contains two custom fields, Custom Field 1 and Custom Field 2. You may have edited the names.
- Upon migration, the name of the custom field becomes the tag group name, with the EDM node in parentheses, to identify where the data came from.

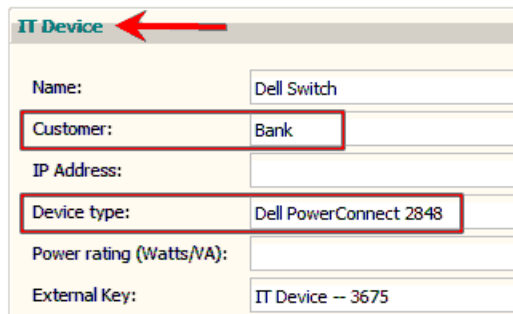
| EDM Node    | Field Name: Contents                               | Migration Creates - > | Tag Group: Tag   |
|-------------|--|-----------------------|--|
| Data Center | Custom Field 1: Sales<br>Custom Field 2: Marketing |                       | Custom Field 1 (Data Center): Sales<br>Custom Field 2 (Data Center): Marketing |
| IT Device   | Custom Field 1: Colo1<br>Custom Field 2: Colo2     |                       | Custom Field 1 (IT Device): Colo1<br>Custom Field 2 (IT Device): Colo2         |
| PDU         | Custom Field 1: Facilities<br>Custom Field 2: IT   |                       | Custom Field 1 (PDU): Facilities<br>Custom Field 2 (PDU): IT                   |



IT Devices:

- In addition to Custom Fields 1 and 2, IT devices also contain fields for Customer and Device Type that you can migrate to tags.

| Field Name: Contents                | Migration Creates -> | Tag Group: Tag                      |
|-------------------------------------|----------------------|-------------------------------------|
| Customer: Bank                      |                      | Device Customer: Bank               |
| Device type: Dell PowerConnect 2848 |                      | Device Type: Dell PowerConnect 2848 |

**IT Device** ←

Name: Dell Switch

Customer: Bank

IP Address:

Device type: Dell PowerConnect 2848

Power rating (Watts/VA):

External Key: IT Device -- 3675

## Migrate Custom Field Data

The Migrate Custom Field Data tool creates new tags and tag groups based on existing custom and standard field data for PDUs, devices, and data centers.

See [Migrating Existing Data to Tags](#) for details.

If you use the migration tool more than once, duplicate tags and tag groups will not be created. If new data is found, new tags will be added to the existing tag groups.

1. In the Reports tab, choose Activities > Tags and Tag Groups.
2. Click Migrate.
3. To confirm, click Migrate Custom Field Data in the message that appears.

When complete, tag groups and tags appear in the Reports tab. The tags have also been applied to the EDM nodes where they originated.

4. To view the tags applied, go to the EDM node in the Data Centers tab, then scroll down to the Tags section. For racks and PDUs, there is no Tags section. Choose Actions> Edit Tags to view tags.

| Tags  |  |
|---|--|
|  Add |  Remove |
| <input type="checkbox"/> Tag Group  | Tag  |
| <input type="checkbox"/> Custom Field 1 (Data Center)                                 | Sales  |
| <input type="checkbox"/> Custom Field 2 (Data Center)                                 | Marketing  |



## Assign Tags in the Data Centers Tab

You can assign tags to EDM nodes in the Data Centers tab. To assign tags to multiple EDM nodes at once, use the CSV import tool. See [Assigning Tags with CSV Import](#).

Tags can be assigned to these EDM nodes:

- Data Center
- Floor
- Room
- Row
- Aisle
- Rack
- PDU: rack PDUs only, no facility items
- IT Device

1. In the Data Centers tab, go to the EDM node you want to tag. Scroll down to the Tags section.
2. Click Add, then select the Tag Group and Tag. Click Add. The assigned tags display in the list.

To assign tags to a rack or PDU in the Data Centers tab:

1. In the Data Centers tab, go to the rack or PDU you want to tag.
2. Choose Actions > Edit Tags.
3. Click Add, then select the Tag Group and Tag. Click Add. The assigned tags display in the list.

To remove tags:

---

*Note: This is the only way to remove a tag. You cannot remove a tag using CSV import.*

---

1. In the Data Centers tab, go to the EDM node you want to remove a tag from.
2. Select the tag and click Remove.



## Exporting and Importing Tags

Tag import is used to assign tags to EDM nodes. You cannot create tag groups and tags using import. See [Assigning Tags with CSV Import](#) .

To export your existing tag assignments, use the export tool. See [Exporting Existing Tag Assignments](#).

For help with import errors, see [Import Errors for Tags](#).



## Exporting Existing Tag Assignments

The tag export file includes all tagged EDM nodes.

You can use the export file as a template to add more tags to EDM nodes. Duplicate tags are not added. Each import adds new tags, and does not change any existing assigned tags. See [Assigning Tags with CSV Import](#).

1. In the Reports tab, choose Activities > Export/Import Tag Entries.
2. Click Export. Save or open the file. Choices depend on your browser.



## Assigning Tags with CSV Import

To assign tags to multiple EDM nodes at once, use the CSV import tool. The import uses the tag groups and tags you have already created. Import cannot create new tag groups or tags. To create new, see [Add Tag Groups and Tags](#).

Duplicate tags are not added. Each import adds new tags, and does not change any existing assigned tags.

The file is validated before import. If any errors are found, the whole file is rejected, and no changes are made. You can view error messages for each line of the file upon rejection. See [Import Errors for Tags](#).

---

*Tip: To export a CSV file to use as a template, assign one tag manually, then export. See [Assign Tags in the Data Centers Tab](#) and [Export Existing Assigned Tags](#).*

---

1. Create the CSV file. The CSV file must have 5 columns:

| type | external_key | name | tag_group | tag |
|------|--------------|------|-----------|-----|
|------|--------------|------|-----------|-----|

- type: The EDM node you're assigning the tag to. Not case sensitive. The following entries can be used.
    - DATA\_CENTER
    - FLOOR
    - ROOM
    - ROW
    - AISLE
    - RACK
    - PDU
    - DEVICE
  - external\_key: The EDM node's external key.
  - name: Include an EDM node name here for convenience when creating your import file. The import does not use or change the name.
  - tag\_group: The name of an existing tag group. The import cannot create a new tag group.
  - tag: The name of an existing tag in the tag group. The import cannot create a new tag.
2. Save the file as .CSV.
  3. In the Reports tab, choose Activities > Export/Import Tag Entries.
  4. Click Browse then select the .CSV file and click OK. Click Import. The file is validated.

Success: All tags are assigned as described in the file.

- Error: If the file does not validate, click View Errors. The Import Errors display in the page. See [Import Errors for Tags](#).



## Import Errors for Tags

Each error includes the line number from the CSV file, the error message, and the details.

|   | A           | B                 | C                    | D           | E            |
|---|-------------|-------------------|----------------------|-------------|--------------|
| 1 | type        | external_key      | name                 | tag_group   | tag          |
| 2 | DATA_CENTER | Data Center -- 3  | Raleigh, NC          | Department  | Sales        |
| 3 | PDU         | 192.168.46.216    | 192.168.46.216       | PDU Make    | #Raritan PX2 |
| 4 | PDU         | 192.168.43.164    | 192.168.43.164       | Department  | Facilities   |
| 5 | DEVICE      | IT Device -- 2286 | KX3 (192.168.45.113) | Status      | INSTALLED    |
| 6 | DEVICE      | IT Device -- 2452 | lcd panel            | Device Type | LCD Panel    |
| 7 | DEVICE      | IT Device -- 2296 | ts-10-128            | Device Type | V1 Hardware  |

Common errors and resolutions:

| Error  | Resolution  |
|--|---|
| Tag group does not exist<br>Tag does not exist | You must add tag groups and tags before you can assign them using the import.<br>See <a href="#">Adding Tag Groups and Tags</a> . |
| Tag entry already exists                       | The tag is already assigned to the EDM node specified in the CSV file.  |
| External key does not exist as an external key | The external key is incorrect for the EDM node. Verify the external key in the EDM node in the Data Centers tab.                  |
| Tag can't be blank                             | You must enter a tag for each line in the CSV file.   |

Example error:

| Line number            | Error                       | EDM Node Type | EDM Node External Key | Tag Group    | Tag              |
|------------------------|-----------------------------|---------------|-----------------------|--------------|------------------|
| Line 160 has Error(s): | Tag entry already exists in | [DEVICE,      | IT Device -- 3657,    | Device Type, | Ethernet Switch] |

## User Permissions for Reports and Tags

You must have the Site Administrator role to create tag groups and tags. This is the "admin" user role.

You must have Site Administrator, Administrator, or Operator role permissions to a node to assign a tag to it.

The reports you create will be limited based on your permissions to view the EDM.

## View Tag Groups

Power IQ 5.1.1 and higher have enhancements to Tag Groups to limit the visibility of customer data. To accomplish this, a new user role has been added: View Tag Groups.

**User Information for jkwz**

Edit Change Password Manage Event Notifications

**Login:** jkwz  
**First Name:** Jeanne  
**Last Name:** Ziobro  
**Email:** jeanne.ziobro@sunbirdcim.com  
**Created:** 04/08/16 03:58:44 PM UTC  
**Last Updated:** 04/08/16 03:58:44 PM UTC  
**Description:**

**User Roles**

Select a role to add... Add Remove Empty

| Name  | Label                                   | Source                           |
|---|---|----------------------------------|
| <input checked="" type="checkbox"/> View Tag Groups | View tags and tag groups.               | Group: <a href="#">All Users</a> |
| <input type="checkbox"/> View                       | View all PDUs, devices, etc. Read-only. | Group: <a href="#">All Users</a> |

Page 1 of 1 Displaying 1 - 2 of 2

**User Groups**

Select a group to add... Add Remove Empty

| Name  |
|---|
| <input checked="" type="checkbox"/> <a href="#">All Users</a> |

Page 1 of 1 Displaying 1 - 1 of 1

By default, all users will have the role assigned to them. Customers wishing to prevent a user from this role must remove the role from their settings.

To remove this role, the Site Administrator must click on the User Group > All Users > Group Roles > View Tag Groups > Remove.

**Group Information for All Users**

Edit

**Name:** All Users  
**Created By:** System Administrator  
**System Group:** Yes  
**Edit Members:** No

**Group Roles**

Please select a role to add... Add Remove Empty

| Name  | Label                                   |
|---|---|
| <input checked="" type="checkbox"/> View Tag Groups | View tags and tag groups.               |
| <input type="checkbox"/> View                       | View all PDUs, devices, etc. Read-only. |

Page 1 of 1 Displaying 1 - 2 of 2

**Group Members**

Please select a user to add... Add Remove Empty

| Login                          | Name                 | Email                        |
|--------------------------------|----------------------|------------------------------|
| <input type="checkbox"/> admin | System Administrator | admin@localhost              |
| <input type="checkbox"/> jkvwz | Jeanne Ziobro        | jeanne.ziobro@sunbirdcim.com |

Page 1 of 1 Displaying 1 - 2 of 2

The role Manage Tag Groups also has been added.

If a Site Administrator wishes to allow a particular user to be able to manage and view the Tag Groups, the Administrator can simply assign this role to the user. By default, users will not have this role.

**User Roles**

Administrator  
Create Reports and Dashboards  
Event Manager  
Operator  
Power Control  
Site Administrator  
Manage Tag Groups  
View Tag Groups  
View

Name

# Chapter 20:Plugins

Power IQ uses two types of plugins to manage data center facility items: standard plugins and dynamic plugins.

Standard plugins are built in to Power IQ and provide native or "out of the box" support for devices. For more information, see *Standard Plugins* on the next page.

Dynamic plugins enable you to add data collection support for external PDUs and facility items that Power IQ does not support by standard plugin. There are two types of dynamic plugins: structured and custom. For more information, see *Dynamic Plugins* on page 650.

---

*Note: During the PDU discovery process, dynamic plugins have priority over standard plugins. Therefore, if a PDU can be managed by either a dynamic or standard plugin, Power IQ will select the dynamic plugin, even if a standard plugin is available.*

---

For a list of vendors supported by standard and dynamic plugins, see *Supported Vendors* on page 746. For complete lists of devices supported by standard and dynamic plugins, see the [Sunbird Addons website](#).





## Standard Plugins

Standard plugins are built in to Power IQ and provide native or "out of the box" support for devices. They do not have to be installed.

Users cannot add or remove standard plugins from Power IQ; however, they can create or download and install their own dynamic plugins. For more information on using dynamic plugins, see *Dynamic Plugins* on the facing page

For a list of vendors supported by standard plugins, see *Supported Vendors* on page 746. For a full list of devices supported by standard plugin, see the [Standard Plugins page on the Sunbird Addons website](#).



## Dynamic Plugins

Dynamic plugins enable you to add data collection support for external PDUs and facility items that Power IQ does not support by standard plugin.

Dynamic plugins work by mapping SNMP OIDs to Power IQ's database so that Power IQ can find and retrieve data from the device. Power IQ does not include dynamic plugins "out of the box"; rather, users may create or download and install the appropriate dynamic plugins for free from the [Sunbird Addons website](#).

During the PDU discovery process, dynamic plugins have priority over standard plugins. Therefore, if a PDU can be managed by either a dynamic or standard plugin, Power IQ will select the dynamic plugin, even if a standard plugin is available.

There are two types of dynamic plugins: structured and custom. For more information, see *Types of Dynamic Plugins: Structured and Custom* on page 652.

The following device types are supported in each type of dynamic plugin:

- CRAC
- Floor PDU
- Floor UPS
- Power Panel
- Rack PDU
- Rack UPS
- Standalone Meter

For a list of vendors supported by existing dynamic plugins, see *Supported Vendors* on page 746. For a full list of supported devices or to download existing plugins, see the [Dynamic Plugins page on the Sunbird Addons website](#).



## Limitations of Dynamic Plugins

There are a number of limitations that should be kept in mind when managing PDUs via dynamic plugins.

- Buffered data retrieval is not supported for PDUs added with dynamic plugins.
- If the desired outcome is a dynamic plugin that only supports traps, then a structured plugin is preferred because a structured plugin can pass validation without any sensor mappings being added. On the other hand, a custom plugin requires at least one sensor mapping to pass validation.
- Power IQ events created from traps via a dynamic plugin will never clear automatically like those managed by standard plugins can. These events must be manually cleared by the end user.
- Under certain scenarios, depending upon what the relevant MIB supports, it may be necessary to hard code certain values in a custom dynamic plugin. For example, if it is not possible to determine from the MIB what type of external sensor is attached at a particular port, it may be necessary to hard code the sensor type to a temperature or humidity as applicable. Assume a scenario with a Rack PDU with two ports, where the custom plugin is configured with Port 1 hard coded to a temperature sensor and Port 2 to a humidity sensor. This will work for all PDUs with this specific configuration. However, if there are PDUs where Port 1 is the humidity sensor and Port 2 is temperature, then Power IQ will show misleading data. It is important to keep this information in mind and to ensure a homogenous configuration across all managed PDUs if necessary.



## Types of Dynamic Plugins: Structured and Custom

There are two types of dynamic plugins: structured and custom.

The structure of the PDU's SNMP MIB typically determines whether a structured or a custom dynamic plugin is most appropriate.

Generally, if the MIB you are working with supports it, you should choose the structured dynamic plugin option.

---

*Note: All dynamic plugins created before Power IQ release 4.1 were structured dynamic plugins. Upon upgrade, the dynamic plugin type for these existing plugins will be set to "Rack PDU." You cannot change the type, but the rest of the dynamic plugin can be edited.*

---

### Structured Dynamic Plugin

A structured dynamic plugin is derived from hierarchically structured MIBs. Typically, the values are organized in tables in the MIB. For example, a hierarchical MIB for a rack PDU typically has separate tables for elements such as inlets, circuit breakers, and outlets.

In a structured dynamic plugin, you define mappings and index mappings that represent a series of OID values to be collected. You do not have to provide a mapping for every single SNMP OID that you want Power IQ to collect. If the MIB supports values that can be retrieved that indicate the number of inlets, outlets, circuits, and so on, or if the MIB contains columnar values that can be counted, it is possible to create a structured dynamic plugin that is capable of managing a variety of PDU models. This is not possible with a custom dynamic plugin.

### Custom Dynamic Plugin

A custom dynamic plugin requires a mapping for every desired reading. For example, you would map values for outlet 1 voltage, outlet 1 current, outlet 2 voltage, outlet 2 current, etc. You must manually specify each object id you want Power IQ to collect, and then map each object id into the Power IQ PDU/electrical device data model.

Custom dynamic plugins are useful when:

- You want to monitor a PDU that does not use SNMP for remote communication. These PDUs may use Modbus or Bacnet protocols for remote communication. You can monitor these PDUs with an SNMP gateway. The SNMP gateway gives the ability to convert Modbus, or other protocols, to SNMP. The custom dynamic plugin can use a combination of the SNMP OIDs and hard-coded values mapped to the data model of the PDU type to support your specific PDU. See *SNMP Gateways and Custom Dynamic Plugins* on page 744.
- The device's MIB does not contain data in tables, also known as a "flat" or "unstructured" MIB.



## Mappings for Each PDU Type

This section lists the valid mappings supported by each type of PDU. Click below to jump to the appropriate section.

- *Common Mappings* below
- *CRAC Mappings* on the facing page
- *Floor PDU Mappings* on the facing page
- *Floor UPS Mappings* on page 656
- *Power Panel Mappings* on page 658
- *Rack PDU Mappings* on page 659
- *Rack UPS Mappings* on page 661
- *Standalone Meter Mappings* on page 664
- *External Temperature and Humidity Sensor Mappings* on page 665
- *Temperature Unit Configuration Precedence* on page 667
- *Binary Sensor Mappings - Custom Dynamic Plugins Only* on page 668
- *Wildcard Index Mappings - Structured Dynamic Plugins Only* on page 668
- *Wildcard Index Mapping Example* on page 669

---

*Note: The Index mappings listed below are supported in structured plugins only. They are not supported for custom plugins.*

---

### Common Mappings

The following mappings are supported across all the PDU types (except for Standalone Meters). All PDU types (except for Standalone Meters) may contain inlets, inlet poles, and external temperature and humidity sensors.

For information on external temperature and humidity sensors, see *External Temperature and Humidity Sensor Mappings* on page 665.

| Structured Plugin Mapping Name | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings |
|--------------------------------|---|
| PDU Name                       | PDU Name  |
| PDU Firmware                   | PDU Firmware  |
| Inlet Index                    | N/A   |
| Inlet Apparent Power           | inlet[ordinal] apparent_power   |

| Structured Plugin Mapping Name            | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings |
|---|---|
| Inlet Active Power                        | inlet[ordinal] active_power   |
| Inlet Power Factor                        | inlet[ ordinal] power_factor  |
| Inlet Voltage                             | inlet[ordinal] voltage  |
| Inlet Current                             | inlet[ordinal] current  |
| Inlet Energy                              | inlet[ ordinal] energy  |
| Inlet Pole Index                          | N/A   |
| Inlet Pole Active Power                   | inlet[ ordinal] inletpole[ordinal] active_power                           |
| Inlet Pole Voltage                        | inlet[ordinal] inletpole[ordinal] voltage                                 |
| Inlet Pole Current                        | inlet[ordinal] inletpole[ordinal] current                                 |
| External Temperature and Humidity Sensors | See <i>External Temperature and Humidity Sensor Mappings</i> on page 665. |

## CRAC Mappings

A CRAC may contain inlets, inlet poles and external temperature and humidity sensors.

Only the *Common Mappings* on the previous page and binary sensor mappings are supported for CRAC PDUs. For information on binary sensors, see *Binary Sensor Mappings - Custom Dynamic Plugins Only* on page 668.

## Floor PDU Mappings

A Floor PDU may contain inlets, inlet poles, power panels, panel inlets, panel inlet poles, circuits, circuit poles, and external temperature and humidity sensors.

In addition to the *Common Mappings* on the previous page, a Floor PDU supports:

| Structured Plugin Mapping Name | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings | Notes |
|--------------------------------|---|-------|
| Panel Index                    | N/A   |       |
| Panel Name                     | panel[ordinal] name   |       |

| Structured Plugin Mapping Name | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings | Notes |
|--------------------------------|---|-------|
| Panel Inlet Index              | N/A   |       |
| Panel Inlet Active Power       | panel[ordinal] inlet[ordinal] active_power                                |       |
| Panel Inlet Apparent Power     | panel[ordinal] inlet[ordinal] apparent_power                              |       |
| Panel Inlet Power Factor       | panel[ordinal] inlet[ordinal] power_factor                                |       |
| Panel Inlet Current            | panel[ordinal] inlet[ordinal] current                                     |       |
| Panel Inlet Voltage            | panel[ordinal] inlet[ordinal] voltage                                     |       |
| Panel Inlet Energy             | panel[ordinal] inlet[ordinal] watt_hour                                   |       |
| Panel Inlet Pole Index         | N/A   |       |
| Panel Inlet Pole Active Power  | panel[ordinal] inlet[ordinal] inletpole [ordinal] active_power            |       |
| Panel Inlet Pole Current       | panel[ordinal] inlet[ordinal] inletpole [ordinal] current                 |       |
| Panel Inlet Pole Voltage       | panel[ordinal] inlet[ordinal] inletpole [ordinal] voltage                 |       |
| Circuit Index                  | N/A   |       |
| Circuit Apparent Power         | panel[ordinal] circuit[ordinal] apparent_power                            |       |
| Circuit Active Power           | panel[ordinal] circuit[ordinal] active_power                              |       |
| Circuit Power Factor           | panel[ordinal] circuit[ordinal] power_factor                              |       |
| Circuit Voltage                | panel[ordinal] circuit[ordinal] voltage                                   |       |
| Circuit Current                | panel[ordinal] circuit[ordinal] current                                   |       |
| Circuit Energy                 | panel[ordinal] circuit[ordinal] energy                                    |       |



| Structured Plugin Mapping Name | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings    | Notes   |
|--------------------------------|--|---|
| Circuit Pole Index             | N/A  |   |
| Circuit Pole Name              | panel[ordinal] circuit[ordinal] circuitpole [ordinal] name                   |   |
| Circuit Pole Phase             | panel[ordinal] panel[ordinal] circuit [ordinal] circuitpole[ordinal] phase   |   |
| Circuit Pole Position          | panel[ordinal] circuit[ordinal] circuitpole [ordinal] position               |   |
| Circuit Pole Active Power      | panel[ordinal] circuit[ordinal] circuitpole [ordinal] active_power           | Not displayed in Power IQ, but data is rolled up to provide Circuit Active Power. Use this mapping if your PDU does not provide Active Power data at the Circuit level. |
| Circuit Pole Voltage           | panel[ordinal] circuit[ordinal] circuitpole [ordinal] voltage                |   |
| Circuit Pole Current           | panel[ordinal] circuit[ordinal] circuitpole [ordinal] current                |   |
| N/A                            | See <i>Binary Sensor Mappings - Custom Dynamic Plugins Only</i> on page 668. |   |

## Floor UPS Mappings

A Floor UPS (Uninterruptible Power Supply) may contain inlets, inlet poles, circuits, circuit poles, batteries, outputs, output poles, and external temperature and humidity sensors.

In addition to the *Common Mappings* on page 653, a Floor UPS supports:

| Structured Plugin Mapping Name | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings | Notes |
|--------------------------------|---|-------|
| Circuit Index                  | N/A   |       |
| Circuit Apparent Power         | circuit[ordinal] apparent_power   |       |





| Structured Plugin Mapping Name | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings | Notes   |
|--------------------------------|---|---|
| Circuit Active Power           | circuit[ordinal] active_power   |   |
| Circuit Power Factor           | circuit[ordinal] power_factor   |   |
| Circuit Voltage                | circuit[ordinal] voltage  |   |
| Circuit Current                | circuit[ordinal] current  |   |
| Circuit Energy                 | circuit[ordinal] energy   |   |
| Circuit Pole Index             | N/A   |   |
| Circuit Pole Name              | circuit[ordinal] circuitpole[ordinal] name                                |   |
| Circuit Pole Phase             | circuit[ordinal] circuitpole[ordinal] phase                               |   |
| Circuit Pole Position          | circuit[ordinal] circuitpole[ordinal] position                            |   |
| Circuit Pole Active Power      | circuit[ordinal] circuitpole[ordinal] active_power                        | Not displayed in Power IQ, but data is rolled up to provide Circuit Active Power. Use this mapping if your PDU does not provide Active Power data at the Circuit level.               |
| Circuit Pole Voltage           | circuit[ordinal] circuitpole[ordinal] voltage                             |   |
| Circuit Pole Current           | circuit[ordinal] circuitpole[ordinal] current                             |   |
| Battery Index                  | N/A   | Please note that only a single battery per UPS is currently supported. Specifying a Battery Index is not required so in most cases it is better to simply not define a Battery Index. |



| Structured Plugin Mapping Name  | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings    | Notes  |
|---------------------------------|--|--|
| Battery Capacity                | battery[ordinal] capacity_percentage   |  |
| Battery Remaining Runtime       | battery[ordinal] runtime_remaining   |  |
| Battery Status                  | battery[ordinal] status  |  |
| Battery Current                 | battery[ordinal] current   |  |
| Battery Voltage                 | battery[ordinal] voltage   |  |
| Seconds on Battery              | battery[ordinal] seconds_on  |  |
| Battery Replacement Indicator   | battery[ordinal] replacement_indicator                                       |  |
| UPS Output Index                | N/A  | Please note that only a single UPS output per UPS is currently supported. Specifying UPS Output Index is not required so in most cases it is better to simply not define a UPS Output Index. |
| UPS Output Load Percentage      | ups_output[ordinal] load_percentage  |  |
| UPS Output Source               | ups_output[ordinal] source   |  |
| UPS Output Pole Index           | N/A  |  |
| UPS Output Pole Load Percentage | ups_output[ordinal] ups_output_pole[ordinal] load_percentage                 |  |
| N/A                             | See <i>Binary Sensor Mappings - Custom Dynamic Plugins Only</i> on page 668. |  |

## Power Panel Mappings

A Power Panel may contain inlets, inlet poles, circuits, circuit poles, and external temperature and humidity sensors.



In addition to the Common Mappings, a Power Panel supports:

| Structured Plugin Mapping Name | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings    | Notes   |
|--------------------------------|--|---|
| Circuit Index                  | N/A  |   |
| Circuit Apparent Power         | circuit[ordinal] apparent_power  |   |
| Circuit Active Power           | circuit[ordinal] active_power  |   |
| Circuit Power Factor           | circuit[ordinal] power_factor  |   |
| Circuit Voltage                | circuit[ordinal] voltage   |   |
| Circuit Current                | circuit[ordinal] current   |   |
| Circuit Energy                 | circuit[ordinal] energy  |   |
| Circuit Pole Index             | N/A  |   |
| Circuit Pole Name              | circuit[ordinal] circuitpole[ordinal] name                                   |   |
| Circuit Pole Phase             | circuit[ordinal] circuitpole[ordinal] phase                                  |   |
| Circuit Pole Position          | circuit[ordinal] circuitpole[ordinal] position                               |   |
| Circuit Pole Active Power      | circuit[ordinal] circuitpole[ordinal] active_power                           | Not displayed in Power IQ, but data is rolled up to provide Circuit Active Power. Use this mapping if your PDU does not provide Active Power data at the Circuit level. |
| Circuit Pole Voltage           | circuit[ordinal] circuitpole[ordinal] voltage                                |   |
| Circuit Pole Current           | circuit[ordinal] circuitpole[ordinal] current                                |   |
| N/A                            | See <i>Binary Sensor Mappings - Custom Dynamic Plugins Only</i> on page 668. |   |

## Rack PDU Mappings

A Rack PDU may contain inlets, inlet poles, circuit breakers, outlets, outlet poles, and external temperature and humidity sensors.



In addition to the *Common Mappings* on page 653, a Rack PDU supports:

| Structured Plugin Mapping Name | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings | Notes   |
|--------------------------------|---|---|
| Circuit Breaker Index          | N/A   |   |
| Circuit Breaker Current        | circuitbreaker[ordinal] current   |   |
| Circuit Breaker Name           | circuitbreaker[ordinal] name  |   |
| Circuit Breaker State          | circuitbreaker[ordinal] state   |   |
| Outlet Index                   | N/A   |   |
| Outlet Active Power            | outlet[ordinal] active_power  |   |
| Outlet Apparent Power          | outlet[ordinal] apparent_power  |   |
| Outlet Name                    | outlet[ordinal] name  |   |
| Outlet Power Control           | outlet[ordinal] power_control   |   |
| Outlet Power Factor            | outlet[ordinal] power_factor  |   |
| Outlet State                   | outlet[ordinal] state   |   |
| Outlet Voltage                 | outlet[ordinal] voltage   |   |
| Outlet Energy                  | outlet[ordinal] energy  |   |
| Outlet Current                 | outlet[ordinal] current   |   |
| Outlet Pole Index              | N/A   |   |
| Outlet Pole Current            | outlet[ordinal] outletpole[ordinal] current                               | Not displayed in Power IQ, but data is rolled up to provide Outlet Current. Use this mapping if your PDU does not provide Current data at the Outlet level. Similarly, if active or apparent power are not available at the outlet but outlet pole current and voltage are available, then outlet power will be |



| Structured Plugin Mapping Name | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings | Notes  |
|--------------------------------|---|--|
|                                |   | estimated from the pole current and voltage readings.  |
| Outlet Pole Voltage            | outlet[ordinal] outletpole[ordinal] voltage                               | Not displayed in Power IQ, but data is rolled up to provide Outlet Voltage. Use this mapping if your PDU does not provide Voltage data at the Outlet level.  |
| Outlet Pole Active Power       | outlet[ordinal] outletpole[ordinal] active_power                          | Not displayed in Power IQ, but data is rolled up to provide Outlet Active Power. Use this mapping if your PDU does not provide Active Power data at the Outlet level. Please note that Power IQ will first attempt to use outlet pole current and voltage to estimate outlet power. If current and voltage are NOT available at the outlet pole level will outlet pole active power be used to estimate outlet active power. |

## Rack UPS Mappings

A Rack UPS may contain inlets, inlet poles, circuit breakers, outlets, outlet poles, batteries, outputs, output poles, and external temperature and humidity sensors.

In addition to the *Common Mappings* on page 653, a Rack UPS supports:

| Structured Plugin Mapping Name | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings | Notes |
|--------------------------------|---|-------|
| Circuit Breaker Index          | N/A   |       |
| Circuit Breaker Current        | circuit_breaker[ordinal] current  |       |
| Circuit Breaker Name           | circuit_breaker[ordinal] name   |       |
| Circuit Breaker State          | circuit_breaker[ordinal] state  |       |
| Outlet Index                   | N/A   |       |

| Structured Plugin Mapping Name | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings | Notes   |
|--------------------------------|---|---|
| Outlet Active Power            | outlet[ordinal] active_power  |   |
| Outlet Apparent Power          | outlet[ordinal] apparent_power  |   |
| Outlet Name                    | outlet[ordinal] name  |   |
| Outlet Power Control           | outlet[ordinal] power_control   |   |
| Outlet Power Factor            | outlet[ordinal] power_factor  |   |
| Outlet State                   | outlet[ordinal] state   |   |
| Outlet Voltage                 | outlet[ordinal] voltage   |   |
| Outlet Energy                  | outlet[ordinal] energy  |   |
| Outlet Current                 | outlet[ordinal] current   |   |
| Outlet Pole Index              | N/A   |   |
| Outlet Pole Current            | outlet[ordinal] outletpole[ordinal] current                               | Not displayed in Power IQ, but data is rolled up to provide Outlet Current. Use this mapping if your PDU does not provide Current data at the Outlet level. Similarly, if active or apparent power are not available at the outlet but outlet pole current and voltage are available, then outlet power will be estimated from the pole current and voltage readings. |
| Outlet Pole Voltage            | outlet[ordinal] outletpole[ordinal] voltage                               | Not displayed in Power IQ, but data is rolled up to provide Outlet Voltage. Use this mapping if your PDU does not provide Voltage data at the Outlet level.   |
| Outlet Pole Active Power       | outlet[ordinal] outletpole[ordinal] active_power                          | Not displayed in Power IQ, but data is rolled up to provide Outlet Active Power. Use this mapping if your PDU does not provide Active Power data at the Outlet level. Please note that Power IQ will first attempt to use   |



| Structured Plugin Mapping Name | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings | Notes  |
|--------------------------------|---|--|
|                                |   | outlet pole current and voltage to estimate outlet power. If current and voltage are NOT available at the outlet pole level will outlet pole active power be used to estimate outlet active power. |
| Battery Index                  | N/A   | Please note that only a single battery per UPS is currently supported. Specifying a Battery Index is not required so in most cases it is better to simply not define a Battery Index.              |
| Battery Capacity               | battery[ordinal] capacity_percentage                                      |  |
| Battery Remaining Runtime      | battery[ordinal] runtime_remaining  |  |
| Battery Status                 | battery[ordinal] status   |  |
| Battery Current                | battery[ordinal] current  |  |
| Battery Voltage                | battery[ordinal] voltage  |  |
| Seconds on Battery             | battery[ordinal] seconds_on   |  |
| Battery Replacement Indicator  | battery[ordinal] replacement_indicator                                    |  |
| UPS Output Index               | N/A   | Please note that only a single UPS output per UPS is currently supported. Specifying UPS Output Index is not required so in most cases it is better to simply not define a UPS Output Index.       |
| UPS Output Load Percentage     | N/A   |  |
| UPS Output Source              | N/A   |  |
| UPS Output Pole Index          | N/A   |  |



| Structured Plugin Mapping Name  | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings | Notes |
|---------------------------------|---|-------|
| UPS Output Pole Load Percentage | N/A   |       |

## Standalone Meter Mappings

A Standalone Meter may contain circuits, circuit poles, and external temperature and humidity sensors.

For information on external temperature and humidity sensors, see *External Temperature and Humidity Sensor Mappings* on the next page.

For information on binary sensors, see *Binary Sensor Mappings - Custom Dynamic Plugins Only* on page 668.

A Standalone Meter supports:

| Structured Plugin Mapping Name | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings | Notes   |
|--------------------------------|---|---|
| PDU Name                       | pdu_name  |   |
| PDU Firmware                   | pdu_firmware  |   |
| Circuit Index                  | N/A   |   |
| Circuit Apparent Power         | circuit[ordinal] apparent_power   |   |
| Circuit Active Power           | circuit[ordinal] active_power   |   |
| Circuit Power Factor           | circuit[ordinal] power_factor   |   |
| Circuit Voltage                | circuit[ordinal] voltage  |   |
| Circuit Current                | circuit[ordinal] current  |   |
| Circuit Energy                 | circuit[ordinal] energy   |   |
| Circuit Pole Index             | N/A   |   |
| Circuit Pole Active Power      | circuit[ordinal] circuitpole[ordinal] active_power                        | Not displayed in Power IQ, but data is rolled up to provide Circuit Active Power. |





| Structured Plugin Mapping Name            | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings    | Notes   |
|---|--|---|
|   |  | Use this mapping if your PDU does not provide Active Power data at the Circuit level. |
| Circuit Pole Voltage                      | circuit[ordinal] circuitpole[ordinal] voltage                                |   |
| Circuit Pole Current                      | circuit[ordinal] circuitpole[ordinal] current                                |   |
| Circuit Pole Position                     | circuit[ordinal] circuitpole[ordinal] position                               |   |
| External Temperature and Humidity Sensors | See <i>External Temperature and Humidity Sensor Mappings</i> below           |   |
| N/A                                       | See <i>Binary Sensor Mappings - Custom Dynamic Plugins Only</i> on page 668. |   |

## External Temperature and Humidity Sensor Mappings

Examine your MIB to determine how the external sensor data is arranged and choose the correct mapping.

### Generic sensor mappings

Generic sensor mappings do not include the "temperature" or "humidity" term in the mapping. Generic sensor mappings are useful when you have an OID to determine the type of sensor, and all sensor data is encoded in a single MIB table.

In custom dynamic plugins, only the generic sensor mappings are supported.

The generic sensor mappings can be used to identify both external temperature and humidity sensors. Mappings specific to temperature and humidity are not required for custom dynamic plugins because you have the ability to control each OID that is collected, and you can hard code any value that is not available through the MIB. If the MIB does not provide a sensor type value, you must hard code it.

| Structured Plugin Mapping Name | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings | Notes                                    |
|--------------------------------|---|--|
| External Sensor Index          | N/A   | Not supported for custom dynamic plugins |
| External Sensor Type           | external_sensor[ordinal] type   |  |

| Structured Plugin Mapping Name | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings | Notes   |
|--------------------------------|---|---|
| External Sensor Name           | external_sensor[ordinal] name   |   |
| External Sensor Value          | external_sensor[ordinal] value  |   |
| External Sensor Unit           | external_sensor[ordinal] unit   | <p>For temperature only, specify Fahrenheit or Celsius. The unit for humidity is always assumed to be a percentage. When all readings are given in the same unit, it's often easier to set the Temperature Unit metadata value.</p> <p>This mapping is needed only in the unlikely case that a MIB gives some temperature readings in Fahrenheit and some in Celsius. If so, you must define this mapping for all temperature and humidity sensors identified because the plugin requires the same total number of mappings for each data model element. For example, if a plugin has five external sensor name mappings defined, then it must have exactly 0 or 5 unit mappings defined.</p> |
| External Sensor Decimal Digits | external_sensor[ordinal] decimal_digits                                   | <p>The Decimal Digits mapping works as a multiplier. Use this mapping when the MIB table contains multiple sensor types and each type has a different scaling. If the scalings are the same, using a multiplier as needed will work, and the multiplier is applied to all sensors.</p>  |

### Sensor specific mappings for temperature

Use a sensor-specific mapping for temperature when all temperature readings are isolated in separate MIB tables from other sensor types, or the MIB table contains both temperature and humidity readings in each row, or a single MIB table contains both temperature and humidity readings (one reading per row) but there is no column OID that indicates the sensor type.



*Note: Sensor specific mappings for temperature cannot be used in custom dynamic plugins. Use the generic sensor mappings instead.*

| Structured Plugin Mapping Name | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings |
|--------------------------------|---|
| Temperature Sensor Index       | N/A   |
| Temperature Sensor Name        | N/A   |
| Temperature Sensor Value       | N/A   |
| Temperature Sensor Unit        | N/A   |

### Sensor specific mappings for humidity

Use a sensor-specific mapping for humidity when all humidity readings are isolated in separate MIB tables from other sensor types, or the MIB table contains both temperature and humidity readings in each row, or a single MIB table contains both temperature and humidity readings (one reading per row) but there is no column OID that indicates the sensor type.

*Note: Sensor specific mappings for humidity cannot be used in custom dynamic plugins. Use the generic sensor mappings instead.*

| Structured Plugin Mapping Name | Custom Plugin Mapping Name or Data Model Element and Sensor Type Pairings |
|--------------------------------|---|
| Humidity Sensor Index          | N/A   |
| Humidity Sensor Name           | N/A   |
| Humidity Sensor Value          | N/A   |

## Temperature Unit Configuration Precedence

For flexibility to support many kinds of MIB structures, there are several ways of indicating what unit temperature readings are displayed in.

They will be applied in the following order of precedence:

- If external\_sensor\_unit (generic) or external\_sensor\_temperature\_unit (specific) mappings are configured and corresponding Temperature Unit (Celsius) and Temperature Unit (Farhreneheit) metadata types are configured then the unit information retrieved from the SNMP agent of the target PDU will be used to determine temperature unit.
- If a Temperature Unit metadata type is configured then it will be used to determine the temperature reading units.
- If no other means to determine temperature reading units is available then Celsius will be assumed.

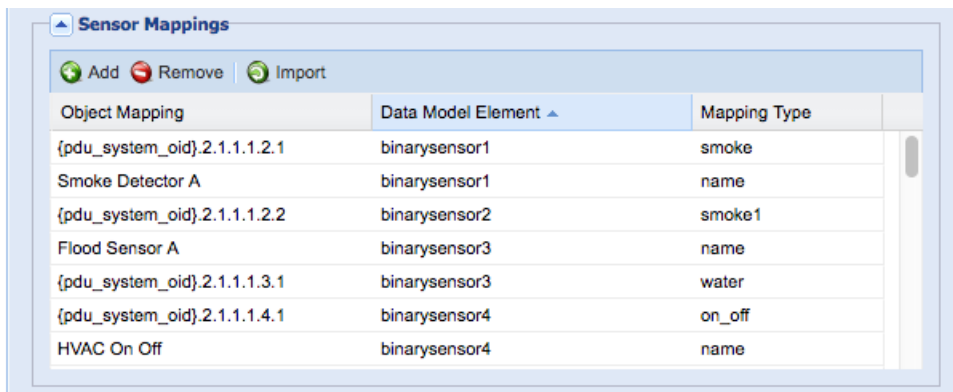


## Binary Sensor Mappings - Custom Dynamic Plugins Only

*Note: All PDU types except rack PDUs and rack UPSs can use binary sensors.*

Only custom dynamic plugins support binary sensors. Once the metadata has been added to the Binary Sensors section, the Mapping Type will be available in the Sensor Mappings section and will be selectable via the Mapping Type dropdown when you add a new sensor mapping. Currently, water, smoke, and on\_off sensors are supported. See the *Metadata for Structured and Custom Dynamic Plugins* on page 671 topic for more information.

- The Object Mapping column may be used to specify an object identifier from which the Mapping Type value is to be retrieved or a hard-coded String value (when the Mapping Type value is 'name').
- The Data Model Element column will contain a 'binarysensor[ordinal]' for a binary sensor, where the ordinal will indicate the position of the sensor relative to other binary sensors.
- The Mapping Type column for binary sensors supports two valid mapping types: 1) the binary sensor type as defined in the Binary Sensors metadata section and 2) 'name' mappings which may be used to designate the name of the sensor.



| Object Mapping               | Data Model Element | Mapping Type |
|------------------------------|--------------------|--------------|
| {pdu_system_oid}.2.1.1.1.2.1 | binarysensor1      | smoke        |
| Smoke Detector A             | binarysensor1      | name         |
| {pdu_system_oid}.2.1.1.1.2.2 | binarysensor2      | smoke1       |
| Flood Sensor A               | binarysensor3      | name         |
| {pdu_system_oid}.2.1.1.1.3.1 | binarysensor3      | water        |
| {pdu_system_oid}.2.1.1.1.4.1 | binarysensor4      | on_off       |
| HVAC On Off                  | binarysensor4      | name         |

*Note: Mapping types must be unique. If the MIB defines more than one set of defined states for a particular sensor type, then you can create additional sensor types by appending an ordinal value to one of the supported mapping types, following the format sensortype[ordinal].*

## Wildcard Index Mappings - Structured Dynamic Plugins Only

Wildcard index mappings are valid for structured dynamic plugins only.

When a MIB has related OIDs grouped together and in a sequential order, but not in perfectly structured tables, wildcard index mappings can help you make the information work in a structured dynamic plugin.

Use a wildcard index mapping when you need an index and the relevant stock index mappings have already been used, or do not make sense. See *Wildcard Index Mapping Example* on the next page.

| Wildcard Index Mappings | Corresponding Variable Substitutions |
|-------------------------|--------------------------------------|
| Wildcard Index 1        | { wildcard_one_index }               |
| Wildcard Index 2        | { wildcard_two_index }               |
| Wildcard Index 3        | { wildcard_three_index }             |
| Wildcard Index 4        | { wildcard_four_index }              |

## Wildcard Index Mapping Example

Wildcard index mappings are useful for creating a structured dynamic plugin when the MIB is not logically organized into tables. A wildcard index mapping can be used as a substitution value in any structured dynamic plugin mapping.

For example, a structured MIB that supports outlet names and outlet current will typically have an outlet table where each row contains one outlet's name and its current (amperage) reading. However, imagine a scenario where the MIB supports outlet names and outlet current, but these values are not accessible through a table. Instead the values are organized as consecutive OIDs in the MIB.

### Example:

The MIB's outlet name OIDs:

1.3.6.1.4.1.999.1.2.1

1.3.6.1.4.1.999.1.2.2

1.3.6.1.4.1.999.1.2.3

1.3.6.1.4.1.999.1.2.4

The MIB's outlet current OIDs:

1.3.6.1.4.1.999.1.2.5

1.3.6.1.4.1.999.1.2.6

1.3.6.1.4.1.999.1.2.7

1.3.6.1.4.1.999.1.2.8

The last decimal value of the OID is the "index" for that value. The index values for the outlet name OIDs are: 1,2,3,4. The index values for the outlet current OIDs are: 5,6,7,8.


With a single 'outlet\_index' mapping, you could not collect both outlet name and outlet current. To solve this problem, you can use a wildcard index to generate a second series of index values needed, so that both sets of values can be collected.


The following screenshot depicts a setting of mappings that illustrate this:

**Mappings**


PDU System OID:


Model OID:

PDU Name:  


Outlet Index:  

Start:  Step:  Proxied:



Outlet Name:  

Wildcard Index 1:  

Start:  Step:  Proxied:

Outlet Current:  

Multiplier:

Add Another Mapping:   



## Metadata for Structured and Custom Dynamic Plugins

The metadata information in this section applies to both structured and custom dynamic plugins.

### Metadata Definitions

PDU manufacturers have a lot of flexibility when it comes to how they choose to implement the MIBs for their hardware. This includes the how they choose to represent status values and units for readings. In order to address this, it is necessary to “tell” PIQ how to map the values in the MIB into concrete status or unit values that PIQ understands.

For example, in the Circuit Breakers and Outlets section, it is possible to define the values that the MIB uses to indicate that a Circuit Breaker is “OK” or is “Tripped”. If the MIB defines the possible circuit breaker states as Ok(1), Tripped(2), then the plugin author would add a value of 1 for metadata field ‘Circuit Breaker State OK’ and a value of 2 for ‘Circuit Breaker State Tripped’.

Similarly, if the possible values are the strings: “OK” and “TRIPPED” then those strings should be configured.

The following Metadata groupings are available:

- Circuits Breakers and Outlets
- Environmental Sensors
- UPS Output Source
- Binary Sensors
- Battery Status
- Battery Replacement Indicator

It is possible to use a wildcard asterisk (\*) character when defining a metadata value. This indicates that any value that is NOT explicitly mapped to another field within the group is to be associated to that metadata field.

Also, it is possible to define a comma separated list of values when defining a metadata value. This indicates that any of the specified values in the list are to be mapped to that metadata field.

Wildcard and comma separated list of values are supported for the following metadata groups:

- Circuits Breakers and Outlets
- UPS Output Source
- Battery Status

---

*Note: Metadata mapping values are case sensitive.*

---

## Metadata for Circuit Breakers and Outlets

### Circuit Breaker State and Outlet State Metadata

The dynamic plugin uses the Circuit Breaker State and Outlet State metadata values to interpret values retrieved from a target PDU during polling. The values entered must be based on information in the target PDU's MIB.



### Example

The MIB indicates that an integer value of 1 indicates that an outlet is ON, and 2 indicates that an outlet is OFF, you must specify those values in the metadata section so that Power IQ can interpret the 1 as ON, and the 2 as OFF when those values are retrieved in polling.

## Outlet Power Metadata

The dynamic plugin uses the Outlet Power metadata values when performing outlet power control on a target PDU. Some MIBs will use the same value to indicate both the outlet state and power control operations. Some MIBs use different values. All four Outlet State and Power metadata values must be configured properly for outlet power control to work.

## Metadata for Environmental Sensors

In the metadata for environmental sensors, the fields work together with the mappings you add to determine your sensor types, and the units used to interpret readings. See *External Temperature and Humidity Sensor Mappings* on page 665 for details. See *External Temperature and Humidity Sensor Mappings Example Screenshots* on page 731 for examples.

- Humidity Sensor Type: When the MIB contains a single sensor reading table, and there is a value you can use to determine sensor type, use this field to set the value of the humidity sensor type.
- Temperature Sensor Type: When the MIB contains a single sensor reading table, and there is a value you can use to determine sensor type, use this field to set the value of the temperature sensor type.
- Temperature Unit: Set the value to C or F to hard code the units used to interpret readings, when the MIB does not have sensor reading unit information, or when Temperature Unit (Celsius)/Temperature Unit (Fahrenheit) values are not found in this metadata section. This field is only used when a unit's value is not specified on a per reading basis using the external\_sensor\_unit (generic) or external\_sensor\_temperature\_unit (specific) mappings.
- Temperature Unit (Celsius) and Temperature Unit (Fahrenheit): These fields work with the external\_sensor\_unit, or external\_sensor\_temperature\_unit mappings. Your readings unit is determined by a match between the value specified here, and the value returned from the MIB for either external\_sensor\_unit or external\_sensor\_temperature\_unit.

## Metadata for UPS Output Source

A UPS output source value indicates the present source of output power for the UPS. PIQ supports four UPS output source values: Unknown, Normal, Bypass and OnBattery. These metadata fields work in conjunction with the UPS Output Source mapping for Floor UPS and Rack UPS devices.

The plugin author should map each of the output source values in the target UPS' MIB to one of the PIQ supported values. For example, consider the upsOutputSource OID from the standard UPS MIB:



```

upsOutputSource OBJECT-TYPE
    SYNTAX      INTEGER {
        other(1),
        none(2),
        normal(3),
        bypass(4),
        battery(5),
        booster(6),
        reducer(7)
    }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The present source of output power. The enumeration
        none(2) indicates that there is no source of output
        power (and therefore no output power), for example,
        the system has opened the output breaker."
    ::= { upsOutput 1 }

```

In this case, an appropriate set of mappings might be:

| UPS Output Source |         |
|-------------------|---------|
| Unknown:          | 1,2,6,7 |
| Normal:           | 3       |
| Bypass:           | 4       |
| On Battery:       | 5       |

or, using the wildcard for the Unknown field will get the same result and protect against possible future enhancements to the MIB which may introduce new status values:

| UPS Output Source |   |
|-------------------|---|
| Unknown:          | * |
| Normal:           | 3 |
| Bypass:           | 4 |
| On Battery:       | 5 |

## Metadata for Binary Sensors

In Power IQ 6.0.2, custom dynamic plugins have been enhanced to support binary sensors to help you better track the environmental conditions in your data center. The currently supported mapping types are as follows:

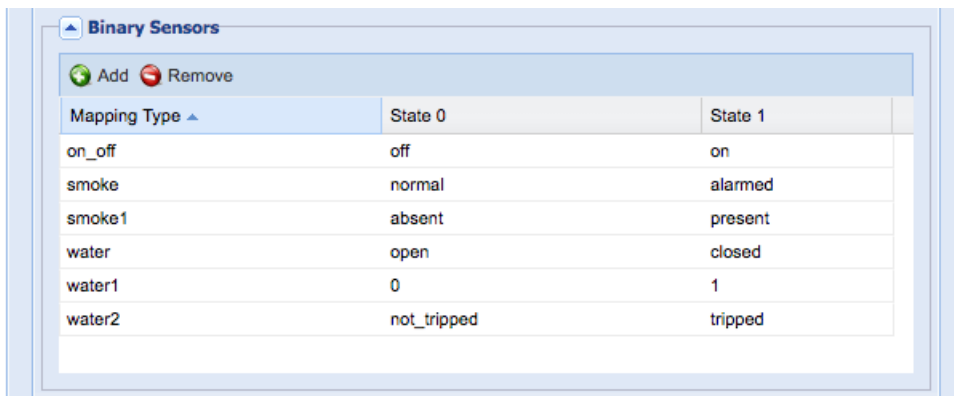


| Mapping Type | Description  |
|--------------|--|
| water        | For water leak alarm status  |
| smoke        | For fire or smoke alarm status   |
| on_off       | For on/off status of floor PDUs and in-row cooling fans or for Running/Stop status of CRAH units |

A section for Binary Sensors has been added to the Metadata section of the Edit Custom Dynamic Plugin page. Dynamic plugin authors can add the Mapping Type and indicate the State 0 and State 1 values based on the supported MIB values:

- State 0: Represents an Off or Normal state. Example relevant values include: 0, false, absent, not\_detected, open, off, normal, not\_tripped, unlocked, and inactive.
- State 1: Represents an On or Alarmed state. Example relevant values include: 1, true, present, detected, closed, on, alarmed, tripped, locked, and active.

*Note: Mapping types must be unique. If the MIB defines more than one set of defined states for a particular sensor type, then you can create additional sensor types by appending an ordinal value to one of the supported mapping types, following the format `sensortype[ordinal]`. For example: `smoke`, `smoke1`, `water`, `water1`, or `on_off`, `on_off1`.*



| Mapping Type | State 0     | State 1 |
|--------------|-------------|---------|
| on_off       | off         | on      |
| smoke        | normal      | alarmed |
| smoke1       | absent      | present |
| water        | open        | closed  |
| water1       | 0           | 1       |
| water2       | not_tripped | tripped |

For information on binary sensor mappings, see *Binary Sensor Mappings - Custom Dynamic Plugins Only* on page 668.

## Metadata for Battery Status

A UPS battery status value indicates the present status of the UPS battery. PIQ supports five UPS battery status values: Unknown, Normal, Low, Depleted and Fault Condition. These Metadata fields work in conjunction with the Battery Status mapping for Floor UPS and Rack UPS equipment.

The plugin author should map each of the UPS battery source values in the target UPS' MIB to one of the PIQ supported values. For example, consider the `upsBatteryStatus` OID from the standard UPS MIB:

```
upsBatteryStatus OBJECT-TYPE
    SYNTAX      INTEGER {
        unknown(1),
        batteryNormal(2),
        batteryLow(3),
        batteryDepleted(4)
    }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The indication of the capacity remaining in the UPS
        system's batteries.  A value of batteryNormal
        indicates that the remaining run-time is greater than
        upsConfigLowBattTime.  A value of batteryLow indicates
        that the remaining battery run-time is less than or
        equal to upsConfigLowBattTime.  A value of
        batteryDepleted indicates that the UPS will be unable
        to sustain the present load when and if the utility
        power is lost (including the possibility that the
        utility power is currently absent and the UPS is
        unable to sustain the output)."
    ::= {upsBattery 1 }
```

In this case, an appropriate set of mappings would be:

| Battery Status   |                                |
|------------------|--------------------------------|
| Unknown:         | <input type="text" value="1"/> |
| Normal:          | <input type="text" value="2"/> |
| Low:             | <input type="text" value="3"/> |
| Depleted:        | <input type="text" value="4"/> |
| Fault Condition: | <input type="text"/>           |

## Metadata for Battery Replacement Indicator

The battery replacement indicator indicates whether or not the battery of a UPS is no longer functioning properly and needs to be replaced. There are two available metadata fields: True and False. These metadata fields work in conjunction with the Battery Replacement Indicator mapping for Floor UPS and Rack UPS equipment.

The plugin author must inspect the MIB supported by the UPS and determine what value indicates that the battery needs to be replaced and specify that value for the True field. Similarly, whatever MIB value indicates that the battery does NOT need to be replaced must be specified as the value for the False field.

For example, if the MIB specifies that a value of 0 indicates that the UPS battery is normal and a value of 1 indicates that the UPS battery has issues and needs to be replaced, then the mappings would look like:

**Battery Replacement Indicator**

True:

False:

## Trap Support in Dynamic Plugins - Structured or Custom

Trap support applies to both structured and custom dynamic plugins.

Power IQ can convert incoming SNMPv1 and SNMPv2/v3 traps from a PDU managed with a dynamic plugin into a Power IQ event. To support this ability, you must add trap mappings to your dynamic plugin.

---

*Note: Trap mapping is supported for proxied PDUs only when managed through custom dynamic plugins. Each proxied PDU is managed by a unique dynamic plugin mapping. You must add an event filter on whatever trap parameter uniquely identifies the proxied PDU which is the target of the event.*

---

*Note: Trap mapping is not supported for proxied PDUs managed through a structured dynamic plugin mapping.*

---

Traps can be mapped to one of these events:

- genericInfo
- genericWarning
- genericCritical

The Power IQ events are generic. Because of this, it is necessary to define event summary text for each trap mapping to give meaning to the event.

Most of the information passed in an SNMP trap is encoded in what are called variable bindings, or "varbinds" for short. Variable bindings are a key value pair, where the key is an object identifier and the value is typically an integer or string. In this guide, for simplicity, trap variable bindings are referred to as trap parameters.

When configuring a trap mapping in Power IQ, the event summary text supports parameter expansion for any SNMP trap parameter contained in the trap. This means any relevant information encoded in a trap's parameters may be displayed in the Power IQ event listing or event details pages through the event summary text. See *Trap Mapping Variables and Format* on page 682

The best practice is to create a detailed, meaningful event summary text. Use filtering to map traps with values matching the filter to a specific event severity level and summary text.

When defining trap filters, you can define a regular expression in place of the trap filter value. You will need to check the Enable regular expression matching checkbox to use a regular expression as a trap filter value.

---

*Note: To avoid duplication of an active event when using a regular expression in place of the trap filter value, you can define regular expression named capture groups. To be considered duplicates, the following criteria must be met for both the active event and the new event: 1) the trap mappings (including matching any specified regular expressions) must match, and 2) all named capture group values (if in use) must match between the new and active events.*

---

**For examples, see:**

- *Example: Trap Mapping with Filters* on page 693
- *Example: Event Summary Message with Variables* on page 695
- Traps can also be added to custom dynamic plugins based on SNMP-gateway managed devices. There are some setup requirements. See *Example: Trap Mapping with Filters for Babel Buster SPX SNMP Gateway* on page 697



## Identify Trap OIDs and Parameters

To create a dynamic plugin with trap support, follow this process to prepare your trap mappings.

- Identify the trap OIDs that you are interested in mapping.
- Identify the key parameters in each trap that will be used to create event filters and the event summary text in the trap mapping.

### Trap OIDs

- Trap OIDs are used to identify the alarm or condition being reported. When creating the trap mapping in the dynamic plugin, you will specify the trap OID:
- The trap OID is specified in the Enterprise OID field for an SNMPv2/v3 trap.
- The trap OID is specified in the Enterprise OID and Enterprise Specific ID field for an SNMPv1 trap.

### Trap Parameters

- Trap parameters are typically useful for:
  - uniquely identifying the alarm or condition which is being reported. This is necessary if a single trap can actually describe more than one alarm or condition.
  - providing sensor reading values and possibly the threshold value that was exceeded
  - uniquely identifying the specific PDU that the alarm pertains to in a proxied or gateway scenario. Custom mappings only.
  - any other trap details that may be useful to the Power IQ user

### Tools To Help With Trap Mapping

A number of tools can be useful while trying to learn enough about a PDU's traps and their parameters to be able to define trap mappings in Power IQ.

- The vendor's MIB.

The MIB defines the traps that the device can generate, as well as the variable bindings, that is, trap parameters, that will be sent in each trap. The order of the parameters is specified in the MIB as well. Parameter order is important because you must know the order to define the parameter expansion values in the event summary text. The event summary text defines the message that will be generated for the Power IQ event that the trap is mapped to.

- A MIB browser.

A MIB browser, such as the free iReasoning MIB browser, is useful for viewing the contents of the MIB, and it has a trap receiver that you can use to listen for and decode SNMPv1 and SNMPv2/v3 traps. One good method is to first configure your PDU to send traps to the computer running the iReasoning browser, and then cause the alarm condition that generates the trap. The iReasoning browser receives and decodes the trap. You can see exactly what traps your PDU is generating, what parameters are being sent, and in what order.

See *Use a MIB Browser* on page 702



## Trap OID Wildcards

An OID wildcard is an asterisk (\*) used in place of an object-identifier decimal value in an event filter OID value. OID wildcards are useful when a trap parameter's OID value contains an index value, and the trap mapping being defined should apply to all index values.

For example, assume that a type of PDU can generate an 'outletSensorChange' trap. This trap can be used to indicate an over current or an over voltage condition on an outlet. One of the trap's parameters indicates whether the alarm is for an "over current" or an "over voltage" condition. The OID associated with this trap parameter has a decimal value that indicates the outlet number that the alarm pertains to. The OIDs for this scenario would look similar to these sample OIDs:

- Outlet 1: 1.3.6.1.4.1.9999.1.9.1
  - Outlet 2: 1.3.6.1.4.1.9999.1.9.2
- and so on, up to the final outlet
- Outlet 30: 1.3.6.1.4.1.9999.1.9.30

Instead of creating a separate trap mapping in PIQ for each and every outlet, use the OID wildcard in place of the index parameter and specify a filter with the OID:

- 1.3.6.1.4.1.9999.1.9.\*

The filter will include all outlets without needing to map a trap for each outlet.

See *Example: Trap Mapping with Filters for Babel Buster SPX SNMP Gateway* on page 697.



## Trap Filter Regular Expressions (Wildcards)

When defining trap filters, you can define a regular expression in place of the trap filter value. This serves as a way to add wildcards to trap filters and provides flexibility to handle unique traps.

You will need to check the **Enable regular expression matching** checkbox to use a regular expression as a trap filter value.

In the example shown below the proxy id for the facility device is being returned at the end of the trap varbind string.

- String returned in varbind: InRow1FA\_Fan1\_Sts 1=Off/2=On/3=On -14

We want to filter the value at the end of the varbind string to match the proxy id used for that device.

**Traps**

SNMP Version:  v1    v2c/v3

---

Enterprise OID:  -

Enterprise Specific ID:

Event Type:  ▼

Event Summary:

---

Filter:  -

OID:

Value:

Enable regular expression matching

---

Filter:  -

OID:

Value:

Enable regular expression matching





|                    |   |
|--------------------|---|
| Regular Expression | <code>^InRow1F.+-(?&lt;proxyId&gt;\d+)\$</code>   |
| as a Java string   | <code>"^InRow1F.+-(?&lt;proxyId&gt;\d+)\$"</code> |
| Replacement        |   |
| groupCount()       | 1   |

Groups created from test string with regular expression entered. Group 0 is always the entire string being tested.

| Test | Target String                            | matches() | replaceFirst() | replaceAll() | lookingAt() | find() | n [start(n),end(n)] group(n)  |
|------|--|-----------|----------------|--------------|-------------|--------|---|
| 1    | InRow1FA_Fan1_Sts<br>1=Off/2=On/3=On -14 | Yes       |                |              | Yes         | Yes    | 0: [0,37] InRow1FA_Fan1_Sts<br>1=Off/2=On/3=On -14<br>1: [35,37] 14 |

The 14 in the test string was successfully put into a separate group

### Expression to test

**Regular expression:**

**Options:**

- Force canonical equivalence (CANON\_EQ)
- Case insensitive (CASE\_INSENSITIVE)
- Allow comments in regex (COMMENTS)
- Dot matches line terminator (DOTALL)
- Treat as a sequence of literal characters (LITERAL)
- ^ and \$ match EOL (MULTILINE)
- Unicode case matching (UNICODE\_CASE)
- Only consider '\n' as line terminator (UNIX\_LINES)

**Replacement:**

**Input 1:**

Regular expression to be used in trap filter

String to be tested. In this example we are trying to put the 14 at the end into a separate group

## Additional Resources

[Regular Expression Test Page for Java](#)

[List of expression syntax commands](#)

## Trap Mapping Variables and Format

When creating trap mappings in Power IQ, the event summary message is important to give a detailed description of the event that occurred.

To create the most useful event summary text, you can write a message that uses parameter expansion for any SNMP trap parameter contained in the trap.

Identify the trap parameters you want to include in your message. Use a trap receiver to view the list of parameters. Identify the parameters by number using the format shown.

The following format is supported: { trap.1} , { trap.2} and so on.

For example, the following table shows the first five trap parameters (varbinds) for a Raritan PX2 'inletSensorStateChange' trap. Two sets of parameters are shown to demonstrate how the SNMPv1 format trap works differently from the SNMPv2/v3 format trap. Note that this is for illustration purposes only--a PX2 PDU cannot be configured to send SNMPv1 traps.

SNMPv2/v3 traps will always have a timestamp and a trap OID parameter as the first two parameters in the trap. SNMPv1 traps do not. If the MIB indicates that a particular trap has five parameters, when it is sent as an SNMPv2/v3 trap, it will actually have seven parameters.

| Number | SNMPv1 Parameters | SNMPv2/v3 Parameters | Expansion Value |
|--------|-------------------|----------------------|-----------------|
| 1      | pduName           | Timestamp            | { trap.1}       |
| 2      | pduNumber         | Trap OID             | { trap.2}       |
| 3      | pxInetAddressType | pduName              | { trap.3}       |
| 4      | pxInetAddress     | pduNumber            | { trap.4}       |
| 5      | inletLabel        | pxInetAddressType    | { trap.5}       |

See *Example: Event Summary Message with Variables* on page 695.



## Duplicate Trap Handling

Some PDU SNMP agents send more than one trap for the same condition.

Power IQ checks if each newly created event matches an existing active event in the database. If there is already an active event, the new event will be discarded. This prevents duplicate notifications for the same underlying condition.



## Event Clearing

In PIQ 7.1 (& later) it is possible to configure trap mappings such that the events generated support automatic clearing. There are two new elements within trap mapping configuration that make this possible: *event parameter mappings* and *event labels*.

### Event Parameter Mappings

Event parameters are key/value pairs that are associated with PIQ events and contain meta data that is necessary for performing PDU element association (ie, associating the event to the proper target object in PIQ) and event correlation (ie, event clearing and de-duplication).

There are a limited number of event parameter keys that are currently supported. They are:

| Event Parameter Key  | Description  | Format                                |
|----------------------|--|---------------------------------------|
| inletLabel           | Identifies specific inlet  | String: I1,I2,..In                    |
| lineLabel            | Identifies specific line   | String: L1,L2,L3 or L1-L2,L2-L3,L1-L3 |
| inletPoleNumber      | Identifies specific inlet pole   | Integer: 1,2,..n                      |
| cbLabel              | Identifies specific circuit breaker  | String: CB1,CB2,..CBn                 |
| outletLabel          | Identifies specific outlet   | Integer: 1,2,..n                      |
| outletPoleNumber     | Identifies specific outlet pole  | Integer: 1,2,..n                      |
| externalSensorNumber | Identifies specific external sensor  | Integer: 1,2,..n                      |
| externalSensorName   | Identifies specific external sensor based on user assigned name  | String                                |
| externalSensorType   | Identifies the type of external sensor. Varbind value must match one of the configured external sensor temp/humidity meta data values. | String                                |



| Event Parameter Key            | Description                        | Format        |
|--------------------------------|------------------------------------|---------------|
| <code>circuitNumber</code>     | Identifies a specific circuit      | Integer: 1..n |
| <code>circuitPoleNumber</code> | Identifies a specific circuit pole | Integer: 1..n |

When configuring trap mappings there is a new *Add Event Parameter* button which may be used to add an event parameter mapping. A drop-down is provided to permit selection of the desired event parameter key. In the example below, an *outletLabel* event parameter key has been added. The *OID* identifies the variable binding whose value will be associated with the *outletLabel* key and subsequently used for identification and correlation during event processing.]



## Traps



SNMP Version:

 v1

 v2c/v

### Outlet Switched Off

Enterprise OID: {pdu\_system\_oid}.0.23

Enterprise Specific ID:

Event Type: Generic Info

Event Label: Outlet Switched Off

Event Summary: User {trap.4} switched OFF outlet {trap.9}.

Filter: Sensor State

OID: {pdu\_system\_oid}.5.4.3.1.3

Value: 8

 Enable regular expression matching

Event Parameter: outletLabel

OID: {pdu\_system\_oid}.3.5.3.1.2

Clearing Event: Outlet Switched On

By adding event parameter mappings it is possible to get more granular control over what PIQ identifies as a duplicate event. Consider the *Outlet Switched Off* trap from our example. Prior to this feature as soon as there was one active event for ANY outlet any subsequent events would be discarded as duplicates. By specifying an *outletLabel* event parameter any unique event (as determined by the *outletLabel* value) will no longer be discarded as a duplicate.

Also, with respect to external sensor events, provided there is a match, any defined externalSensor\* event parameters will be used to associate the resulting event to the external sensor EDM object rather than to the source PDU which generated the trap.

---

*Note that within a given trap mapping, once an event parameter has been selected it will be removed from the drop-down list.*

---

Event parameter mapping values will appear on the event details page in the PIQ UI along with any SNMP variable binding values that are sent with any given trap.

## Event Labels

Trap mappings now support an Event Label field which allow a dynamic plugin author to create a event label string which identifies the event. This string value must be:

- unique within any given dynamic plugin
- no longer than 64 characters

The event label field provides a more descriptive, user-friendly name and will appear in the PIQ UI in place of the generic event text that is displayed currently. This is true on the event listing page as well as on the event details page.

---

***Please note that event labels are not required and existing trap mappings will continue to function as before if an event label is not provided.***

---

## Clearing Event Labels

Once at least one trap mapping has an event label defined, the *Add Clearing Event* button is enabled. Clicking the *Add Clearing Event* button adds a clearing event field and the plugin author can choose the corresponding clearing event from a drop down list of configured event labels. In the example below the *Outlet Switched On* event is selected as a clearing event for the *Outlet Switched Off* event.



**Outlet Switched Off**
▲

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|                                     |  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
|-------------------------------------|--|-----|-----------------------|---|------------------------|---|---------------------------|---|----------------------|---|-------------------------|---|--------------------------------|---|------------------------|---|-----------------|---|-------------------------------|---|-------------------------|---|------------------------|---|-------------------------------------|---|-----------------------------------|---|----------------------------------|---|------------------------------------|---|---------------------------|---|-----------------------------------|---|-----------------------------|---|----------------------------------|---|------------------------------------|---|------------------------------|---|-----------------------------|---|----------------------|---|
| Enterprise OID:                     | {pdu_system_oid}.0.23  | -   |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Enterprise Specific ID:             |  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Event Type:                         | Generic Info   | ▼   |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Event Label:                        | Outlet Switched Off  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Event Summary:                      | User {trap.4} switched OFF outlet {trap.9}.  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Filter:                             | Sensor State   | -   |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
|                                     | OID: {pdu_system_oid}.5.4.3.1.3  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
|                                     | Value 8  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
|                                     | <input type="checkbox"/> Enable regular expression matching  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| + Add Filter                        |  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Event Parameter:                    | outletLabel  | ▼ - |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
|                                     | OID: {pdu_system_oid}.3.5.3.1.2  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| + Add Event Parameter               |  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Clearing Event:                     | Outlet Switched On   | ▼ - |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| + Add Clearing Event                | <table style="width: 100%; border-collapse: collapse;"> <tr><td style="padding: 2px 5px;">Authentication Failed</td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;">Circuit Breaker Normal</td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;"><b>Outlet Switched On</b></td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;">Circuit Breaker Trip</td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;">Humidity Lower Critical</td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;"><b>Outlet State Change Off</b></td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;">Humidity Lower Warning</td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;">Humidity Normal</td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;"><b>Outlet State Change On</b></td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;">Humidity Upper Critical</td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;">Humidity Upper Warning</td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;"><b>Inlet Voltage Upper Critical</b></td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;">Inlet Pole Voltage Lower Critical</td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;">Inlet Pole Voltage Lower Warning</td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;"><b>Inlet Voltage Upper Warning</b></td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;">Inlet Pole Voltage Normal</td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;">Inlet Pole Voltage Upper Critical</td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;"><b>Inlet Voltage Normal</b></td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;">Inlet Pole Voltage Upper Warning</td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;"><b>Inlet Voltage Lower Warning</b></td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;">Inlet Voltage Lower Critical</td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;">Inlet Voltage Lower Warning</td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> <tr><td style="padding: 2px 5px;">Inlet Voltage Normal</td><td style="text-align: right; padding: 2px 5px;">▼</td></tr> </table> |     | Authentication Failed | ▼ | Circuit Breaker Normal | ▼ | <b>Outlet Switched On</b> | ▼ | Circuit Breaker Trip | ▼ | Humidity Lower Critical | ▼ | <b>Outlet State Change Off</b> | ▼ | Humidity Lower Warning | ▼ | Humidity Normal | ▼ | <b>Outlet State Change On</b> | ▼ | Humidity Upper Critical | ▼ | Humidity Upper Warning | ▼ | <b>Inlet Voltage Upper Critical</b> | ▼ | Inlet Pole Voltage Lower Critical | ▼ | Inlet Pole Voltage Lower Warning | ▼ | <b>Inlet Voltage Upper Warning</b> | ▼ | Inlet Pole Voltage Normal | ▼ | Inlet Pole Voltage Upper Critical | ▼ | <b>Inlet Voltage Normal</b> | ▼ | Inlet Pole Voltage Upper Warning | ▼ | <b>Inlet Voltage Lower Warning</b> | ▼ | Inlet Voltage Lower Critical | ▼ | Inlet Voltage Lower Warning | ▼ | Inlet Voltage Normal | ▼ |
| Authentication Failed               | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Circuit Breaker Normal              | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| <b>Outlet Switched On</b>           | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Circuit Breaker Trip                | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Humidity Lower Critical             | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| <b>Outlet State Change Off</b>      | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Humidity Lower Warning              | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Humidity Normal                     | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| <b>Outlet State Change On</b>       | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Humidity Upper Critical             | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Humidity Upper Warning              | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| <b>Inlet Voltage Upper Critical</b> | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Inlet Pole Voltage Lower Critical   | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Inlet Pole Voltage Lower Warning    | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| <b>Inlet Voltage Upper Warning</b>  | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Inlet Pole Voltage Normal           | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Inlet Pole Voltage Upper Critical   | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| <b>Inlet Voltage Normal</b>         | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Inlet Pole Voltage Upper Warning    | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| <b>Inlet Voltage Lower Warning</b>  | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Inlet Voltage Lower Critical        | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Inlet Voltage Lower Warning         | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |
| Inlet Voltage Normal                | ▼  |     |                       |   |                        |   |                           |   |                      |   |                         |   |                                |   |                        |   |                 |   |                               |   |                         |   |                        |   |                                     |   |                                   |   |                                  |   |                                    |   |                           |   |                                   |   |                             |   |                                  |   |                                    |   |                              |   |                             |   |                      |   |





## Event Clearing Detail

An active event is considered a match for (or a duplicate of) a new event based on the following criteria:

- event type (genericInfo, genericWarning, genericCritical)
- trap OID
- target of the event (ie, PDU element: PDU, inlet, outlet CB, external sensor, etc...)
- sensor type (ie, current, voltage, onOff, temperature, humidity, etc..)
- for generic events, elements from the dynamic plugin trap mapping:
  - o user defined trap filters
  - o user defined event parameters
  - o user defined clearing events

## Event Listing and Detail Page Changes

Prior to 7.1.0, the *Event (Name)* field on the event listing and event detail pages simply showed one of the following generic event names for events generated by the dynamic plugin:

- *Informational Event*
- *Warning Event*
- *Critical Event*

In 7.1.0 and later the *Event (Name)* field now displays the user-defined event label when available rather than its corresponding generic event name. From our example, the user will see *Outlet Switched On* instead of *Informational Event*. If no event label is defined the generic event name will continue to be used as the event name.



**Event Listing**





Rows: 1-23 of 2008   Columns: 7   Filters :Status:

| ✓ | Occurred At ▼<br><input type="text" value="Filter..."/> | Severity ▼<br><input type="text" value="Filter..."/> | Event ▼<br><input type="text" value="Filter..."/> | Summary                       |
|---|---|--|---|-------------------------------|
| ✓ | 04/16/20, 04:58:56 PM                                   | <b>INFORMATIONAL</b>                                 | Outlet State Change On                            | Outlet 11 changed state to O  |
| ✓ | 04/16/20, 04:58:55 PM                                   | <b>INFORMATIONAL</b>                                 | Outlet Switched On                                | User admin switched ON out    |
| ✓ | 04/16/20, 04:58:25 PM                                   | <b>INFORMATIONAL</b>                                 | Log In  | User admin logged in.         |
| ✓ | 04/16/20, 02:40:07 PM                                   | <b>INFORMATIONAL</b>                                 | Clear Phase B Over Current Alarm                  | SAM-2, [Clear] Over Current A |
| ✓ | 04/16/20, 02:39:46 PM                                   | <b>INFORMATIONAL</b>                                 | Log Out   | User admin logged out.        |
| ✓ | 04/16/20, 02:39:25 PM                                   | <b>CRITICAL</b>                                      | Phase B Over Current Alarm                        | SAM-2, Over Current Alarm o   |
| ✓ | 04/16/20, 02:29:49 PM                                   | <b>INFORMATIONAL</b>                                 | Temperature Normal                                | Temperature returned to nor   |



## Event Listing

Event Listing

## Details

|                |  |
|----------------|--|
| Event          | Outlet Switched On   |
| Status         | Active   |
| Severity       | <b>INFORMATIONAL</b>   |
| Location       | Raleigh Data Center / Room for 192 subnet / Aisle for 192.168 subnet / Row for 192.168.43 subnet / Rack for 192.168.43.158 |
| Occurred At    | 04/16/20, 04:58:55 PM  |
| Target         | 192.168.43.158   |
| Summary        | User admin switched ON outlet 11.  |
| Cleared events | None   |

Cancel

Clear this event

## Event Parameters

| Ordinal | Parameter                      |
|---------|--------------------------------|
| 1       | 1.3.6.1.2.1.1.3.0              |
| 2       | 1.3.6.1.6.3.1.1.4.1.0          |
| 3       | 1.3.6.1.4.1.13742.6.3.2.2.1.13 |
| 4       | 1.3.6.1.4.1.13742.6.0.0.1.1.2  |
| 5       | 1.3.6.1.4.1.13742.6.3.2.2.1.8  |
| 6       | 1.3.6.1.4.1.13742.6.3.2.2.1.50 |
| 7       | 1.3.6.1.4.1.13742.6.3.2.2.1.51 |

---

**Please note that when sorting by Event (Name) on the event listing page generic events created by the dynamic plugin will continue to be sorted based on the generic event names and therefore may appear out of order.**

---

## Expand/Collapse Configured Trap Mappings

The dynamic plugin UI can be cumbersome to navigate because of the number of sections and mappings that a dynamic plugin can contain. The Traps portion of the dynamic plugin UI can be particularly easy to get lost in when there are a significant number of traps supported.

In 7.1.0 we added the ability to expand or collapse configured trap mappings. This will help plugin authors significantly as they work to add event clearing support to their existing mappings and develop new mappings.

By default, when a plugin mapping is edited, all existing trap mappings will be collapsed and only the trap mappings' event label will be displayed. Clicking the + will expand the selected trap mapping. If no event label is defined an auto-generated trap mapping descriptor will be generated using the format: *Trap Mapping [ordinal]*

## Upgrading PIQ With Existing Trap Mapping Definitions

In a PIQ upgrade scenario where a PIQ system with existing dynamic plugin mappings is upgraded to PIQ 7.1.0 (or later) there are a few considerations to make note of.

If existing trap mapping definitions are not updated to take advantage of event clearing then trap to event conversion will remain unchanged after the upgrade.

After adding event clearing configuration to an existing trap mapping the plugin author should manually clear any matching active events to ensure that any newly generated matching events are not erroneously identified as a duplicate and discarded.



## Example: Trap Mapping with Filters

*This example uses Raritan PX2 details as a reference. Dynamic plugins are not needed for PX2 PDUs.*

In this example, assume a dynamic plugin has been created for a Raritan PX2 PDU. The dynamic plugin will support trap mapping for one trap, with filtering added to create events with two severity levels.

Example Goal:

- To add trap mappings that show a Warning level event when the PX2's inlet sensor state is above the upper warning level, and to show a Critical level event when the inlet sensor state is above the upper critical level.

### PX2 MIB - Trap Information

```
inletSensorStateChange      NOTIFICATION-TYPE
    OBJECTS {
        pduName,
        pduNumber,
        pxInetAddressType,
        pxInetAddress,
        inletLabel,
        typeOfSensor,
        measurementsInletSensorTimeStamp,
        measurementsInletSensorValue ,
        measurementsInletSensorState ,
        oldSensorState,
        sysContact,
        sysName,
        sysLocation }
    STATUS current
    DESCRIPTION
        "Inlet Sensor State Change"
    ::= { traps 61 }
```

Steps:

1. Select SNMP v2c.
2. To add the Critical level mapping, click Add Trap, and add the Enterprise OID for the "inletSensorStateChange" trap for the PDU. Use the { pdu\_system\_oid} variable if desired.



3. Select Generic Critical for the Event Type.
4. Write an event summary message that describes the critical event. Use variables for the trap parameters to be included. The trap parameters expand when the message displays in the event details.

For example, the first variable specified in the MIB for this trap is 'pduName'. This is the user-assigned name of the PDU that generated the trap. This example shows an SNMPv2 trap, so the 'pduName' variable is sent as the third variable in the trap. The first two varbinds of all SNMPv2 traps are 'timestamp' and 'trap oid'. See [Identify Trap OIDs and Parameters](#) and [Trap Mapping Variables and Format](#).

5. To make sure that only critical-level, inlet state events are mapped to this message, add a filter that looks for the "above upper critical" value for the inlet sensor state. Click Add Filter. Enter a descriptive name for the filter. Enter the OID for Inlet Sensor State, then enter the value for a critical event. This filter requires a value of "6", which means "AboveUpperCritical".

To add the Warning level trapping, repeat the Add Trap and Add Filter process, with these changes:


- Event Type: Generic Warning
- Event Summary: write text to describe warning condition, rather than critical
- Filter Value: change from "6" to "5". A value of "5" for inlet sensor state means "AboveUpperWarning".




## Example: Event Summary Message with Variables

Example of a trap mapping with trap parameters as variables in the Event Summary message, and the resulting Event Details with complete summary shown.


SNMP Version:  v1  v2c

Enterprise OID:  

Enterprise Specific ID:


Event Type:  

Event Summary:

Filter:  

OID:

Value:

 Add Filter

**Event Details**

|                       |  |                 |                                |
|-----------------------|--|-----------------|--------------------------------|
| <b>Event</b>          | Informational Event  |                 |                                |
| <b>Status</b>         | Active   | <b>Severity</b> | Informational                  |
| <b>Occurred at</b>    | 11/02/14 01:07:56 PM EST   | <b>Target</b>   | <a href="#">192.168.43.177</a> |
| <b>Summary</b>        | User admin turned off outlet 12 on PDU Bill Y PX2. Trap OID: 1.3.6.1.4.1.13742.6.0.23, |                 |                                |
| <b>Cleared events</b> | None   |                 |                                |

The event summary text that is displayed in the Events tab list and in the event details is generated at the time of the event creation. Any configured {trap.N} substitutions defined in the event summary text of the matching trap mapping are expanded from the event's SNMP parameter values.

**Event Details**

|                       |  |                 |                           |
|-----------------------|--|-----------------|---------------------------|
| <b>Event</b>          | Informational Event                          |                 |                           |
| <b>Status</b>         | Active                                       | <b>Severity</b> | Informational             |
| <b>Occurred at</b>    | 11/14/14 12:16:26 PM EST                     | <b>Target</b>   | <a href="#">10.33.1.2</a> |
| <b>Summary</b>        | No matching plugin trap definition was found |                 |                           |
| <b>Cleared events</b> | None   |                 |                           |



If event summary text cannot be generated because the relevant trap mapping was deleted or modified such that it is no longer a match, then an error message displays, indicating that no matching trap mapping could be found.





## Example: Trap Mapping with Filters for Babel Buster SPX SNMP Gateway

Power IQ can receive threshold traps from SNMP gateways, such as Babel Buster, and convert them into meaningful events.

You must configure the Babel Buster to send traps before the traps can be mapped in the dynamic plugin.

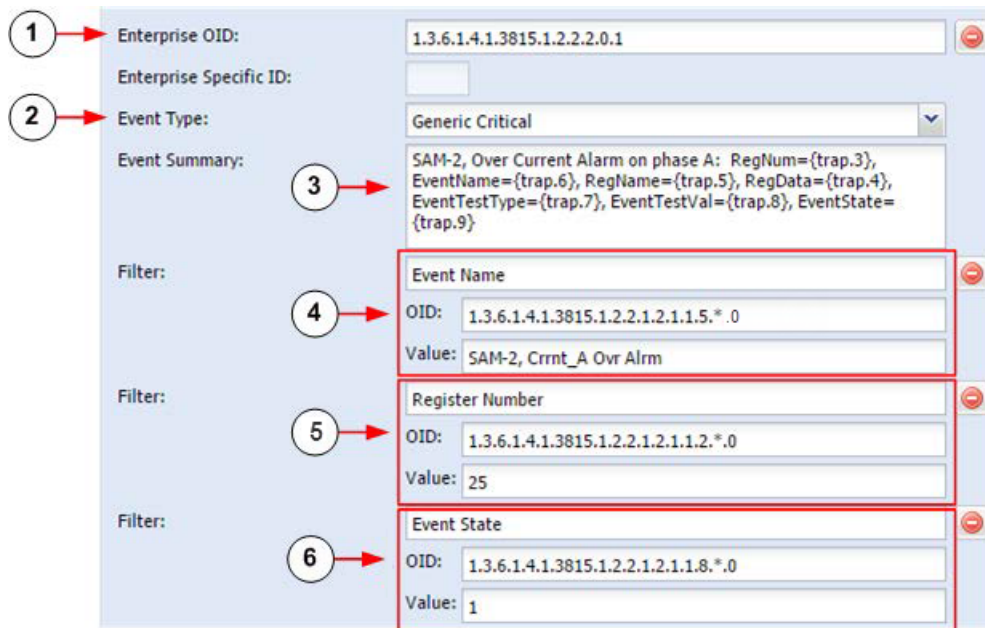
To configure a Babel Buster device to generate traps that can be converted to Power IQ events, you must:

- Create uniquely named events
- Configure threshold rules for the event
- Associate the event with a register you want to monitor the value of

See *Tips for Babel Buster Configuration* on the facing page.

Example:

- To configure the dynamic plugin to be capable of mapping these traps to Power IQ events, follow these examples. Check the numbers in the screenshot with the list that follows for an example of each item.



The screenshot shows a configuration form with the following fields and values:

- Enterprise OID:** 1.3.6.1.4.1.3815.1.2.2.2.0.1
- Enterprise Specific ID:** (empty)
- Event Type:** Generic Critical
- Event Summary:** SAM-2, Over Current Alarm on phase A: RegNum={trap.3}, EventName={trap.6}, RegName={trap.5}, RegData={trap.4}, EventTestType={trap.7}, EventTestVal={trap.8}, EventState={trap.9}
- Filter 1:**
  - Event Name: (empty)
  - OID: 1.3.6.1.4.1.3815.1.2.2.1.2.1.1.5.\*.0
  - Value: SAM-2, Crrnt\_A Ovr Alm
- Filter 2:**
  - Register Number: (empty)
  - OID: 1.3.6.1.4.1.3815.1.2.2.1.2.1.1.2.\*.0
  - Value: 25
- Filter 3:**
  - Event State: (empty)
  - OID: 1.3.6.1.4.1.3815.1.2.2.1.2.1.1.8.\*.0
  - Value: 1

1. Configure the Enterprise OID with the Babel Buster 'eventStateChange' trap OID: 1.3.6.1.4.1.3815.1.2.2.2.0.1  
Babel Buster only supports a single trap OID, so the enterprise trap OID will always have this value for any threshold trap you configure.
2. Select the appropriate Event Type based on the alarm condition being reported by the specific trap you are mapping.
3. Configure meaningful Event Summary text using desired trap parameter expansion elements: { trap.1 } , { trap.2 } ... { trap.N }

See *Trap Mapping Variables and Format* on page 682.

4. Add an Event Name filter. Use the unique event name as configured on the Babel Buster as the filter's Value.

Each filter OID must be specified such that it is an exact match for the OID of the targeted trap parameter.

One or more asterisks (\*) may be substituted in any position in the OID in place of a decimal value. This asterisk acts as a wildcard and will cause the Power IQ trap handler to ignore that particular portion of the OID when performing matching. See *Trap OID Wildcards* on page 679.

This is helpful in the Babel Buster scenario because the second to last decimal value is an 'eventIndex' value which indicates the row in 'eventTable' in the Babel Buster MIB. The 'eventIndex' value is dynamic and will change based on the Babel Buster configuration. Specifying an asterisk in your filter OID mappings will prevent your configuration from having to be modified in the event that the Babel Buster threshold configuration changes in the future.

5. Add a 'Register Number' filter. Use the number of the register associated with the threshold configured on the Babel Buster as the Filter's Value. This step is optional if the 'Event Name' filter value is unique.
6. Add an 'Event State' filter. The event state trap parameter value indicates whether the alarm condition is active (asserted) or not active (de-asserted). An event state value of (1) indicates an active event, and a value of (0) indicates that the condition is not active. This means that an event state value of (0) indicates that the alarm condition has been cleared.

A common scenario would be to create two trap mappings for each Babel Buster Action Rule or Event Name. One trap mapping would be used to map the active trap, where EventState value is 1, and one trap mapping would be used to map the clearing trap, where EventState value is 0.

## Tips for Babel Buster Configuration

BabelBuster Event State Change reference information: eventStateChange

Babel Buster devices allow you to configure a named threshold that will generate an eventStateChange trap.

### Trap

```
eventStateChange  NOTIFICATION-TYPE
OBJECTS {
    eventRegNum,
    eventRegName,
    eventRegData,
    eventName,
    eventTestType,
    eventTestVal,
    eventState
}
STATUS    current
DESCRIPTION
    "This trap is sent when an event changes state"
```



if notifications are enabled for the object that changed."

```
::= { bbx2Traps 1 }
```

VariablesEdit section

eventRegNum - (Integer) Register number referenced by this event.

eventRegName - (DisplayString) Name of register referenced by this event.

eventRegData - (DisplayString) Floating point ASCII string representation of register data.

eventName - (DisplayString) Name given to this event for identification purposes.

eventTestType - (Integer - undefined(0), greaterThan(1), greaterOrEqual(2), lessThan(3), lessOrEqual(4), equal(5), notEqual(6)) Event test type, comparison of register data against test value.

eventTestVal - (DisplayString) Floating point ASCII string representation of event test value.

eventState - (Integer - false(0), true(1)) State of event, true means register meets test defined by threshold rule, true may imply alarm condition active



# Structured Dynamic Plugins

## Requirements

- MIB file for the device you want to manage. See *Find the MIB File* on the next page.
- Ability to correctly identify OIDs in a MIB file.



## Find the MIB File

To add a PDU using dynamic plugins, you must have the MIB file for the PDU.

To find the MIB file:

- MIBs are usually available in one of the following locations.

The product interface. For example, Raritan PXPdUs have a menu option to save the MIB file.

---

*Note: PXPdUs are supported. You do not need to add dynamic plugins for Raritan PDUs.*

---

- The product's website.

The product's technical support department.



## Use a MIB Browser

A MIB browser is useful when creating your dynamic plugins. When adding traps to dynamic plugins, a trap receiver is also helpful.

iReasoning MIB Browser free personal edition is suggested. iReasoning also includes a trap receiver.

See *Identify Trap OIDs and Parameters* on page 678 for details on using a MIB browser to help with trap mapping.

Go to <http://ireasoning.com/download.shtml>.



## Identify the OIDs for Mapping

Power IQ provides the ability to map OIDs for many components, attributes, and details of power devices. Power IQ can collect and display data from the device based on the mappings you provide.

OIDs are documented in a product's MIB file.

In SNMP, the object identifier (OID) that uniquely identifies the make and model of an SNMP-managed device is the MIB-II System Object Identifier, commonly referred to as "sysObjectID", which is 1.3.6.1.2.1.1.2.0.

Within Power IQ, the value for "sysObjectID" is referred to as the "PDU System OID".

For example, the sysObjectID or "PDU System OID" for a Raritan model PX PDU is "1.3.6.1.4.1.13742.4". The "PDU System OID" is commonly used as the prefix for additional OIDs used to retrieve PDU attribute and component information.

See *Mappings for Each PDU Type* on page 653 for lists of values that you can map from your PDU to Power IQ.

For each feature that you want to map, you must find the OID, and enter it in the mapping form to create the dynamic plugin. See *Creating a Custom Mapping Dynamic Plugin* on page 714.



## Creating a Structured Dynamic Plugin

Select the data you want to collect from your PDU and add the OID mappings for it to create the structured dynamic plugin.

When adding OIDs, you can use variables to simplify data entry and reduce errors. You must use the correct formatting, which is validated when you click Apply Changes or Save Plugin. See *OID Variables and Format* on page 706 for details.

For a full list of available data you can map, see *Mappings for Each PDU Type* on page 653.

For help with mapping external sensors on rack PDUs, see *External Temperature and Humidity Sensor Mappings* on page 665.

For help with mapping traps, see *Trap Support in Dynamic Plugins - Structured or Custom* on page 677.

1. In the Settings tab, click Dynamic Plugins in the Appliance Administration section.
2. Click Add, then click the type of device: CRAC, Floor PDU, Floor UPS, Power Panel, Rack PDU, Standalone Meter. Do not select Custom when using a structured MIB to create the plugin. See *Creating a Custom Mapping Dynamic Plugin* on page 714.

For environmental sensor aggregators, use Rack PDU.

Type cannot be changed once the dynamic plugin is created.

3. The new dynamic plugin page displays. Enter a name to identify this dynamic plugin, in the Name field. Use lower-case letters and underscores only.
4. Enter a description to identify this dynamic plugin in the Description field.
5. Enter the manufacturer of the device you want to add using this dynamic plugin in the Manufacturer field.
6. The Model Name Filter field can be used to define a string value which will be used as a filter to determine which PDU models will be managed by the plugin mapping. This is useful when the vendor's MIB supports multiple models and it is not possible to design a single plugin mapping capable of supporting them all. This is also useful when a standard plugin exists but one or more models have been encountered which are not managed by it in a satisfactory manner. Normally, model name comparisons must be an exact match for the plugin mapping to be selected. However, a trailing asterisk character in the model name value is treated as a wildcard and may be used to have the plugin mapping used with more than one model name. For example, a Model Name Filter value of "PX2-1000" will only match PDUs with a model name of PX2-1000. However, a Model Name Filter value of "PX2-\*" will match on model names PX2-1000, PX2-2000, etc.
7. For Phase, select Automatic to allow Power IQ to determine the phase of the device by counting the number of poles on the inlets. Or, make a selection to hard-code the phase as Single Phase or Three Phase.
8. Check the Always Use SNMPv1 checkbox if the target device only supports SNMPv1. Leave the checkbox blank to use the default, SNMPv2/v3 communication.
9. In the Metadata section, enter the value used in the MIB to indicate each status or control value. Common MIB value pairs are Yes/No, On/Off, 1/2. See *Metadata for Circuit Breakers and Outlets* on page 671 for details.
  - Circuit Breaker State OK
  - Circuit Breaker State Tripped
  - Outlet State On
  - Outlet State Off
  - Outlet Power On
  - Outlet Power Off





10. Enter values for the Environmental Sensors Metadata. These values work with external sensor mappings. See *Metadata for Environmental Sensors* on page 672 for details.
11. If needed, enter values for the UPS Output Source Metadata. These values work with the UPS Output Source mapping. See *Metadata for UPS Output Source* on page 672 for details.
12. If needed, enter values for the Battery Status Metadata. These values work with the Battery Status mapping. See *Metadata for Battery Status* on page 674 for details.
13. If needed, enter values for the Battery Replacement Indicator Metadata. These values work with the Battery Replacement Indicator mapping. See *Metadata for Battery Replacement Indicator* on page 675 for details.
14. Enter the PDU System OID and PDU Model OID for the devices that will use this dynamic plugin. See *OID Variables and Format* on the facing page for details. Required. See Step 7 for the Model Filtering field, if you expect multiple models to be returned.
15. To add features of the PDU, select an item from the "Add another mapping" drop-down list, then click Add. These links contain the list of supported mappings for each device type.
  - *CRAC Mappings* on page 654
  - *Floor PDU Mappings* on page 654
  - *Floor UPS Mappings* on page 656
  - *Power Panel Mappings* on page 658
  - *Rack PDU Mappings* on page 659
  - *Rack UPS Mappings* on page 661
  - *Standalone Meter Mappings* on page 664
  - *Wildcard Index Mappings - Structured Dynamic Plugins Only* on page 668
16. For each mapping you add, enter the OID. If the MIB does not have an OID for an Index item, enter an integer value, or a columnar OID whose rows will be SNMP walked during polling to determine the PDU element's count. See *Index Mapping Format* on page 709 for details about mapping indices.

Some mappings require extra information, below the main mapping field.
17. Start and Step for Index mappings:
  - a. Some MIBs number indices starting at a number other than 1, and in increments greater than 1. If your MIB shows this, enter the starting number in the Start field, and the increment in the Step field.
18. Proxied checkbox for Index mappings:
  - a. Select the Proxied checkbox when a columnar OID is entered.
19. Multipliers for measurement mappings:
  - a. Power IQ expects power readings to be in the following units: Amps, Volts, Watts, VoltAmps, Degrees Fahrenheit/Celsius, and so on.

Many MIBs report power readings in different units than what Power IQ requires. The multiplier field is used to scale the retrieved readings to the units required.

#### Example

If the MIB reports readings in KiloWatts a multiplier value of 1000 must be specified to scale KiloWatts to Watts. A value of 5KW reported by the SNMP agent is converted to 5000 Watts when the multiplier is applied.



20. To add mappings for traps sent by the PDU, select SNMP Version, v1 or v2c, then click Add Trap to display the fields. To add multiple traps, click Add Trap to display another set of fields.
21. For SNMP v1 traps, enter the Enterprise OID and the Enterprise Specific ID for the trap. For SNMP v2 traps, only the Enterprise OID for the trap is required.
22. Select the generic event this trap will map to: Generic Info, Generic Warning, Generic Critical.
23. In the Event Summary, write the message that will appear in the event details. Use the trap's parameters as variables to create a complete, detailed summary of the event. See *Trap Mapping Variables and Format* on page 682 for syntax. See *Example: Event Summary Message with Variables* on page 695 for a sample summary.
24. To filter the incoming traps, click Add Filter to display the fields. If a trap defined by the PDU's MIB can describe multiple alarm conditions, and you would like to map an incoming trap to one of several Power IQ events based on a specific alarm condition, then you must define event filters. The filters determine which Power IQ event an incoming trap should be mapped to.
  - a. Enter a name for the filter.
  - b. Enter OID of the trap parameter that this filter applies to.
  - c. Enter the value that the trap parameter must match. The trap parameter value must match exactly to be considered a match.

See *Example: Trap Mapping with Filters* on page 693.

25. When you've finished with mappings, click Create Plugin.
26. Add the PDU that uses the dynamic plugin. See *How to Add PDUs to Power IQ* on page 112 and *Check PDUs Added with Dynamic Plugins* on page 738.

## OID Variables and Format

When creating a dynamic plugin mapping in Power IQ, there are a number of variable substitutions that are supported to assist with generating the desired set of Object Identifiers (OIDs) at poll time.

For example, consider the PDU System OID for a Raritan PX1 PDU which is 1.3.6.1.4.1.13742.

Virtually all OIDs from the Raritan PX1 MIB will have this identical prefix. Rather than specifying this prefix for all OIDs it is possible to simply use the variable substitution { pdu\_system\_oid} in the OID definition when creating the mapping. Then, at poll time, the "{ pdu\_system\_oid}" text will be replaced with the "1.3.6.1.4.1.13742" prefix to arrive at the complete OID.

The following variable substitutions are supported.

| OID                   | Variable                 | Notes |
|-----------------------|--------------------------|-------|
| PDU System OID        | { pdu_system_oid}        |       |
| PDU Proxy Index       | { proxy_id}              |       |
| Circuit Breaker Index | { circuit_breaker_index} |       |

| OID                    | Variable                   | Notes   |
|------------------------|----------------------------|---|
| Inlet Index            | { inlet_index }            |   |
| Inlet Pole Index       | { inlet_pole_index }       |   |
| Outlet Index           | { outlet_index }           |   |
| Outlet Pole Index      | { outlet_pole_index }      |   |
| Panel Index            | { panel_index }            |   |
| Panel Inlet Index      | { panel_inlet_index }      |   |
| Panel Inlet Pole Index | { panel_inlet_pole_index } |   |
| Circuit Index          | { circuit_index }          |   |
| Circuit Pole Index     | { circuit_pole_index }     |   |
| Battery Index          | { battery_index }          | Although the <i>Battery Index</i> mapping is available, only a single battery per UPS is currently supported. Specifying a <i>Battery Index</i> is not required so in most cases it is better to simply not define a <i>Battery Index</i> .           |
| UPS Output Index       | { ups_output_index }       | Although the <i>UPS Output Index</i> mapping is available, only a single UPS output per UPS is currently supported. Specifying <i>UPS Output Index</i> is not required so in most cases it is better to simply not define a <i>UPS Output Index</i> . |
| UPS Output             | { ups_output_pole_index }  |   |

| OID              | Variable  | Notes |
|------------------|---|-------|
| Pole Index       |   |       |
| Sensor Indexes   | { external_sensor_index}<br>{ external_sensor_temperature_index}<br>{ external_sensor_humidity_index} |       |
| Wildcard Indexes | { wildcard_one_index}<br>{ wildcard_two_index}<br>{ wildcard_three_index}<br>{ wildcard_four_index}   |       |

To use a variable in an OID, substitute the variable text for the numbers. You must use the curly brackets before and after, and the period after the final bracket. Follow the examples in the table.

| OID with variable substitution               | Fully Expanded OIDs  |
|--|--|
| { pdu_system_oid }.1.1.13.0                  | PDU Name for a PX1:<br>1.3.6.1.4.1.13743.4.1.1.13.0  |
| { pdu_system_oid }.1.1.1.0                   | PDU Firmware for a PX1<br>1.3.6.1.4.1.13743.4.1.1.1.0  |
| { pdu_system_oid }.1.2.2.1.7.{ outlet_index} | Outlet Active Power OIDs for an 8-outlet PX1<br>1.3.6.1.4.1.13742.4.1.2.2.1.7.1<br>1.3.6.1.4.1.13742.4.1.2.2.1.7.2<br>1.3.6.1.4.1.13742.4.1.2.2.1.7.3<br>1.3.6.1.4.1.13742.4.1.2.2.1.7.4<br>1.3.6.1.4.1.13742.4.1.2.2.1.7.5<br>1.3.6.1.4.1.13742.4.1.2.2.1.7.6<br>1.3.6.1.4.1.13742.4.1.2.2.1.7.7<br>1.3.6.1.4.1.13742.4.1.2.2.1.7.8 |



## Index Mapping Format

Structured dynamic plugins use index mappings to determine the number of PDU elements that a particular PDU has. PDU elements are inlets, inlet poles, circuit breakers, outlets, and so on.

There are 3 options for specifying index mapping values.

- **SNMP OID:** Specify an SNMP OID whose retrieved value indicates the PDU element's count.
- **Proxied (Columnar OID):** Specify a columnar OID and check the “proxied” option in the UI. At poll time, an SNMP walk will be performed on the columnar OID to determine how many rows there are and that count will be used as the PDU element's count.
- **Hard-coded Integer:** Specify a hard-coded integer value to indicate the PDU element's count.

The advantage of the first two options is that a single dynamic plugin is capable of supporting a variety of different PDU models with different numbers of inlets, inlet poles, circuit breakers, outlets, and so on.

If the MIB supports a simple count object identifier, then the first option is the easiest and preferred.

Please note that it is possible to define an index mapping in terms of another defined index mapping via variable substitution. For example, let's assume that a PDU has multiple inlets and each inlet can have a different inlet pole count (i.e., some single phase and some three phase). In this scenario, it is not possible to simply hard code a value or rely on a single retrieved count value because each inlet can have a different number of poles.

Let's say that the MIB defines a table that contains the number of inlet poles at each inlet with the inlet as the index to the table. Similarly, inlet pole current and voltage are available in another table, which is indexed by inlet ordinal and inlet pole ordinal. The mapping for this scenario could look like the following:

**Mappings**

PDU System OID:

Model OID:

Inlet Index:  -

Start:  Step:  Proxied:

Inlet Pole Index:  -

Start:  Step:  Proxied:

Inlet Pole Current:  -

Multiplier:

Inlet Pole Voltage:  -

Multiplier:

In some cases, the MIB may not define an OID whose value indicates the PDU element's count. If the relevant PDU element information is contained within a table, it is possible to specify a columnar SNMP OID from the desired MIB table and



check the “proxied” option when you configure the plugin in Power IQ. During polling, Power IQ will perform an SNMP walk of all the rows of the specified table and use the count of the number of rows as the PDU element’s count.

If the MIB does not define OIDs that can be used to determine the count dynamically, you must provide a hard-coded integer value. In this case, the dynamic plugin will likely only work for a specific model. You may also need to specify a Model name filter to ensure the dynamic plugin is only used with the appropriate model type.

Find a count object in the MIB that specifies the number of a particular component, such as outlets, that the target PDU has. Specify the OID for the count as the value of the index.

When an OID is a scalar object, that is, not part of a table, add a “.0” to the end of the OID.

### Example

The Raritan PX MIB supports an “outletCount” object with an OID of 1.3.6.1.4.1.13742.4.1.2.1.

Add a “.0” to the end of the OID to arrive at an OID of 1.3.6.1.4.1.13742.4.1.2.1.0.

Power IQ can then use this OID to perform an SNMP get request for the number of outlets on a specific PDU.

To map this value in the dynamic plugin, enter “1.3.6.1.4.1.13742.4.1.2.1.0” in the Outlet Index field.

### Example

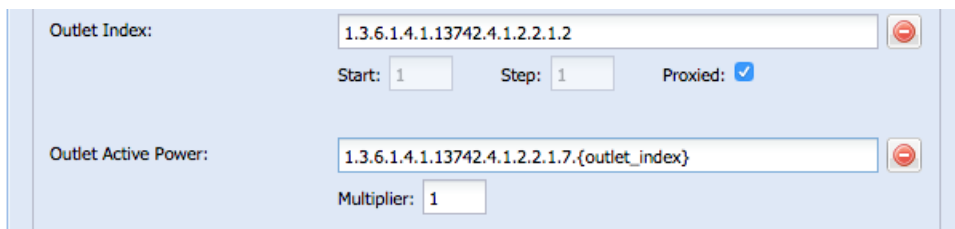


The screenshot shows a configuration window with two main sections. The first section, labeled "Outlet Index:", has a text input field containing "1.3.6.1.4.1.13742.4.1.2.1.0". Below this field are three smaller input fields: "Start:" with the value "1", "Step:" with the value "1", and "Proxied:" with an unchecked checkbox. The second section, labeled "Outlet Active Power:", has a text input field containing "1.3.6.1.4.1.13742.4.1.2.2.1.7.{outlet\_index}" and a "Multiplier:" input field with the value "1". Each of the two main sections has a red minus icon in a circle to its right.

Staying with the previous example of the Raritan PX MIB, assume that the “outletCount” object was not available. Any of the columns from the private.enterprises.raritan.board.pdu.outlets.outletTable.outletEntry object can be used to determine the number of rows in the table, and therefore the number of outlets on the PDU.

- The first accessible column in the “outletEntry” object is “outletLabel”, whose OID is 1.3.6.1.4.1.13742.4.1.2.2.1.2.
- Power IQ can use this OID to perform an SNMP walk of all the entries in the outlet table and determine the number of outlets on a specific PDU.
- To map this value in the dynamic plugin, enter “1.3.6.1.4.1.13742.4.1.2.2.1.2” in the Outlet Index field, and check the “Proxied” checkbox.

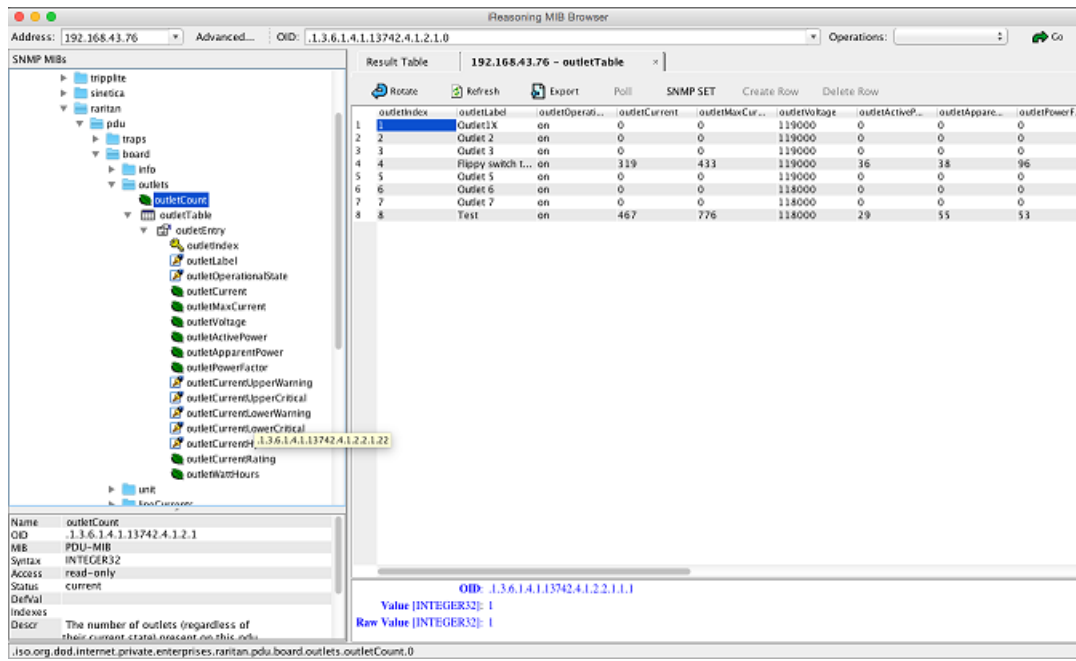
### Example



The screenshot shows a configuration window similar to the previous one. The "Outlet Index:" section now has the text input field containing "1.3.6.1.4.1.13742.4.1.2.2.1.2" and the "Proxied:" checkbox is checked. The "Outlet Active Power:" section remains the same with the text input field containing "1.3.6.1.4.1.13742.4.1.2.2.1.7.{outlet\_index}" and the "Multiplier:" input field with the value "1". Each of the two main sections has a red minus icon in a circle to its right.

The iReasoning MIB browser is useful when inspecting the objects in a MIB to determine what information is exposed and available for use in your dynamic plugin mapping.

For example, this screenshot shows the “outlets” portion of the Raritan PX1 MIB and a table view of the outletTable of an 8 outlet PX1 PDU.



The screenshot shows the Reasoning MIB Browser interface. On the left, a tree view displays the MIB structure under 'raritan' > 'pdu' > 'outlets' > 'outletTable'. The main area shows a table view of the 'outletTable' with the following data:

| outletIndex | outletLabel        | outletOperas... | outletCurrent | outletMaxCur... | outletVoltage | outletActiveP... | outletAppare... | outletPowerF... |
|-------------|--------------------|-----------------|---------------|-----------------|---------------|------------------|-----------------|-----------------|
| 1           | Outlet 1           | on              | 0             | 0               | 119000        | 0                | 0               | 0               |
| 2           | Outlet 2           | on              | 0             | 0               | 119000        | 0                | 0               | 0               |
| 3           | Outlet 3           | on              | 0             | 0               | 119000        | 0                | 0               | 0               |
| 4           | Flippy switch 1... | on              | 319           | 433             | 119000        | 36               | 38              | 96              |
| 5           | Outlet 5           | on              | 0             | 0               | 119000        | 0                | 0               | 0               |
| 6           | Outlet 6           | on              | 0             | 0               | 118000        | 0                | 0               | 0               |
| 7           | Outlet 7           | on              | 0             | 0               | 118000        | 0                | 0               | 0               |
| 8           | Test               | on              | 467           | 776             | 118000        | 29               | 55              | 53              |

Below the table, the OID for the selected row is shown: **OID: .1.3.6.1.4.1.13742.4.1.2.2.1.1.1**. The value is **Value [INTEGER32]: 1** and the raw value is **Raw Value [INTEGER32]: 1**.

At the bottom left, the details for the 'outletCount' object are shown:

```

Name: outletCount
OID: .1.3.6.1.4.1.13742.4.1.2.1
MIB: PDU-MIB
Syntax: INTEGER32
Access: read-only
Status: current
DefVal:
Indexes:
Descr: The number of outlets (regardless of
their current status) present on this pdu.
.iso.org/dod.internet.private.enterprises.raritan.pdu.board.outlets.outletCount.0
    
```



## Custom Mapping Dynamic Plugins

### Requirements:

- For custom mappings based on flat MIBs:
  - MIB file for the device you want to manage. See *Find the MIB File* on page 701.
  - Ability to correctly identify OIDs in a MIB file.
- For custom mappings based on SNMP-gateway managed devices:
  - A SNMP gateway device that converts Modbus/Bacnet to SNMP
  - A list of the registers for the PDU you want to manage. See *Find the Modbus Register List* on the next page.
  - Ability to correctly convert the registers to SNMP OIDs, using your SNMP-gateway device





## Find the Modbus Register List

To add a Modbus device using a custom mapping dynamic plugin, you must have the register list for the device.

- Modbus register lists are usually available in one of the following locations.
- The product's user guide
- The product's website.
- The product's technical support department.



## Creating a Custom Mapping Dynamic Plugin

1. In the Settings tab, click Dynamic Plugins in the Appliance Administration section.
2. Click Add, then click Custom. Do not select the type of device now.

The new dynamic plugin page displays.

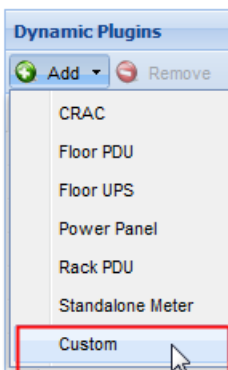
3. Enter a name to identify this dynamic plugin, in the Name field.
4. Lowercase letters and underscores only.

---

*Tip for SNMP gateway use cases: When you have multiple devices using the same gateway, include proxy information in the name. This will help you identify the correct plugin when adding devices. See Proxy ID field.*

---

5. Enter a description to identify this dynamic plugin in the Description field.
6. Enter the manufacturer of the device you want to add using this dynamic plugin in the Manufacturer field.
7. The Model Name Filter field can be used to define a string value which will be used as a filter to determine which PDU models will be managed by the plugin mapping. This is useful when the vendor's MIB supports multiple models and it is not possible to design a single plugin mapping capable of supporting them all. This is also useful when a standard plugin exists but one or more models have been encountered which are not managed by it in a satisfactory manner. Normally, model name comparisons must be an exact match for the plugin mapping to be selected. However, a trailing asterisk character in the model name value is treated as a wildcard and may be used to have the plugin mapping used with more than one model name. For example, a Model Name Filter value of "PX2-1000" will only match PDUs with a model name of PX2-1000. However, a Model Name Filter value of "PX2-\*" will match on model names PX2-1000, PX2-2000, etc.



8. Check the Always Use SNMPv1 checkbox if the target PDU only supports SNMPv1. Leave the checkbox blank to use the default, SNMPv2/v3 communication.
9. In the Metadata section, enter the value used in the MIB to indicate each status or control value. Common MIB value pairs are Yes/No, On/Off, 1/2. See *Metadata for Circuit Breakers and Outlets* on page 671 for details.
  - Circuit Breaker State OK
  - Circuit Breaker State Tripped
  - Outlet State On
  - Outlet State Off
  - Outlet Power On
  - Outlet Power Off

**Metadata**

|                                |     |
|--------------------------------|-----|
| Circuit Breaker State OK:      | 1   |
| Circuit Breaker State Tripped: | 2   |
| Outlet State On:               | ON  |
| Outlet State Off:              | OFF |
| Outlet Power On:               | ON  |
| Outlet Power Off:              | OFF |

- Enter values for the Environmental Sensors Metadata. These values work with external sensor mappings. See *Metadata for Environmental Sensors* on page 672 for details.

|                                |                      |
|--------------------------------|----------------------|
| Humidity Sensor Type:          | <input type="text"/> |
| Temperature Sensor Type:       | <input type="text"/> |
| Temperature Unit:              | <input type="text"/> |
| Temperature Unit (Celsius):    | <input type="text"/> |
| Temperature Unit (Fahrenheit): | <input type="text"/> |

- If needed, enter values for the UPS Output Source Metadata. These values work with the UPS Output Source mapping. See *Metadata for UPS Output Source* on page 672 for details.
- If needed, enter values for the Battery Status Metadata. These values work with the Battery Status mapping. See *Metadata for Battery Status* on page 674 for details.
- If needed, enter values for the Battery Replacement Indicator Metadata. These values work with the Battery Replacement Indicator mapping. See *Metadata for Battery Replacement Indicator* on page 675 for details.
- In the Mappings section, select the type of device: CRAC, Floor PDU, Floor UPS, Power Panel, Rack PDU, Standalone Meter.
- Type cannot be changed once the plugin is created.

**Mappings**

|               |  |
|---------------|--|
| Type:         | Floor PDU <input type="button" value="v"/> |
| PDU Name:     | <input type="text"/>                       |
| System OID:   | <input type="text"/>                       |
| Proxy ID:     | <input type="text"/>                       |
| Model ID:     | <input type="text"/>                       |
| PDU Firmware: | <input type="text"/>                       |

- Enter the device's name in the PDU Name field.
- Enter the System OID for the PDU.
- For SNMP gateway use cases, enter the gateway's System OID.
- The Proxy ID field is used to identify PDUs in daisy chained configurations, or managed by a serial device. In an SNMP gateway use case, use this field to assign a proxy id to each PDU managed by the gateway. Best practice is to start with 1 for gateways, entering a unique proxy id for each PDU managed through the gateway.



20. Note: When you add the PDUs managed by the SNMP gateway to Power IQ, you will indicate the proxy index for each one. This is how Power IQ differentiates the separate PDUs behind the same IP address.
21. Enter the PDU Model OID for the PDU that will use this dynamic plugin. Required. See Step 7 for the Model Filtering field, if the MIB you are working with supports multiple models, and you want to limit this custom mapping to a specific model. Hard code a value if the MIB does not provide a value.
22. Enter an OID for the firmware version in the PDU Firmware field.
23. Enter or import Custom Mappings. See *Sensor Mappings* on the next page.

#### Sensor Mappings

+ Add - Remove + Import

| Object Mapping | Data Model Element | Sensor Type       |
|----------------|--------------------|-------------------|
| Enter OID      | Enter Identity     | Enter Sensor Type |

24. Enter Sensor Multipliers. See *Sensor Multipliers* on page 723.

#### Sensor Multipliers

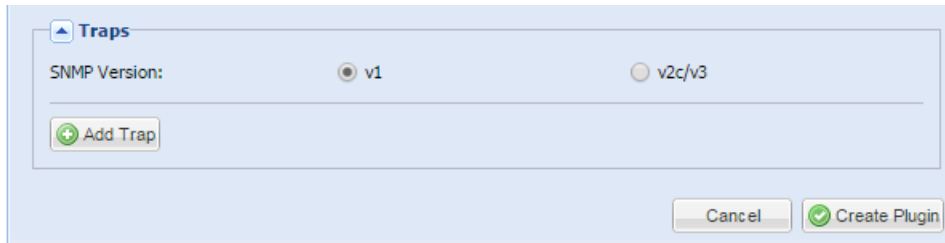
+ Add - Remove

| Data Model Element | Sensor Type       | Multiplier       |
|--------------------|-------------------|------------------|
| Enter Element Type | Enter Sensor Type | Enter Multiplier |

25. To add mappings for traps sent by the PDU, select SNMP Version, v1 or v2c/v3, then click Add Trap to display the fields. To add multiple traps, click Add Trap to display another set of fields.
26. For SNMP v1 traps, enter the Enterprise OID and the Enterprise Specific ID for the trap. For SNMP v2/v3 traps, only the Enterprise OID for the trap is required.
27. Select the generic event this trap will map to: Generic Info, Generic Warning, Generic Critical.
28. In the Event Summary, write the message that will appear in the event details. Use the trap's parameters as variables to create a complete, detailed summary of the event. See *Trap Mapping Variables and Format* on page 682 for syntax. See [Example: Event Summary Message with Variables on page 695](#) for a sample summary.
29. To filter the incoming traps, click Add Filter to display the fields. If a trap defined by the PDU's MIB can describe multiple alarm conditions, and you would like to map an incoming trap to one of several Power IQ events based on a specific alarm condition, then you must define event filters. The filters determine which Power IQ event an incoming trap should be mapped to.
30. Enter a name for the filter.
31. Enter OID of the trap parameter that this filter applies to.
32. Enter the value that the trap parameter must match. The trap parameter value must match exactly to be considered a match.

See *Example: Trap Mapping with Filters* on page 693.

See *Example: Trap Mapping with Filters for Babel Buster SPX SNMP Gateway* on page 697.



33. When you've finished with mappings, multipliers, and traps, click Create Plugin.
34. Add the PDU that uses the dynamic plugin. See *How to Add PDUs to Power IQ* on page 112
35. See *Check PDUs Added with Dynamic Plugins* on page 738.

## Sensor Mappings

Sensor mappings are used in the custom dynamic plugin to identify each power sensor, or data point, you want Power IQ to support for your PDU.

Sensor mappings can be entered manually, by entering and selecting values. Or, you can create a CSV file with the information formatted correctly, and import the file.

To understand sensor mappings and view instructions for manual entry, see:

- *Data Model Element* on the facing page
- *Sensor Type* on page 720
- *Custom Dynamic Plugin Example Screenshots* on page 727

To see instructions and an example of the CSV file for importing mappings, see:

- *Sensor Mapping CSV Import File Structure* on page 722

To see rules that apply to mappings, see:

- *Additional Custom Mapping Rules* on page 725

## Object Identifier

The object identifier is the SNMP OID for the sensor, such as an attribute or reading, you want to collect.

In some cases, when an OID is not available in the MIB, you can hard code a value.

Valid values:

- SNMP OID for the sensor
- OR**
- A hard-coded value for some sensor types. See *Sensor Type* on page 720.

Hard code a value when an OID is not available in the MIB. You can hard code circuit pole phase, circuit pole position on a panel, names, and any sensor type where a positive decimal number value would be returned. Hard coding for numeric val-

ues makes sense in some cases, such as voltage. Some other numeric values, such as active power, may be hard coded but will not result in meaningful data.

## Data Model Element

The data model element specifies where this sensor is associated in the model of the PDU.

Each device type support different data model elements. The data model elements have hierarchical parent-child relationships. See *Data Model Elements by PDU Type* below.

You must identify the precise association of each sensor.

To identify the data model element:

1. In the list of data model elements, find the data model element you want to associate a sensor type with. See *Data Model Elements by PDU Type* below.
2. Append the number of the element to the end of each element's name. Leave one space between elements.

### Example

```
panel2 circuit10 circuitpole3
```

An amperage sensor for pole 3 on circuit 10 of a Floor PDU's second panel.

## Data Model Elements by PDU Type

Data model elements have hierarchical parent-child relationships.

Rules for all PDU types:

- A panel may directly contain inlets and circuits or circuitpoles
- An inlet must contain at least one inletpole. See *Additional Custom Mapping Rules* on page 725 for an example mapping to follow when a device does not have inletpoles.
- An outlet may contain outletpoles
- A circuit may contain circuitpoles
- A ups output may contain ups output\_poles
- CRAC
  - inlet
  - inlet inletpole
  - externalsensor
- FLOOR\_PDU
  - inlet
  - inlet inletpole
  - panel
  - panel inlet
  - panel inlet inletpole
  - panel circuit
  - panel circuit circuitpole



- panel circuitpole
- circuit
- circuit circuitpole
- circuitpole
- externalsensor
- FLOOR\_UPS
  - inlet
  - inlet inletpole
  - circuit
  - circuit circuitpole
  - battery
  - ups\_output
  - ups\_output\_pole
  - externalsensor
- POWER\_PANEL
  - inlet
  - inlet inletpole
  - circuit
  - circuit circuitpole
  - circuitpole
  - externalsensor
- RACK\_PDU
  - inlet
  - inlet inletpole
  - circuitbreaker
  - outlet
  - outlet outletpole
  - battery
  - ups\_output
  - ups\_output\_pole
  - externalsensor
- RACK\_UPS
  - inlet
  - inlet inletpole
  - circuitbreaker
  - outlet
  - outlet outletpole
  - battery
  - ups\_output
  - ups\_output\_pole
  - externalsensor
- STANDALONE\_METER
  - circuit
  - circuit circuitpole
  - externalsensor



## Sensor Type

The sensor type identifies the type of reading expected from the sensor.

| Valid values   | Valid for these data model elements            | Valid hard coded value in Object Identifier Field   |
|----------------|--|---|
| active_power   | inlet, inletpole, outlet, circuit, circuitpole | positive decimal number   |
| apparent_power | inlet, outlet, circuit                         | positive decimal number   |
| current        | inlet, outlet, circuit, any pole, battery      | positive decimal number   |
| decimal_digits | external sensor                                | positive decimal number used to scale external sensor readings  |
| name           | outlet, circuit, circuitpole, circuitbreaker   | name of the data model element  |
| phase          | circuitpole                                    | L1, L2, L3<br>A, B, C<br>X, Y, Z<br>1,2,3<br>See <i>Set Phase Labels for Circuit Pole Phase</i> on page 762.                    |
| position       | circuitpole                                    | Number greater than 0.<br>Specifies the circuit pole position on the panel.   |
| power_control  | outlet   | Hard coding not supported for power control.  |
| power_factor   | inlet, outlet, circuit                         | positive decimal number between 0 - 1.<br>Example: Power factor 98% is hard coded as .98. 100% is 1.0.                          |
| state          | outlet, circuit breaker                        | Hard coded value must match the configured metadata value.<br>See <i>Metadata for Circuit Breakers and Outlets</i> on page 671. |



| Valid values        | Valid for these data model elements       | Valid hard coded value in Object Identifier Field  |
|---------------------|---|--|
| type                | externalsensor                            | <p>Example: T for Temperature, H for Humidity.</p> <p>Hard coded value must match the configured metadata value for Humidity Sensor Type or Temperature Sensor Type.</p> <p>See <i>Metadata for Environmental Sensors</i> on page 672.</p> |
| unit                | externalsensor                            | <p>Example: C for Celsius.</p> <p>Hard coded value must match the configured metadata value for Temperature Unit (Celsius) or Temperature Unit (Fahrenheit).</p> <p>See <i>Metadata for Environmental Sensors</i> on page 672.</p>         |
| value               | externalsensor                            | decimal number   |
| voltage             | inlet, outlet, circuit, any pole, battery | positive decimal number  |
| watt_hour           | inlet, panelinlet, circuit, outlet        | positive decimal number  |
| load_percentage     | ups_output, ups_output_pole               | Percentage of UPS power capacity currently being used. Positive number between 0 and 100 (inclusive).  |
| source              | ups_output                                | Source of UPS output power. Hard coded value must match a configured metadata value. See <i>Metadata for UPS Output Source</i> on page 672 for details.  |
| status              | battery                                   | Battery health status. Hard coded value must match a configured metadata value. See <i>Metadata for Battery Status</i> on page 674.  |
| replacement         | battery                                   | Indicates whether or not the battery needs to be replaced. Hard coded value must match a configured metadata value.<br>See <i>Metadata for Battery Replacement Indicator</i> on page 675 for details.                                      |
| capacity_percentage | battery                                   | Battery charge remaining expressed as percentage of full charge. Positive number between 0 and 100 (inclusive).  |
| runtime_remaining   | battery                                   | Time to battery depletion under present load conditions (in minutes). Positive number.   |

| Valid values | Valid for these data model elements | Valid hard coded value in Object Identifier Field   |
|--------------|-------------------------------------|---|
| seconds_on   | battery                             | Elapsed time since the UPS last switched to battery power (in seconds).<br>Positive number. |

## Sensor Mapping CSV Import File Structure

To include sensor mappings for a custom dynamic plugin, you may import a CSV file containing the information, instead of entering and selecting the information manually.

These links include instructions and valid values for each column:

- [Data Model Element](#) on page 718
- [Sensor Type](#) on page 720

To import the sensor mapping CSV file:

1. In the custom plugin form, click Import in the Sensor Mappings section.
2. Select the file and click Upload. If the file validates, the entries appear in the fields.
3. The structure of the CSV file:
  - One line per sensor mapping
  - No header row
  - Each line has only the value columns, in the following order

| Column 1:<br>Object Identifier | Column 2:<br>Data Model Element | Column 3:<br>Sensor Type |
|--------------------------------|---------------------------------|--------------------------|
|--------------------------------|---------------------------------|--------------------------|

**Example**



| A                                   | B                     | C            |
|-------------------------------------|-----------------------|--------------|
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.25 | Circuit1              | active power |
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.24 | Circuit1              | watt hour    |
| HVAC Feed                           | Circuit1              | name         |
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.7  | Circuit1 CircuitPole1 | current      |
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.8  | Circuit1 CircuitPole2 | current      |
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.9  | Circuit1 CircuitPole3 | current      |
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.6  | Circuit1 CircuitPole4 | current      |
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.10 | Circuit1 CircuitPole1 | voltage      |
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.11 | Circuit1 CircuitPole2 | voltage      |
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.12 | Circuit1 CircuitPole3 | voltage      |
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.12 | Circuit1 CircuitPole4 | voltage      |
| A                                   | Circuit1 CircuitPole1 | phase        |
| B                                   | Circuit1 CircuitPole2 | phase        |
| C                                   | Circuit1 CircuitPole3 | phase        |
| N                                   | Circuit1 CircuitPole4 | phase        |
| HVAC Feed Pole1                     | Circuit1 CircuitPole1 | name         |
| HVAC Feed Pole2                     | Circuit1 CircuitPole2 | name         |
| HVAC Feed Pole3                     | Circuit1 CircuitPole3 | name         |
| HVAC Feed Neutral Pole              | Circuit1 CircuitPole4 | name         |

## Sensor Multipliers

Power IQ expects power readings to be in the following units: Amps, Volts, Watts, VoltAmps, Degrees Fahrenheit/Celsius, and so on.

Many MIBs report power readings in different units than what Power IQ requires. The multiplier field is used to scale the retrieved readings to the units required.

1. In the custom dynamic plugin form, click Add to add a row to the Sensor Multipliers list.  
The list has three fields for each entry.
2. Double-click the Data Element and Sensor Type fields to access a drop-down list of values.
3. Double-click the Multiplier field to access a text field.

| Data Element  | Sensor Type:                                       | Multiplier Value:   |
|---|--|---|
| Select the data model element this multiplier is used on. | Select the sensor type this multiplier is used on. | Enter the decimal value the dynamic plugin will use to normalize the readings into units supported by Power IQ. |



| Data Element  | Sensor Type:   | Multiplier Value:  |
|---|--|--|
| circuit<br>circuit_pole_pos-<br>ition<br>circuit_pole_phase<br>circuit_breaker<br>circuit_breaker_<br>pole<br>inlet<br>inlet_pole<br>outlet<br>outlet_pole<br>external_sensor<br>external_sensor_<br>humidity<br>external_sensor_<br>temperature<br>panel_inlet<br>panel_inlet_pole | active_power<br>apparent_power<br>current<br>power_factor<br>voltage<br>watt_hour<br>value | <p>For example: If an active power sensor OID returns a value of 5 kilowatts, enter a multiplier of 1000 to normalize to 5000 watts.</p>   |
| ups_output ups_out-<br>put_pole   | load_per-<br>centage   | <p>Percentage of UPS power capacity currently being used. Positive number between 0 and 100 (inclusive). For example if sensor reports value of 0.50 (meaning 50%), specify multiplier of 100.</p> |
| battery   | current<br>voltage   | <p>Specify multiplier to normalize sensor reading to Amps or Volts.</p>  |
| battery   | capacity_per-<br>centage   | <p>Battery charge remaining expressed as percentage of full charge. For example if sensor reports value of 0.50 (meaning 50%), specify multiplier of 100.</p>                                      |
| battery   | runtime_remain-<br>ing   | <p>Time to battery depletion under present load conditions (in minutes). For example, if sensor reports remaining runtime in seconds, specify a mul-</p>   |



| Data Element | Sensor Type: | Multiplier Value:  |
|--------------|--------------|--|
|              |              | Multiplier of 0.0167 to normalize reading to minutes.  |
| battery      | seconds_on   | Elapsed time since the UPS last switched to battery power (in seconds). For example, if sensor reports time on battery in minutes, specify a multiplier of 60 to normalize reading to seconds. |

## Additional Custom Mapping Rules

When creating your plugin, remember these additional rules to ensure your plugin validates, and that you get the best possible data collection.

Make sure you correctly map the phase of your circuit poles to the phase of the building.

Add inlet poles in order (A, B, C).

In a group of like elements, for example, inlet\_poles, each element must have the same type of sensors mapped, and must indicate the same total number of the element.

### Example

If an inlet\_pole has voltage mapped, then all inlet\_poles for that plugin must have voltage mapped.

### Example

If there are mappings for 3 voltage sensors for 'inlet\_pole' then there must be exactly 3 current sensors configured, or 0 current sensors if current readings are not desired or available.

For a given sensor type and data model element, all mappings must be OIDs or hard-coded. A mix is not permitted.

PDU Proxy\_Index substitution supports daisy-chained PDUs.

Every inlet must have at least one inlet pole. For devices that do not provide inlet pole level data, the inlet data for current, active\_power, and voltage can be represented as an inlet pole instead.

### Example

A device only provides inlet level data, but to meet the requirement for an inlet pole, the mappings should be modified as in this example:

- inletXinletpole1 voltage
- inletXinletpole1 current
- inletXinletpole1 active\_power
- inletXenergy



- `inletXapparent_power`
- `inletXwatt_hour`

## Showing Accurate Circuit Pole Positions

To show accurate circuit pole positions, add the OIDs for each pole to the custom mapping in the correct order, or hard code the circuit pole positions in the custom mapping.



## Custom Dynamic Plugin Example Screenshots

This custom dynamic plugin example shows a Babel Buster SNMP gateway managing a Schneider PowerLogic PM710 standalone meter.

### Edit Dynamic Plugin for Custom

|               |   |
|---------------|---|
| Name:         | <input type="text" value="bbuster_pm710_custom_sam"/>                                   |
| Description:  | <input type="text" value="Raleigh Panel #2 - Babel Buster/Schneider PowerLogic PM710"/> |
| Manufacturer: | <input type="text" value="Schneider Electric"/>   |
| Model:        | <input type="text"/>  |

Always use SNMPv1

#### Metadata

|                                |                      |
|--------------------------------|----------------------|
| Circuit Breaker State OK:      | <input type="text"/> |
| Circuit Breaker State Tripped: | <input type="text"/> |
| Outlet State On:               | <input type="text"/> |
| Outlet State Off:              | <input type="text"/> |
| Humidity Sensor Type:          | <input type="text"/> |
| Temperature Sensor Type:       | <input type="text"/> |
| Temperature Unit:              | <input type="text"/> |
| Temperature Unit (Celsius):    | <input type="text"/> |
| Temperature Unit (Fahrenheit): | <input type="text"/> |

**Mappings**

Type: Standalone Meter

PDU Name: raleigh\_panel2\_meter




System OID: 1.3.6.1.4.1.3815.2.2.2.1

Proxy ID: 1

Model ID: PM710

PDU Firmware: v2.36

**Sensor Mappings**

 Add
  Remove
  Load

| Object Mapping                      | Data Model Element    | Sensor Type  |
|-------------------------------------|-----------------------|--------------|
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.25 | circuit1              | active_power |
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.24 | circuit1              | watt_hour    |
| HVAC Feed                           | circuit1              | name         |
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.7  | circuit1 circuitpole1 | current      |
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.8  | circuit1 circuitpole2 | current      |
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.9  | circuit1 circuitpole3 | current      |
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.10 | circuit1 circuitpole1 | voltage      |



| Object Mapping                      | Data Model Element    | Sensor Type |
|-------------------------------------|-----------------------|-------------|
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.11 | circuit1 circuitpole2 | voltage     |
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.12 | circuit1 circuitpole3 | voltage     |
| A                                   | circuit1 circuitpole1 | phase       |
| B                                   | circuit1 circuitpole2 | phase       |
| C                                   | circuit1 circuitpole3 | phase       |
| HVAC Feed Pole1                     | circuit1 circuitpole1 | name        |
| HVAC Feed Pole2                     | circuit1 circuitpole2 | name        |

|                                     |                       |                |
|-------------------------------------|-----------------------|----------------|
| HVAC Feed Pole1                     | circuit1 circuitpole1 | name           |
| HVAC Feed Pole2                     | circuit1 circuitpole2 | name           |
| HVAC Feed Pole3                     | circuit1 circuitpole3 | name           |
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.26 | circuit1              | apparent_power |
| 1.3.6.1.4.1.3815.1.2.2.1.1.1.1.2.22 | circuit1              | power_factor   |





**Sensor Multipliers**

 Add  Remove

| Data Model Element | Sensor Type    | Multiplier |
|--------------------|----------------|------------|
| circuit            | active_power   | 100        |
| circuit            | watt_hour      | 1000       |
| circuit            | apparent_power | 100        |
| circuit            | power_factor   | 0.0001     |
| circuit_pole       | current        | 0.1        |
| circuit_pole       | voltage        | 0.1        |

## Custom Dynamic Plugin Mapping Example - UPS

This custom dynamic plugin example shows the data model element, sensor type, and object mapping value syntax on a sample UPS smart page.

The object mapping value refers to a value entered for the environmental metadata when the dynamic plugin is edited or created. For more information, see *Metadata for Structured and Custom Dynamic Plugins* on page 671.

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*Note: The data in this example is provided for educational purposes only and does not represent output from an actual UPS. For help with interpreting the mappings or creating your dynamic plugin, contact Sunbird Technical Support.*

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10.34.1.65 — ABC Company

Key Data Model Element Sensor Type Object Mapping Value

Actions

Energy Trends

UPS Details

Output 1

|                       |        |   |
|-----------------------|--------|---|
| Output 1 Percent Load | 6.0%   | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">ups_output load_percentage</span>       |
| Output Source         | Normal | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">ups_output source</span>                |
| Pole 1 Percent Load   | 5.0%   | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">ups_output_pole1 load_percentage</span> |
| Pole 2 Percent Load   | 0.0%   | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">ups_output_pole2 load_percentage</span> |
| Pole 3 Percent Load   | 7.0%   | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">ups_output_pole3 load_percentage</span> |

Latest reading taken 14 minutes ago

Battery Details

|                    |         |  |
|--------------------|---------|--|
| Status             | Normal  | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">battery status</span>              |
| Capacity           | 100.0%  | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">battery capacity_percentage</span> |
| DC Voltage         | 219.0 V | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">battery voltage</span>             |
| DC Current         | 0.0 A   | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">battery current</span>             |
| Runtime Remaining  | N/A     | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">battery runtime_remaining</span>   |
| Seconds on Battery | 0       | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">battery seconds_on</span>          |
| Needs Replacement? | No      | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">battery replacement</span>         |

Latest reading taken 14 minutes ago

Readings

Inlet Readings

| PDU Element | Voltage (V)   | Current (A)   | Active Power (W)   | Apparent Power (VA)  | Power Factor   | Energy (Wh)   |
|-------------|---|---|--|--|--|---|
| Inlet 1     | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">inlet1 voltage 234</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">inlet1 current 3</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">inlet1 active_power N/A</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">inlet1 apparent_power N/A</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">inlet1 power_factor N/A</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">inlet1 watt_hour N/A</span> |

Line Readings

| PDU Element    | Voltage (V)  | Current (A)  | Unused Capacity (A) |
|----------------|--|--|---------------------|
| <b>Inlet 1</b> |  |  |                     |
| L1             | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">inlet1 inletpole1 voltage 234</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">inlet1 inletpole1 current 3</span>   | N/A                 |
| L2             | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">inlet1 inletpole2 voltage 236</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">inlet1 inletpole2 current 2.1</span> | N/A                 |
| L3             | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">inlet1 inletpole3 voltage 237</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">inlet1 inletpole3 current 1.5</span> | N/A                 |

Circuit Readings

| Circuit    | Ordinal  | Voltage (V)   | Current (A)   | Active Power (W)   | Apparent Power (VA)  | Power Factor   | Energy (Wh)   |
|------------|--|---|---|--|--|--|---|
| UPS Output | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 name 1</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 voltage 230</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 current 4</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 active_power N/A</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 apparent_power N/A</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 power_factor N/A</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 watt_hour N/A</span> |

Circuit Pole Readings

| Ordinal                      | Phase  | Name  | Voltage (V)  | Current (A)  |
|------------------------------|--|---|--|--|
| <b>Circuit 1: UPS Output</b> |  |   |  |  |
| 1                            | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 circuitpole1 phase</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 circuitpole1 name</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 circuitpole1 voltage 231</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 circuitpole1 current 3</span> |
| 2                            | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 circuitpole2 phase</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 circuitpole2 name</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 circuitpole2 voltage 231</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 circuitpole2 current 0</span> |
| 3                            | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 circuitpole3 phase</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 circuitpole3 name</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 circuitpole3 voltage 230</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 circuitpole3 current 4</span> |

Sensors

| Ordinal | Label               | Type  | Latest Reading  |
|---------|---------------------|---|---|
| 1       | Battery Temperature | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">externalsensor1 name</span> | Temperature <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">externalsensor1 type T</span> 70.9°F <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">externalsensor1 value</span> |

Latest reading taken 14 minutes ago

PDU Elements

| PDU Element            | IT Device  | Active Power (W)   | Apparent Power ...   | Current (A)   | Voltage (V)   | Unused Capac... | Active Power Trend                          |
|------------------------|--|--|--|---|---|-----------------|---|
| Circuit 1 (UPS Output) | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 name</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 active_power N/A</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 apparent_power N/A</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 current 4</span> | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">circuit1 voltage 230</span> | N/A             | Trend maximum active power for the past day |

Details

|                |   |  |
|----------------|---|--|
| Type           | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">type</span>         | Floor UPS  |
| IP Address     |   | 10.34.1.65   |
| External Key   |   | Pdu - 525  |
| Name           | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">pdu name</span>     | px-10-34-1-65  |
| Manufacturer   | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">manufacturer</span> | Schneider  |
| Model          | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">model id</span>     | MGE Galaxy 3500 40 kVA   |
| Firmware       | <span style="background-color: #f4a460; border: 1px solid black; padding: 2px;">pdu firmware</span> | 962.0716.1   |
| Contact        |   | Contact@abc.com  |
| Location       |   | ABC Company  |
| Custom Field 1 |   |  |
| Custom Field 2 |   |  |
| SNMP Version   |   | 1/2c   |
| Inlet Phase    |   | Three Phase  |
| Belongs to     |   | Not associated with a data center object.  |
| Health         |   | <b>Connectivity:</b> OK<br>Most recent poll of the target PDU was successful.<br><b>Active events:</b> Good<br>No active events. |

The Object Mapping Value here refers to a value entered for environmental metadata when you create or edit the dynamic plugin. In this example, the Object Mapping Value "T" was entered in the Temperature Sensor Type field in the Metadata section on the Edit Dynamic Plugin page in Power IQ.

**Metadata**

Circuits and Outlets

Environment Sensors

Humidity Sensor Type: H

Temperature Sensor Type: T

Temperature Unit: C

Temperature Unit (Celsius): C

Temperature Unit (Fahrenheit): F

Event Listing

Clear selected events

| Occurred at     | Severity | Event | Summary | Status |
|-----------------|----------|-------|---------|--------|
| No events found |          |       |         |        |

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## External Temperature and Humidity Sensor Mappings Example Screenshots

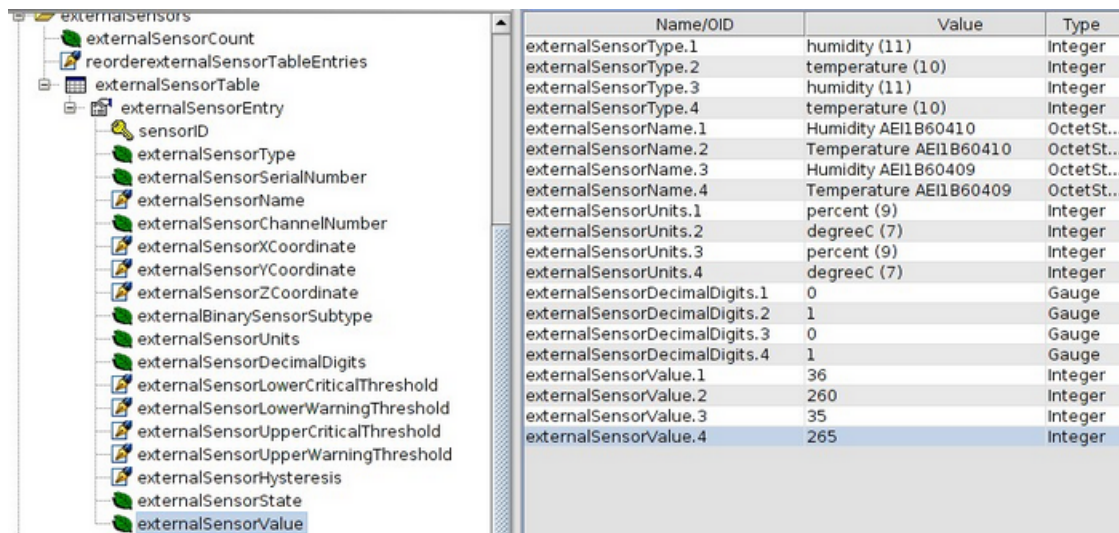
If temperature and humidity sensor information is available in a single table AND there is a way to uniquely determine the type of the sensor:

If temperature and humidity information is available in a single table AND there is an OID that can be queried to determine the type of the sensor, use the generic set of `external_sensor_*` mappings to collect sensor data.

### Example

A PX1 192.168.45.236 has environmental sensor data available in a single table called 'externalSensors'. There is an OID 'externalSensorType' that determines the type of each sensor. In this scenario, the generic set of `external_sensor_*` mappings can collect the environmental sensor data.







For example, a  
MIB for the PX1:



| Name/OID                      | Value                 | Type       |
|-------------------------------|-----------------------|------------|
| externalSensorType.1          | humidity (11)         | Integer    |
| externalSensorType.2          | temperature (10)      | Integer    |
| externalSensorType.3          | humidity (11)         | Integer    |
| externalSensorType.4          | temperature (10)      | Integer    |
| externalSensorName.1          | Humidity AE1B60410    | OctetSt... |
| externalSensorName.2          | Temperature AE1B60410 | OctetSt... |
| externalSensorName.3          | Humidity AE1B60409    | OctetSt... |
| externalSensorName.4          | Temperature AE1B60409 | OctetSt... |
| externalSensorUnits.1         | percent (9)           | Integer    |
| externalSensorUnits.2         | degreeC (7)           | Integer    |
| externalSensorUnits.3         | percent (9)           | Integer    |
| externalSensorUnits.4         | degreeC (7)           | Integer    |
| externalSensorDecimalDigits.1 | 0                     | Gauge      |
| externalSensorDecimalDigits.2 | 1                     | Gauge      |
| externalSensorDecimalDigits.3 | 0                     | Gauge      |
| externalSensorDecimalDigits.4 | 1                     | Gauge      |
| externalSensorValue.1         | 36                    | Integer    |
| externalSensorValue.2         | 260                   | Integer    |
| externalSensorValue.3         | 35                    | Integer    |
| externalSensorValue.4         | 265                   | Integer    |

Sensor Metadata and Mappings Using the PX1 MIB:



|   |  |
|---|--|
| Humidity Sensor Type:   | <input type="text" value="11"/>  |
| Temperature Sensor Type:  | <input type="text" value="10"/>  |
| Temperature Unit:   | <input type="text" value="C"/>   |
| Temperature Unit (Celsius):   | <input type="text" value="7"/>   |
| Temperature Unit (Fahrenheit):  | <input type="text"/>   |
| <b>Mappings</b>   |  |
| PDU System OID:   | <input type="text" value="1.3.6.1.4.1.13742.4"/>   |
| PDU Model OID:  | <input type="text" value="{pdu_system_oid}.1.1.12.0"/>   |
| External Sensor Index:  | <input type="text" value="{pdu_system_oid}.3.1.0"/>                             |
| Start:  | <input type="text" value="1"/>   |
| Step:   | <input type="text" value="1"/>   |
| External Sensor Type:   | <input type="text" value="{pdu_system_oid}.3.3.1.2.{external_sensor_index}"/>   |
| External Sensor Value:  | <input type="text" value="{pdu_system_oid}.3.3.1.41.{external_sensor_index}"/>  |
| Multiplier:   | <input type="text" value="1"/>   |
| External Sensor Unit:   | <input type="text" value="{pdu_system_oid}.3.3.1.16.{external_sensor_index}"/>  |
| External Sensor Scale Factor:   | <input type="text" value="{pdu_system_oid}.3.3.1.17.{external_sensor_index}"/>  |
| Add Another Mapping:  | <input type="text" value="Select mapping..."/>                                  |
| <input type="button" value="Cancel"/> <input checked="" type="button" value="Update Plugin"/> |  |

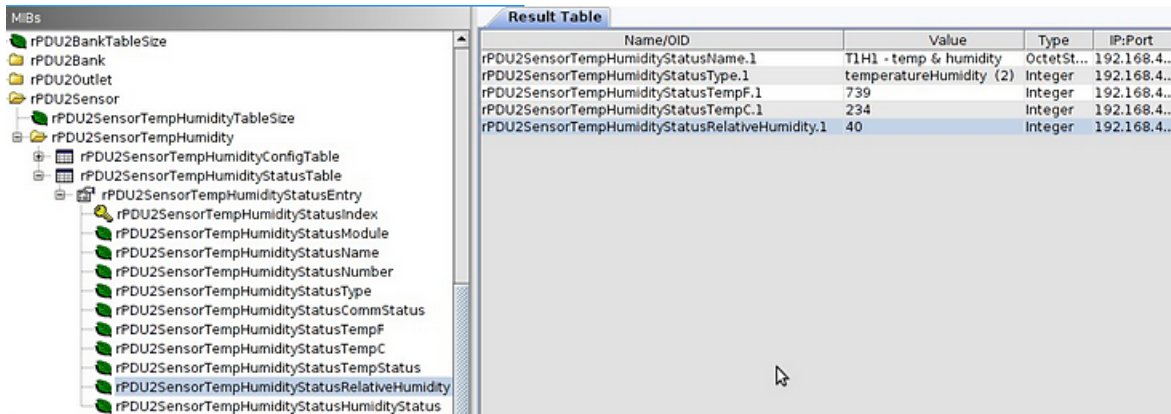
If there is no OID to determine the sensor type, but there are separate OIDs for temperature and humidity sensor values:

- When the temperature and humidity sensor information is available in a single table AND there is no OID to determine the sensor type, BUT there are separate OIDs for temperature and humidity sensor values, use the `temperature_sensor_*` and `humidity_sensor_*` mappings to collect sensor data.

### Example

An APC 192.168.42.216-1 has one environmental probe that has both temperature and humidity sensors. The information is available in a single table and there are separate OIDs for temperature and humidity readings. In this scenario, the `temperature_sensor_*` and `humidity_sensor_*` mappings can collect the sensor data.

**MIB for the APC:**



**MIBs**

- rPDU2BankTableSize
- rPDU2Bank
- rPDU2Outlet
- rPDU2Sensor
  - rPDU2SensorTempHumidityTableSize
  - rPDU2SensorTempHumidity
    - rPDU2SensorTempHumidityConfigTable
    - rPDU2SensorTempHumidityStatusTable
      - rPDU2SensorTempHumidityStatusEntry
        - rPDU2SensorTempHumidityStatusIndex
        - rPDU2SensorTempHumidityStatusModule
        - rPDU2SensorTempHumidityStatusName
        - rPDU2SensorTempHumidityStatusNumber
        - rPDU2SensorTempHumidityStatusType
        - rPDU2SensorTempHumidityStatusCommStatus
        - rPDU2SensorTempHumidityStatusTempF
        - rPDU2SensorTempHumidityStatusTempC
        - rPDU2SensorTempHumidityStatusTempStatus
        - rPDU2SensorTempHumidityStatusRelativeHumidity
        - rPDU2SensorTempHumidityStatusHumidityStatus

**Result Table**

| Name/OID  | Value                   | Type       | IP:Port      |
|---|-------------------------|------------|--------------|
| rPDU2SensorTempHumidityStatusName.1             | T1H1 - temp & humidity  | OctetSt... | 192.168.4... |
| rPDU2SensorTempHumidityStatusType.1             | temperatureHumidity (2) | Integer    | 192.168.4... |
| rPDU2SensorTempHumidityStatusTempF.1            | 739                     | Integer    | 192.168.4... |
| rPDU2SensorTempHumidityStatusTempC.1            | 234                     | Integer    | 192.168.4... |
| rPDU2SensorTempHumidityStatusRelativeHumidity.1 | 40                      | Integer    | 192.168.4... |

### Sensor Metadata and Mappings Using the APC MIB:

Humidity Sensor Type:

Temperature Sensor Type:

Temperature Unit:

Temperature Unit (Celsius):

Temperature Unit (Fahrenheit):

**Mappings**

PDU System OID:

PDU Model OID:

Humidity Sensor Index:

Start:  Step:

Humidity Sensor Name:

Humidity Sensor Value:

Multiplier:

Temperature Sensor Index:

Start:  Step:

Temperature Sensor Name:

Temperature Sensor Value:

Multiplier:



## How Power IQ Associates Facility Items with a Structured or Custom Plugin

During the discovery process, facility items are automatically associated with the appropriate plugin. Power IQ will check all available plugins. The appropriate plugin is selected from among the available plugins based on system ID (sysId), proxy ID, and/or model.

The tables below explain how Power IQ associates facility items with structured or custom plugins.

### Structured Plugin Associations

| Criteria  | Result   |
|---|--|
| Plugin has the same sysID and model as the target device                      | Plugin is an exact match for the target device. With an exact match found, Power IQ will associate the target device with the plugin and not check additional available plugins. |
| Plugin has the same sysID as the target device but the model is not specified | Plugin is a candidate to manage the target device, but Power IQ will continue to check additional plugins for an exact match.  |

### Custom Plugin Associations

| Criteria   | Result   |
|--|--|
| Plugin has the same sysID, proxy ID, and model as the target device  | Plugin is an exact match for the target device. With an exact match found, Power IQ will associate the target device with the plugin and not check additional available plugins. |
| Plugin has the same sysID and model as the target device but the plugin's proxy ID is not specified and the target device's proxy ID is null     | Plugin is an exact match for the target device. With an exact match found, Power IQ will associate the target device with the plugin and not check additional available plugins. |
| Plugin has the same sysID and model as the target device but the plugin's proxy ID is not specified and the target device's proxy ID is not null | Plugin is a candidate to manage the target device, but Power IQ will continue to check additional plugins for an exact match.  |
| Plugin has the same sysID and proxy ID as the target device but the model is not specified   | Plugin is a candidate to manage the target device, but Power IQ will continue to check additional plugins for an exact match.  |
| Plugin has the same sysID as the target device but the model and proxy ID are not specified  | Plugin is a candidate to manage the target device, but Power IQ will continue to check additional plugins for an exact match.  |

## Adding PDUs with Custom Dynamic Plugins

When adding a PDU that uses a custom dynamic plugin, use the same Add a PDU feature as any other addition. See *How to Add PDUs to Power IQ* on page 112.

When Power IQ detects that there is at least one custom dynamic plugin configured, a Plugin drop-down field displays.



### Add a New PDU

IP Address:


Plugin:


Automatic ▼

Proxy Index:

Automatic  
bb\_pm710\_custom\_sam\_proxy1

External Key:

Custom Field 1 :

Custom Field 2 :

SNMP Version:

1/2c ▼

#### PDU Administrative Credentials

Username:

Password:

Password Confirm:

#### SNMP v1/2c Credentials

Community String:


Community String Confirm:

#### Backup IP Address

Backup IP Address:

Validate and wait for discovery to complete before proceeding

Add and return to this form

 Add



Automatic: Use Automatic to allow Power IQ to determine the correct plugin for the PDU you are adding. Automatic attempts to find an exact match between the PDU and the plugin for SysObjectID, PDU Model name, and Proxy ID.

If there is no exact match, but several dynamic plugins are eligible to manage the PDU, based on sysObjectID, then Power IQ selects from among the eligible plugins. If automatic mode does not select the desired dynamic plugin, delete the PDU and add it again, selecting the specific custom dynamic plugin from the list.

Alternatively, select the specific custom dynamic plugin from the list.

For more information, see *How Power IQ Associates Facility Items with a Structured or Custom Plugin* on page 734.



## Check PDUs Added with Dynamic Plugins

After you add a PDU using a dynamic plugin, you should check the data collected to verify accuracy.

1. In the Facility Items tab, click the PDU link. The PDU details page opens.
2. Examine the page to verify that all the data you created mappings for is available. If you do not see data you expected, check your mappings.
3. Check power measurement values to make sure that multipliers were entered correctly.
4. If you see issues, check all mappings and the log file to troubleshoot.
5. In the Settings tab, click Dynamic Plugins in the Appliance Administration section.
6. Click View Log.



## Viewing PDUs Using a Dynamic Plugin

When a dynamic plugin is in use, you can view the PDUs that are associated with it.

1. In the Settings tab, click Dynamic Plugins in the Appliance Administration section.
2. All dynamic plugins display in a list. In the PDU Count column, the number link shows how many PDUs use this dynamic plugin. Click the link to view a list of the PDUs associated with the plugin.



## Troubleshooting Dynamic Plugins

For each scenario, check the Dynamic Plugin Log file to help troubleshoot errors.

Add PDU fails with error "Unmanageable", or PDU connectivity is "Unmanageable":

The wrong PDU System OID, or the wrong PDU Model OID is specified in the dynamic plugin.

- Dynamic Plugin Log file excerpt sample when PDU System OID is wrong:

```
2011-05-12 13:44:40,394 INFO [DiscoverTask-192.168.100.100] PduDiscovery: sup-
portsSystemObjectId: target sysObjectId=1.3.6.1.4.1.13742.4 2011-05-12
13:44:40,450 INFO [DiscoverTask-192.168.100.100] PduDiscovery: sup-
portsSystemObjectId: no dynamic plugin capable of managing PDU w/ sysObjectID
1.3.6.1.4.1.13742.4
```

- Dynamic Plugin Log file excerpt sample when PDU Model OID is wrong:

```
2011-05-12 12:23:36,836 INFO [DefaultUDPTransportMapping_127.0.0.1/0] Snm-
pUtils: onResponse: got an exception varbind for oid
1.3.6.1.4.1.13742.4.1.1.120.0, 2011-05-12 12:23:36,836 WARN [DiscoverTask-
192.168.100.100] PduDiscovery: getModelName: failed to retrieve model name 2011-
05-12 12:23:36,837 INFO [DiscoverTask-192.168.100.100] PduDiscovery: discover:
Model Name not Found
```

- Information on PDU details page is wrong or missing:

If adding the PDU is successful, but information on the PDU details page is missing or wrong, an incorrect OID for outlet active power may be specified in the dynamic plugin, for example.

- Dynamic Plugin Log file excerpt sample when Outlet Active Power is wrong:

```
2011-05-12 14:14:24,647 INFO [DefaultUDPTransportMapping_127.0.0.1/0] Snm-
pUtils: onResponse: got an exception varbind for oid
1.3.6.1.4.1.13742.4.1.2.2.1.56.1, 2011-05-12 14:14:24,647 INFO
[DefaultUDPTransportMapping_127.0.0.1/0] SnmpUtils: onResponse: got an exception
varbind for oid 1.3.6.1.4.1.13742.4.1.2.2.1.56.2, 2011-05-12 14:14:24,647 INFO
[DefaultUDPTransportMapping_127.0.0.1/0] SnmpUtils: onResponse: got an exception
varbind for oid 1.3.6.1.4.1.13742.4.1.2.2.1.56.3, 2011-05-12 14:14:24,647 INFO
[DefaultUDPTransportMapping_127.0.0.1/0] SnmpUtils: onResponse: got an exception
varbind for oid 1.3.6.1.4.1.13742.4.1.2.2.1.56.4, 2011-05-12 14:14:24,647 INFO
[DefaultUDPTransportMapping_127.0.0.1/0] SnmpUtils: onResponse: got an exception
varbind for oid 1.3.6.1.4.1.13742.4.1.2.2.1.56.5, 2011-05-12 14:14:24,647
```



```
INFO [DefaultUDPTransportMapping_127.0.0.1/0] SnmpUtils: onResponse: got an exception varbind for oid 1.3.6.1.4.1.13742.4.1.2.2.1.56.6, 2011-05-12 14:14:24,647
INFO [DefaultUDPTransportMapping_127.0.0.1/0] SnmpUtils: onResponse: got an exception varbind for oid 1.3.6.1.4.1.13742.4.1.2.2.1.56.7, 2011-05-12 14:14:24,648
INFO [DefaultUDPTransportMapping_127.0.0.1/0] SnmpUtils: onResponse: got an exception varbind for oid 1.3.6.1.4.1.13742.4.1.2.2.1.56.8, 2011-05-12 14:14:24,648
WARN [PollScheduler Scheduler-10 Pool-fiber09] SnmpOutletCollector: collect: failed to retrieve data for mapping symbol 'outlet_active_power'
```

- Add PDU fails with error "Application Error" or PDU connectivity is "Application Error":

The dynamic plugin encountered an unexpected error that it cannot recover from while attempting to add the PDU to Power IQ. The PDU health shows as Critical in this case, if the PDU is added.

When the PDU state is "Application Error", this may indicate that one or more index mappings is failing to resolve. Check the dynamic plugin log output for mapping resolution errors.



## When to Delete and Rediscover a PDU Using a Dynamic Plugin

Certain changes, either to a PDU, or to a plugin, may require you to delete and rediscover the PDU.

- Change mapping and PDU enters "Application Error" state.
- Change mapping and the new mapping is not reflected in the PDU's details or smart page. For example, changes to multiplier, sensor unit, number of circuit poles.



## Troubleshooting Dynamic Plugin Trap Mapping

**Problem:** An incoming trap is mapped to the wrong event in Power IQ:

When mapping an incoming SNMP trap to a dynamic plugin trap mapping, Power IQ always takes the FIRST possible match. The dynamic plugin UI will attempt to alert a plugin author of duplicate trap mappings but it is possible for the author to configure multiple trap mappings that match a particular trap. This may occur when OID wildcards (\*) are used.

To resolve, verify that the trap mappings are unique with the plugin.

**Problem:** In a custom dynamic plugin with proxied PDUs, such as in a Babel Buster gateway scenario, an incoming trap is associated to the wrong PDU:

The incoming trap will have the IP address of the proxy and Power IQ must determine which of the proxied PDUs the trap is actually for. Power IQ iterates through each of the custom plugin's trap mappings used to manage the proxied PDUs and will take the FIRST possible match.

To resolve, verify that the configured trap mappings are unique across each of the proxy's custom plugins.

**Problem:** The event summary text for a particular event on the event listing or event details is not available:

Check the dynamic plugin to determine if the relevant trap mapping has been modified or deleted. Either scenario will prevent Power IQ from generating the desired event summary text when requested.



## SNMP Gateways and Custom Dynamic Plugins

The custom dynamic plugin works with SNMP-gateway devices to convert other protocols, such as Modbus or Bacnet, to SNMP. The SNMP gateway allows you to get the information you need to monitor an intelligent power device that does not have an SNMP agent. Examples of SNMP gateways include Control Solutions Babel Buster SPX and FieldServer DCC1075 gateways.

### Example

Modbus can communicate data about your PDU. Each piece of data has a 16-bit integer register, and each register has an address. A Modbus register address is similar to an SNMP OID. Each uniquely identifies a data point.

A SNMP-gateway works with Modbus devices in a serial primary-extension setup. The gateway device polls the extension devices, reads the register data back, and stores it into the gateway device. The gateway makes the register data available as SNMP OIDs.





## Configuring the SNMP Gateway

Configuring your SNMP gateway device to prepare for creating a custom dynamic plugin should include:

- Getting the Modbus register list for the PDU you want to monitor from the PDU manufacturer.
- Configuring the gateway with the necessary registers to allow for data collection. This may include mappings for line to line voltages, active power, apparent power, power factor, pole current, and other types supported by Power IQ.
- Using your gateway to convert the registers to SNMP OIDs.
- Understanding the units that each data point is reported in. The register list will specify the scaling factor for each value. For example, watts or kilowatts, degrees or degrees multiplied by 100.



## Importing and Exporting Plugin Files

Once you have created a dynamic plugin, you can export it to a .JSON file. Use the file to share the plugin with another Power IQ installation by importing it there. Or, use the file as a template to edit to create other dynamic plugins, and re-import.

1. In the Settings tab, click Dynamic Plugins in the Appliance Administration section.
2. The list of dynamic plugins displays. Click Download on the plugin you want to export.
3. Open or save the file.

Only .JSON files can be imported.

4. In the Settings tab, click Dynamic Plugins in the Appliance Administration section.
5. Click Import, then click Browse and select the .JSON file. Click Import.

When the file imports, it displays in the list.

## Supported Vendors

The table below summarizes the list of vendors whose products are currently supported in Power IQ by standard and/or dynamic plugin.

For a full list of supported models or to download plugins for Power IQ, visit [addons.sunbirdcim.com](http://addons.sunbirdcim.com).

For a list of supported events, see *Supported Events* on page 191.

| Vendor Name               | Supported via Standard Plugin | Supported via Dynamic Plugin |
|---------------------------|-------------------------------|------------------------------|
| APC                       | X                             | X                            |
| Aphel                     | X                             |                              |
| Avocent                   | X                             |                              |
| Baytech                   | X                             | X                            |
| Chatsworth Products, Inc. | X                             | X                            |
| Cisco Energywise          | X                             |                              |
| Climanveneta              |                               | X                            |
| Cmatic                    |                               | X                            |

| Vendor Name             | Supported via Standard Plugin | Supported via Dynamic Plugin |
|-------------------------|-------------------------------|------------------------------|
| Control Solutions, Inc. |                               | X                            |
| Cyberex                 |                               | X                            |
| CyberSwitching          | X                             |                              |
| Cyclades                | X                             |                              |
| Eaton                   | X                             | X                            |
| Emerson                 |                               | X                            |
| FieldServer             |                               | X                            |
| Geist                   | X                             | X                            |
| Gude                    |                               | X                            |
| HP                      | X                             | X                            |
| HW Group                |                               | X                            |
| IBM                     |                               | X                            |
| Janitza                 |                               | X                            |
| Knurr                   | X                             |                              |
| Legrand                 |                               | X                            |
| Liebert                 | X                             | X                            |
| Masterguard             |                               | X                            |
| Measurelogic            |                               | X                            |
| Mitsubishi Electric     |                               | X                            |
| MRV                     | X                             |                              |
| Netbotz                 | X                             |                              |

| Vendor Name        | Supported via Standard Plugin | Supported via Dynamic Plugin |
|--------------------|-------------------------------|------------------------------|
| Northern Design    |                               | X                            |
| NTI                | X                             | X                            |
| Obvius             | X                             |                              |
| Oracle             |                               | X                            |
| Panduit            | X                             | X                            |
| PDI                |                               | X                            |
| Raritan            | X                             | X                            |
| Riello             |                               | X                            |
| Rittal             | X                             | X                            |
| RLE                |                               | X                            |
| RT Systems         | X                             |                              |
| Schleifenbauer     | X                             | X                            |
| Schneider Electric | X                             | X                            |
| Server Tech        | X                             | X                            |
| Sinetica           | X                             |                              |
| Socomec            |                               | X                            |
| SquareD            |                               | X                            |
| Starline           |                               | X                            |
| Stulz              |                               | X                            |
| Toshiba            |                               | X                            |
| Tripp Lite         | X                             |                              |

| Vendor Name        | Supported via Standard Plugin | Supported via Dynamic Plugin |
|--------------------|-------------------------------|------------------------------|
| Unite Technologies | X                             |                              |
| United Power       |                               | X                            |
| Universal Electric | X                             | X                            |
| USV-Masterguard    |                               | X                            |
| Vertiv             | X                             |                              |



# Chapter 21: Maintenance Tasks

## Downloading Daily Sensor Readings

Storage of daily raw readings in CSV files can be enabled or disabled. When enabled, depending on your configuration, Power IQ can store up to 8 days of CSV files. See [Configuring Raw Sensor Readings Storage](#).

The daily sensor readings CSV file includes the state of the circuit breakers for applicable Raritan PX PDUs. The circuit breaker state is recorded to this file only once every polling interval, even if you enable buffered data retrieval under Polling Options.

Sensor readings include internal sensors and temperature, humidity, airflow, air pressure, and contact closure sensors.

See [Configuring Remote Storage of Archive Files](#) for details on automatic remote storage of sensor reading archives.

1. In the Facility Items tab, choose Activities > Download PDU Sensor Readings. The Sensor Readings Archives page opens.
2. The option is hidden when storage for sensor readings files is disabled. See [Configuring Raw Sensor Readings Storage](#).
3. Click a filename link to download an archive of the sensor readings taken on that day. Filenames include the date and time when the file was created. There may be more than one file per day, because Power IQ creates the file when a reasonable maximum file size is reached, before the file is too large to be usable in Excel. Or, click Download Latest Readings to download the current sensor readings CSV file.

---

*Tip: Use the time stamp of the file to find the beginning of a time period you are looking for, and the time stamp on the next file for the end of this period. Note that with data logging or network outages, readings taken outside the time stamp range may be in the file.*

---

*Note: To delete an archived file, select the checkbox next to the filename, then click Remove.*

---

You can set up an external program to download the latest sensor readings file each day.

### Example using wget:

```
wget-1.10.2.exe -t 3 --http-user=[username] --http-passwd=[password] --no-check-certificate https://[hostname]/sensor_readings_csvs/latest
```

### Example using curl:



```
curl --user [username]:[password] https://[hostname]/sensor_readings_csv/latest >
latest-csv-archive.zip
```

## Downloading Daily Sensor Readings

Storage of daily raw readings in CSV files can be enabled or disabled. When enabled, depending on your configuration, Power IQ can store up to 8 days of CSV files. See [Configure Raw Sensor Readings Storage](#).

The daily sensor readings CSV file includes the state of the circuit breakers for applicable Raritan PX PDUs. The circuit breaker state is recorded to this file only once every polling interval, even if you enable buffered data retrieval under Polling Options.

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---

*Tip: Use the time stamp of the file to find the beginning of a time period you are looking for, and the time stamp on the next file for the end of this period. Note that with data logging or network outages, readings taken outside the time stamp range may be in the file.*

---

*Note: To delete an archived file, select the checkbox next to the filename, then click Remove.*

---

You can set up an external program to download the latest sensor readings file each day.

Example using wget:

```
wget-1.10.2.exe -t 3 --http-user=[username] --http-passwd=[password] --no-check-certificate https://[hostname]/sensor_readings_csvs/latest
```

Example using curl:

```
curl --user [username]:[password] https://[hostname]/sensor_readings_csv/latest > latest-csv-archive.zip
```





## Upgrading Power IQ Firmware

When new firmware is released, you can upgrade Power IQ to receive the latest in features and functionality.

See the Release Notes for any special instructions on upgrading.

---

**Note: Back Up Your System Before You Upgrade!** Before you upgrade to a new Power IQ release, we strongly recommend that you generate a backup of your Power IQ system configuration and save it to another location, such as your hard drive or an external server. We also strongly recommend that you set up remote storage for backup files to automatically push all daily backups to a remote storage location.

---

1. In the Settings tab, click Software Upgrades in the Appliance Administration section. The Upgrade page opens.
2. Click Browse, select the firmware file (usually a \*.bin file).
3. Click Upload. The new firmware uploads to the application.



## Shutting Down and Restarting Power IQ

You can shut down and power off or restart Power IQ.

- In the Settings tab, click System Shutdown in the Appliance Services section.  
The Power IQ shuts down and powers off.
- In the Settings tab, click System Restart in the Appliance Services section.  
The Power IQ restarts.



## Accessing Audit Logs

Power IQ Web Client audit logs can be viewed in a browser, or exported to a file for viewing or storage.

**Warning: Audit logs are automatically deleted from the system after 3 calendar months. If you need to maintain a complete audit trail, export logs regularly and store the files outside Power IQ.**

1. In the Settings tab, click Audit Log in the Application Administration section.
  - The Audit Log Entries page opens.
2. In the Settings tab, click Audit Log in the Application Administration section.
3. Click the Download Audit Logs link. All audit log entries are exported to a text file.
4. Save the file.



# Chapter 22:Appliance Administration

## Allow HTML Widgets on Dashboard

The Dashboards tab can include your custom HTML portlets as a widget. HTML portlets may have security implications. You must allow them before you can add an HTML widget to the Dashboards tab.

1. In the Settings tab, click Application Settings in the Appliance Settings section.
2. In the Display Settings section, select the "Allow user-created HTML portlets on the dashboard" checkbox.
3. Click Save.



## Allow HTML Widgets on Dashboard

The Dashboards tab can include your custom HTML portlets as a widget. HTML portlets may have security implications. You must allow them before you can add an HTML widget to the Dashboards tab.

1. In the Settings tab, click Application Settings in the Appliance Settings section.
2. In the Display Settings section, select the "Allow user-created HTML portlets on the dashboard" checkbox.
3. Click Save.



## Display a Logo on Every Page

Upload your company logo to display it on every page in Power IQ. This is useful for branding a dashboard presentation.

Logos must not exceed 150 pixels wide, 48 pixels high, or 512KB in size.

For details on adding a logo to the dashboard, see [Image Widget](#) .

1. In the Settings tab, click Application Settings in the Appliance Administration sections.
2. In the Display Settings box, select the "Show a custom uploaded logo" checkbox.
3. Click Browse to select the logo file, then click Open.
4. If the file does not meet the logo criteria, error messages display. Edit the image as needed, then upload again.
5. Click Save Display Settings. The logo appears in the top right corner of every page in Power IQ.



## Configuring the System Clock

Power IQ uses the system clock to time-stamp events and data records. Set the system clock as soon as possible to keep an accurate record of events.

Using an NTP server is recommended to keep the system clock synchronized between Power IQ and the PDUs it manages.

**Important! You must use the same NTP server for Power IQ and all Raritan PX PDUs managed to get accurate readings from PX.**

---

*Note: If your Power IQ is integrated with dcTrack, it is important that both dcTrack and Power IQ are setup to use NTP with the same NTP servers.*

---



## Configuring NTP Server Settings

The Configure Time Servers table lists the NTP servers Power IQ contacts to get date and time information. NTP must be enabled first.

1. In the Settings tab, click Application Settings in the Appliance Administration section.
2. In the Time Settings box, click the arrow to expand the NTP Settings
3. Select the Enable NTP checkbox.
4. Click Add.
5. Type the time server's IP address in the Time Server field then click OK.
6. Click Save Time Settings.

To edit NTP server settings:

1. Select the server in the table and click Edit.
2. Type the time server's IP address in the Time Server field
3. Click Save Changes.

To remove an NTP server:

1. Select the server in the table.
2. Click Remove.
3. Click Yes in the confirmation message.





## Configuring the System Clock Manually

1. In the Settings tab, click Application Settings in the Appliance Administration section.
2. In the Time Settings section, select the Time Zone Power IQ server resides in from the Time Zone drop-down list.
3. Select the date and time using the tools in the "Set time manually" fields. Select the date from the pop-up calendar. Select the 24-hour time from the drop-down list.
4. Click Save Time Settings.



## Set Phase Labels for Circuit Pole Phase

Specify how circuit pole phases are labeled in Power IQ.

1. In the Settings tab, click Application Settings in the Appliance Administration section.
2. In the Language and Locale Settings, select your Phase Label preference.
  - A, B, C
  - L1, L2, L3
  - X, Y, Z
  - 1, 2, 3
3. Click Save Locale Settings.



## Set Fahrenheit or Celsius Temperature

Specify your system temperature unit to Fahrenheit or Celsius. This setting is used wherever temperatures are shown in Power IQ.

1. Temperature settings are global in Power IQ.
2. In the Settings tab, click Application Settings in the Appliance Administration section.
3. In the Language and Locale Settings, set Temperature Unit to Celsius or Fahrenheit.
4. Click Save Locale Settings.

## How to Secure a Sunbird Appliance

### Change the 'config' user's password via the console

A Sunbird appliance ships with a root user account that has a preconfigured password. By default, this account is disabled such that no one can log in, even if they know the password. When the user provides access, this account is used by Sunbird's support team to troubleshoot issues.

The 'config' user is the only user that can unlock this account. This password for the 'config' user is configurable through the console.

The "config" user account is an OS account, not a UI account.

The "config" user account password constraints cannot be changed from the PIQ UI Setting tab.

The constraint level is set to HIGH because of the DOD work and has the following constraints.

The new password must have one each of an upper case, lower case, numeric, and non-alphanumeric character.

Minimum password length is 9 characters.

The 'config' user can also reset the password for the administrative account on A Sunbird appliance's web application.

**CAUTION:** Do not lose the password for the 'config' user. If the root account is locked and you lose this password, there is nothing Sunbird can do to help you recover from an error other than performing a clean install and restoring from a backup.

### Consider using IP Access Control

Through IP Access Control (settable in the console or via the Settings tab on the web interface), you can disable SSH access, ODBC access, and whether the appliance will respond ICMP pings. Alternately, you can limit access to certain IP address ranges



## Change the password for the administrative account on the appliance

By default, the username for the administrative user account is 'admin'. This username can also be changed.

## Change the 'odbcuser' password

If you enable ODBC access to the appliance, be sure to change the password for the odbcuser account. Also consider limiting access to known good IP addresses. By default, ODBC access is disabled.

## Monitor the Audit Log

All SSH and UI access attempts are logged to the audit log. Monitoring this can help you identify unauthorized access attempts

## Use an external System Log server

A Sunbird appliance can be configured to send audit log messages to an external system log server. Sending these to an external system helps to maintain an audit log and allows for searching/alerting on certain events.

## Install a valid HTTPS Certificate

A Sunbird appliance ships with a default unsigned certificate. Installing a certificate that's signed by a trusted certificate authority will allow clients to establish trust in the server.

## Use encrypted backups and leverage the appliance's automated remote backup feature

A Sunbird appliance allows you to create encrypted backup and provides a feature to automatically push the daily backups to a separate system. Refer to the user's guide on how to set these features up.

## Keep the appliance up to date

Sunbird provides regular maintenance and feature releases that include security updates. We frequently update the OS, database, and other components to keep the appliance secure.

Note: Sunbird performs penetration testing at the application and network level on every release.

## Report security issues to Sunbird support

Sunbird takes security seriously. Please report any security issues to our support team such that we can address them.





# Chapter 23: Upgrading Raritan PX, Power Meter, and EMX

Upgrading Raritan PX PDUs, Raritan Power Meter's PMC module, or Raritan EMX devices managed by Power IQ consists of three steps.

1. Uploading firmware to Power IQ
2. Creating an upgrade plan to distribute the firmware to the units.
3. Executing the plan.

You can use the plans immediately or save them for later.

**Warning: Never downgrade a PX to a lower version number. Downgrading causes damage to the PDU.**



## Plan a New Upgrade

Bulk upgrade plans are only applicable to Raritan PX PDUs, Raritan Power Meter's PMC module, and Raritan EMX units. When adding any PDU in a port forwarding configuration, it is NOT required to add all PDUs in the chain to the upgrade plan.

If the plan includes all PDUs in a port forwarding configuration, Power IQ automatically orders them so that the extension PDU is upgraded first and then the primary PDU. This prevents the extension PDU from losing communications with Power IQ when the primary PDU resets during the upgrade process.

It is recommended to put all PDUs into maintenance mode to prevent lost connectivity during the upgrade. See [Maintenance Mode](#).

---

*Note: If an extension PDU is polled when the primary PDU resets, the extension PDU shows the communication lost state. Restart the poller in Settings > Appliance Administration > Restart Poller.*

---

Appropriate firmware versions for supporting the port forwarding configuration are available in the USBCascading Solution Guide, which can be downloaded from the [PX2 web page \(http://www.raritan.com/support/product/px2/\)](http://www.raritan.com/support/product/px2/) of the Raritan website

1. In the Facility Items tab, choose Activities > Bulk Firmware Updates.
2. Select Manage Firmware Upgrade Plans.
3. Click the Next button.
4. Choose Plan a new upgrade. The upgrade planning wizard starts.
5. Enter a name for the plan and click Continue.
6. A summary of plan options appears at the top of the page. Continue adding details of your upgrade plan at the bottom of the page, or click the links in the summary list to add details.
7. In the Choose Firmware Version section, you can add a new firmware file or select a previously uploaded firmware file. Firmware files are .BIN files. If the file is zipped, unzip and upload the .BIN file.
  - To add a new file, click the Upload a New File tab, then click Browse to select the file. Enter comments. Click Upload. The file is automatically selected for the plan.
  - To select a previously uploaded file, click the Available Files tab, then select a file from the list, and click Continue.
8. All PX PDUs available for the upgrade appear in a list. Select the checkboxes for the PDUs you want to upgrade, then click Selected PDUs to add them to the "PDUs selected to this upgrade" list at the bottom of the page. Or, click All PDUs to add all available PX PDUs to the list.
9. To remove PDUs from the plan, click Selected PDUs or All PDUs in the bottom list. Only PDUs in the bottom list will be upgraded.
10. Click Continue. Click the Plan Options link in the summary at top.
11. On the Plan Options page, edit the plan name, if needed, and set other preferences.
12. Select the "Abort on failure" checkbox if you want Power IQ to cancel all remaining upgrades in the plan if an upgrade failure occurs. This could help prevent an upgrade problem from affecting other PDUs in the plan.
13. Select the "Allow simultaneous rollouts" checkbox if you want Power IQ to upgrade the firmware of multiple Raritan PX PDUs at once. This makes batch upgrades faster by allowing up to 25 upgrades to run at the same time.
14. Click Continue. Review the summary of the plan. Click Add Comment if you want add notes to the plan. Click Add or Remove PDUs if you want to edit the list of PDUs to upgrade.
15. Click Save. The completed plan summary page opens.

16. Click Start Upgrade to execute the plan immediately. The upgrade starts, and the status page displays. You can also execute the saved plan later. See [Execute a Saved Upgrade Plan](#).

See [View Status of Upgrade Plans in Progress](#) for details on checking upgrades in progress.

See [View Completed Upgrade Plans](#) for details on checking completed upgrades.





## Viewing Saved Upgrade Plans

View saved upgrade plans to verify and edit their details before executing a plan.

1. In the Facility Items tab, choose Activities > Bulk Firmware Updates.
2. Select Manage Firmware Upgrade Plans.
3. Click the Next button.
4. Choose Activities > View status of current upgrades.
5. Click the Plan name link to view the details and edit if needed.



## Editing a Saved Upgrade Plan

Saved upgrade plans can be edited to change details, add or remove PDUs, or change the firmware version.

You can only edit upgrade plans that you created.

1. In the Facility Items tab, choose Activities > Bulk Firmware Updates.
2. Select Manage Firmware Upgrade Plans.
3. Click the Next button.
4. Choose Activities > View status of current upgrades.
5. Click the Plan name's link to view the details.
6. Click the blue links in the plan summary to edit the plan. Or, scroll down to click Edit and use the wizard to edit.

See [Plan a New Upgrade](#) for details of plan settings.



## Execute a Saved Upgrade Plan

Once a plan is saved, execute it to start the upgrade process.

If the plan includes all facility items in a port forwarding configuration, Power IQ automatically orders them so that the extension facility item is upgraded first and then the primary facility item. This prevents the extension facility item from losing communications with Power IQ when the primary facility item resets during the upgrade process.

It is recommended to put all facility items into maintenance mode to prevent lost connectivity during the upgrade. See [Maintenance Mode](#).

---

*Note: If an extension facility item is polled when the primary facility item resets, the extension facility item shows the communication lost state. Restart the poller in Settings > Appliance Administration > Restart Poller.*

---

1. In the Facility Items tab, choose Activities > Bulk Firmware Updates.
2. Select Manage Firmware Upgrade Plans.
3. Click the Next button.
4. Choose Activities > View status of current upgrades.
5. Click the plan that you want to execute.
6. Click Start Upgrade to execute the plan.

See [Viewing Status of Upgrade Plans in Progress](#) for details on checking upgrades in progress.

See [Viewing Completed Upgrade Plans](#) for details on checking completed upgrades.



## Upgrade Timing

Each PX PDU upgrade takes approximately 5-10 minutes.

If you select "Allow simultaneous rollouts" in the plan options, 25 upgrades will begin simultaneously, and each batch of 25 will take approximately 10 minutes.



## Viewing Status of Upgrade Plans in Progress

- Upgrade plans in progress have three possible statuses.
- Init: Rebooting the PDU
- Login: Logging in to the PDU
- Verify: Verifying the new firmware version on the PDU

The status page for plans in progress displays when you execute the plan. You can return to the status page at any time, even after the plan has finished.

1. In the Facility Items tab, choose Activities > Bulk Firmware Updates.
2. Select Manage Firmware Upgrade Plans.
3. Click the Next button.
4. Choose Activities > View status of current upgrades.



## View Completed Upgrade Plans

When a plan has been executed, you can view details of the plan status and results of each PDU included in the plan.

1. In the Facility Items tab, choose Activities > Bulk Firmware Updates.
2. Select Manage Firmware Upgrade Plans.
3. Click the Next button.
4. Click the Plan name link to view the details.

If the plan completed successfully, a success message displays at the top of the plan details.

The list of PDUs included in the plan includes a Success or Failure message.

5. Click the "View detailed upgrade status messages" link for more information about each PDU.



## Managing Firmware Versions

You can upload different versions of firmware for use in upgrade plans, and view previously uploaded firmware.

Firmware files are .BIN files. You can download firmware versions from the Raritan website, in the Support section. If the file is zipped, unzip and use only the .BIN file.

1. In the Facility Items tab, choose Activities > Bulk Firmware Updates.
2. Select Manage Firmware Upgrade Plans.
3. Click the Next button.
4. Choose Activities > Manage Firmware Versions. This link is not available if you do not have any uploaded firmware files. The Manage Firmware Versions page opens.

All firmware versions previously uploaded appear in a list.

To delete a firmware version:

1. Select the checkbox for the firmware version you want to delete, then click Delete.
2. Scroll down to the Upload New Firmware File section.
3. Click Browse to select the .BIN file.
4. Enter comments in the Comment box.
5. Click Upload. The file is added to the list and will be available to select when creating a new upgrade plan. See [Plan a New Upgrade](#).



# Chapter 23: Managing Removed or Out of Service Items

Once an item is physically removed, replaced, or being maintained, you can mark it as removed or out of service, rather than deleting it from Power IQ, so that its historic data remains available in Power IQ.

The facility items that can be marked as removed or out of service are facility items, IT devices, and sensors.

Power IQ provides two states for marking a facility item that is not in service: Maintenance and Decommissioned. For more information, see *Maintenance Mode* on page 778 and *Decommission a Facility Item* on page 788 respectively.

For IT devices and sensors, only the decommissioning option is available. They do not have the maintenance mode state in Power IQ.





## Available Setting Options

Power IQ provides two options for marking a facility item that is not in service: Maintenance Mode and Decommissioned. If both options are enabled for a facility item, that item is considered decommissioned.

You can set any facility item in the USB-cascading configuration to the maintenance mode or decommission it.

For devices and sensors, only the decommissioning option is available. They do not have the maintenance mode option in Power IQ.

---

*Note: You can only decommission a sensor by decommissioning the PDU or removing the sensor from the PDU via the manufacturer's process. For more information, see [Decommission a Sensor](#) on page 796.*

---



## Maintenance Mode

Maintenance mode applies to facility items only. Use this mode when a facility item is out of service due to upgrades, configuration updates, or other maintenance tasks.

A facility item in maintenance mode is not polled, its traps are not acknowledged, and its events are stopped. This mode is helpful for preventing a facility item from generating events, such as connectivity loss events, in Power IQ.

You still can upgrade the facility item's firmware and change the configuration while in maintenance mode. Historic data for facility items in maintenance mode is included in tabular reports.

Maintenance mode will override any other state, except the decommissioned state.



# Setting Facility Items to Maintenance Mode

Before performing any maintenance task, such as firmware upgrade, set the facility item to maintenance mode.

You can set individual or multiple facility items to maintenance mode on the Facility Items list, or you can set an individual facility item to maintenance mode by editing its details from the facility item smart page.

To set individual or multiple facility items to maintenance mode on the Facility Items list:

1. In the Facility Items tab > Facility Items list, select the facility items you would like to put in maintenance mode. Click the Maintenance link.

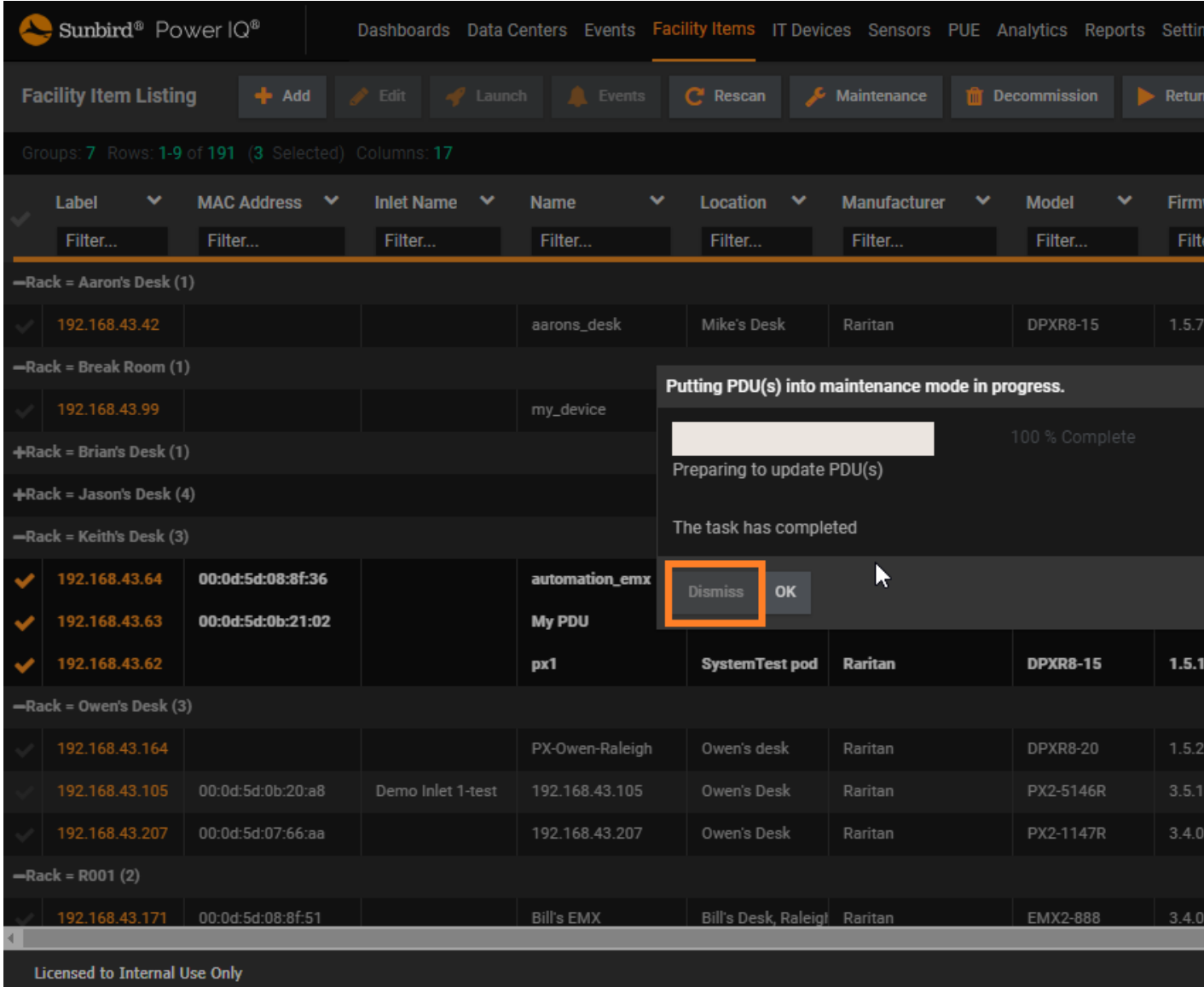
The screenshot shows the Sunbird Power IQ interface with the 'Facility Items' tab selected. The 'Maintenance' button in the top toolbar is highlighted with an orange box. In the table below, three rows are selected with orange checkmarks: 'jasons\_desk' (Health: GOOD), '192.168.43.102-PRO' (Health: GOOD), and '192.168.43.127' (Health: WARNING). The table columns include Label, MAC Address, Inlet Name, Name, Location, Manufacturer, Model, Firmware, Health, Current (A), Active Power (W), Apparent Power (VA), and Inlet Ten.

| Label          | MAC Address       | Inlet Name | Name                  | Location       | Manufacturer | Model      | Firmware      | Health   | Current (A) | Active Power (W) | Apparent Power (VA) | Inlet Ten |
|----------------|-------------------|------------|-----------------------|----------------|--------------|------------|---------------|----------|-------------|------------------|---------------------|-----------|
| 192.168.43.42  |                   |            | aarons_desk           | Mike's Desk    | Raritan      | DPXR8-15   | 1.5.7-11220   | CRITICAL |             |                  |                     |           |
| 192.168.43.99  |                   |            | my_device             | Break Room     | Raritan      | DPXR8-20   | 1.5.20-11783  | CRITICAL |             |                  |                     |           |
| 192.168.43.58  |                   |            | jasons_desk           | Jason's Desk   | Raritan      | DPCR8-15   | 1.5.8-11272   | GOOD     | 0.13        | 6                | 15                  | 21        |
| 192.168.43.102 | 00:0d:5d:07:e6:57 |            | 192.168.43.102-PRO    | Jason's Desk   | Raritan      | EMX-880    | 2.1.0.5-36560 | GOOD     |             |                  |                     | 20.3      |
| 192.168.43.127 | 00:0d:5d:0b:21:0e |            | How long will it take | Jason's Desk   | Raritan      | PX2-5146R  | 3.4.0.5-44367 | WARNING  | 0           | 0                | 0                   | 20.1      |
| 192.168.43.101 |                   |            | asset-strip           | Jason's Desk   | Raritan      | PX2-119OCR | 2.4.3.5-40298 | CRITICAL |             |                  |                     |           |
| 192.168.43.64  | 00:0d:5d:08:8f:36 |            | automation_emx        | lab            | Raritan      | EMX2-888   | 2.5.3.5-41801 | GOOD     |             |                  |                     |           |
| 192.168.43.63  | 00:0d:5d:0b:21:02 |            | My PDU                |                | Raritan      | PX2-5146R  | 3.4.0.5-44367 | WARNING  | 0.3         | 18               | 33                  | 27        |
| 192.168.43.62  |                   |            | px1                   | SystemTest pod | Raritan      | DPXR8-15   | 1.5.13-11595  | GOOD     | 0.3         | 18               | 35                  |           |
| 192.168.43.164 |                   |            | PX-Owen-Raleigh       | Owen's desk    | Raritan      | DPXR8-20   | 1.5.20-11698  | CRITICAL |             |                  |                     |           |

2. On the confirmation popup, click the Enter maintenance mode for facility item(s) button.

This screenshot shows the same Facility Items list as the previous image. A confirmation dialog box is overlaid on the table, titled 'Confirm disabling PDU(s)'. The dialog contains the text: 'Putting PDUs into maintenance mode will result in no data being collected or events monitored for the PDU.' Below the text are two buttons: 'Enter maintenance mode for PDU(s)' (highlighted with an orange box) and 'Cancel'. The background table shows the same data as the previous screenshot, with the three items still selected.

- Maintenance mode will be enabled. Click the Dismiss button if you want to dismiss the status popup.

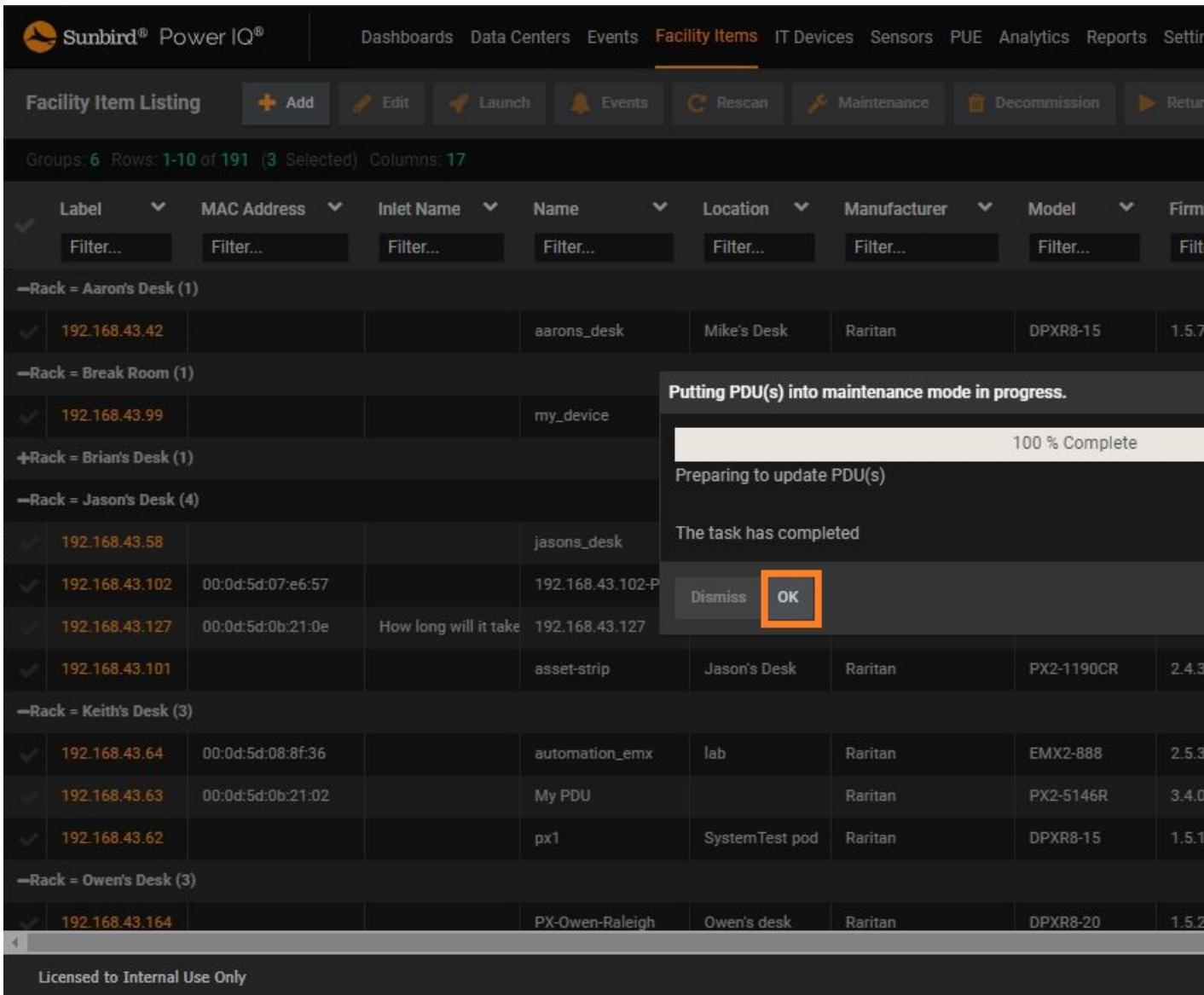


The screenshot shows the Sunbird Power IQ interface. At the top, there's a navigation bar with 'Facility Items' selected. Below it is a 'Facility Item Listing' section with various action buttons like '+ Add', 'Edit', 'Launch', 'Events', 'Rescan', 'Maintenance', 'Decommission', and 'Return'. A table below shows a list of facility items grouped by rack. A modal popup is open over the table, titled 'Putting PDU(s) into maintenance mode in progress.' It shows a progress bar at 100% Complete and the message 'The task has completed'. At the bottom of the popup are 'Dismiss' and 'OK' buttons. The 'Dismiss' button is highlighted with an orange box.

| Label                     | MAC Address       | Inlet Name        | Name            | Location             | Manufacturer | Model     | Firm  |
|---------------------------|-------------------|-------------------|-----------------|----------------------|--------------|-----------|-------|
| --Rack = Aaron's Desk (1) |                   |                   |                 |                      |              |           |       |
| ✓ 192.168.43.42           |                   |                   | aarons_desk     | Mike's Desk          | Raritan      | DPXR8-15  | 1.5.7 |
| --Rack = Break Room (1)   |                   |                   |                 |                      |              |           |       |
| ✓ 192.168.43.99           |                   |                   | my_device       |                      |              |           |       |
| +Rack = Brian's Desk (1)  |                   |                   |                 |                      |              |           |       |
| +Rack = Jason's Desk (4)  |                   |                   |                 |                      |              |           |       |
| --Rack = Keith's Desk (3) |                   |                   |                 |                      |              |           |       |
| ✓ 192.168.43.64           | 00:0d:5d:08:8f:36 |                   | automation_emx  |                      |              |           |       |
| ✓ 192.168.43.63           | 00:0d:5d:0b:21:02 |                   | My PDU          |                      |              |           |       |
| ✓ 192.168.43.62           |                   |                   | px1             | SystemTest pod       | Raritan      | DPXR8-15  | 1.5.1 |
| --Rack = Owen's Desk (3)  |                   |                   |                 |                      |              |           |       |
| ✓ 192.168.43.164          |                   |                   | PX-Owen-Raleigh | Owen's desk          | Raritan      | DPXR8-20  | 1.5.2 |
| ✓ 192.168.43.105          | 00:0d:5d:0b:20:a8 | Demo Inlet 1-test | 192.168.43.105  | Owen's Desk          | Raritan      | PX2-5146R | 3.5.1 |
| ✓ 192.168.43.207          | 00:0d:5d:07:66:aa |                   | 192.168.43.207  | Owen's Desk          | Raritan      | PX2-1147R | 3.4.0 |
| --Rack = R001 (2)         |                   |                   |                 |                      |              |           |       |
| ✓ 192.168.43.171          | 00:0d:5d:08:8f:51 |                   | Bill's EMX      | Bill's Desk, Raleigh | Raritan      | EMX2-888  | 3.4.0 |

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4. When maintenance mode is enabled, click the OK button.



The screenshot shows the Sunbird Power IQ interface with the 'Facility Item Listing' page. A modal dialog is open over the table, titled 'Putting PDU(s) into maintenance mode in progress.' The dialog shows a progress bar at 100% Complete and the text 'Preparing to update PDU(s)'. Below the progress bar, it says 'The task has completed'. At the bottom of the dialog, there are two buttons: 'Dismiss' and 'OK'. The 'OK' button is highlighted with an orange square.

| Label                    | MAC Address       | Inlet Name            | Name             | Location       | Manufacturer | Model      | Firm  |
|--------------------------|-------------------|-----------------------|------------------|----------------|--------------|------------|-------|
| -Rack = Aaron's Desk (1) |                   |                       |                  |                |              |            |       |
| ✓ 192.168.43.42          |                   |                       | aarons_desk      | Mike's Desk    | Raritan      | DPXR8-15   | 1.5.7 |
| -Rack = Break Room (1)   |                   |                       |                  |                |              |            |       |
| ✓ 192.168.43.99          |                   |                       | my_device        |                |              |            |       |
| +Rack = Brian's Desk (1) |                   |                       |                  |                |              |            |       |
| -Rack = Jason's Desk (4) |                   |                       |                  |                |              |            |       |
| ✓ 192.168.43.58          |                   |                       | jasons_desk      |                |              |            |       |
| ✓ 192.168.43.102         | 00:0d:5d:07:e6:57 |                       | 192.168.43.102-P |                |              |            |       |
| ✓ 192.168.43.127         | 00:0d:5d:0b:21:0e | How long will it take | 192.168.43.127   |                |              |            |       |
| ✓ 192.168.43.101         |                   |                       | asset-strip      | Jason's Desk   | Raritan      | PX2-1190CR | 2.4.3 |
| -Rack = Keith's Desk (3) |                   |                       |                  |                |              |            |       |
| ✓ 192.168.43.64          | 00:0d:5d:08:8f:36 |                       | automation_emx   | lab            | Raritan      | EMX2-888   | 2.5.3 |
| ✓ 192.168.43.63          | 00:0d:5d:0b:21:02 |                       | My PDU           |                | Raritan      | PX2-5146R  | 3.4.0 |
| ✓ 192.168.43.62          |                   |                       | px1              | SystemTest pod | Raritan      | DPXR8-15   | 1.5.1 |
| -Rack = Owen's Desk (3)  |                   |                       |                  |                |              |            |       |
| ✓ 192.168.43.164         |                   |                       | PX-Owen-Raleigh  | Owen's desk    | Raritan      | DPXR8-20   | 1.5.2 |

5. The Health column for the selected facility items will display Maintenance as the state.

Alternatively, enable maintenance mode for an individual facility item on the facility item's smart page.

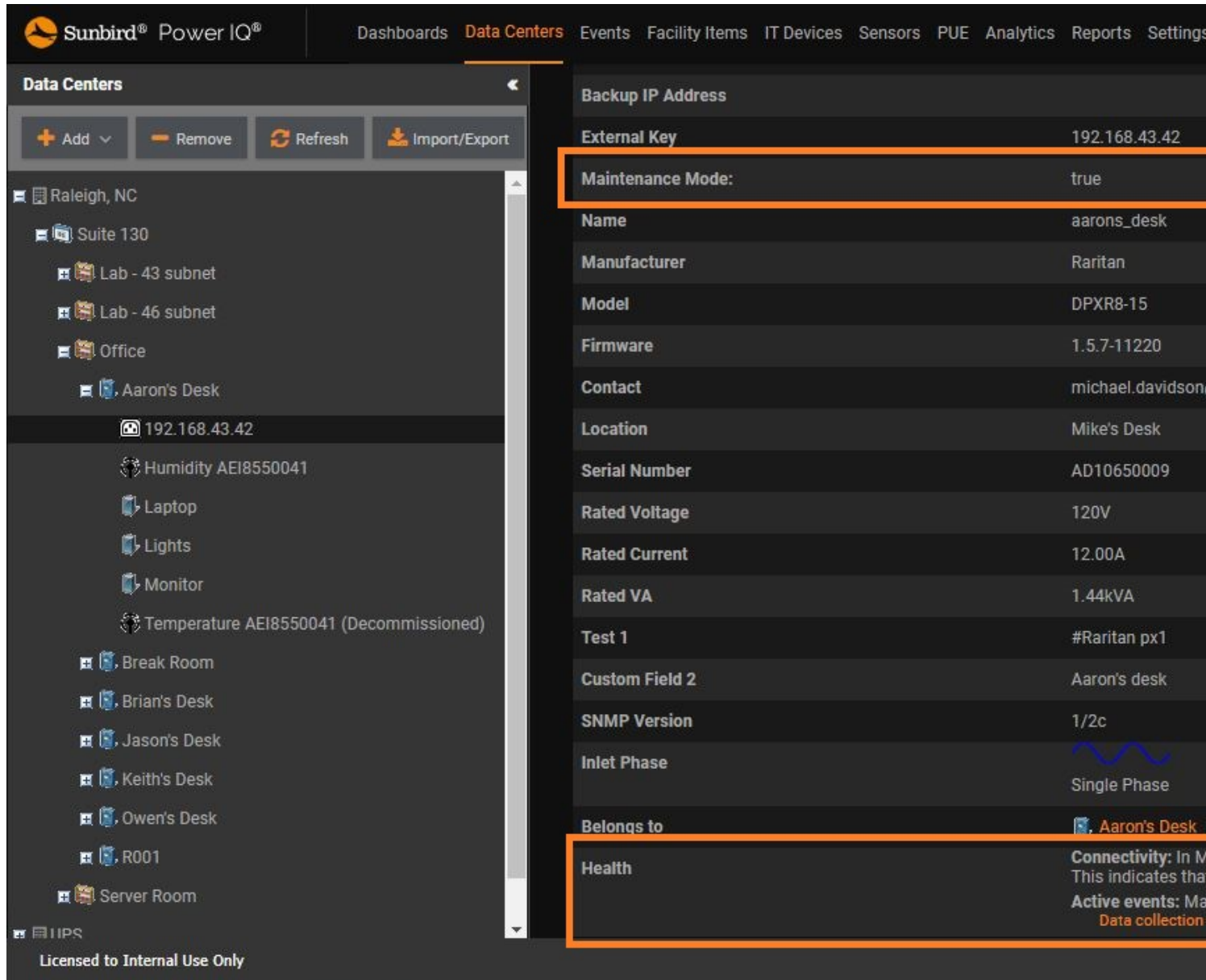
1. Click a facility item link to open the facility item smart page.
2. Choose Actions > Edit.
3. On the Change Credentials panel, select the Maintenance Mode checkbox.
4. Click Save.



Note: If you also select the Decommissioned checkbox, the facility item is considered decommissioned instead of being in the maintenance mode. See [Decommissioning a Facility Item](#)

The Details section of the facility item smart page will show the following:

- Maintenance Mode field displaying a value set to true
- Health field Connectivity displaying an In Maintenance Mode state
- Health field Active events displaying a Maintenance state



The screenshot shows the Sunbird Power IQ interface. On the left, the 'Data Centers' sidebar lists a hierarchy: Raleigh, NC > Suite 130 > Aaron's Desk. The main panel shows details for the selected item, 'Aaron's Desk'. The 'Maintenance Mode' field is highlighted with an orange box and shows a value of 'true'. The 'Health' section is also highlighted with an orange box, showing 'Connectivity: In Maintenance Mode' and 'Active events: Maintenance Data collection'.

| Field                    | Value   |
|--------------------------|---|
| Backup IP Address        |   |
| External Key             | 192.168.43.42   |
| <b>Maintenance Mode:</b> | <b>true</b>   |
| Name                     | aarons_desk   |
| Manufacturer             | Raritan   |
| Model                    | DPXR8-15  |
| Firmware                 | 1.5.7-11220   |
| Contact                  | michael.davidson  |
| Location                 | Mike's Desk   |
| Serial Number            | AD10650009  |
| Rated Voltage            | 120V  |
| Rated Current            | 12.00A  |
| Rated VA                 | 1.44kVA   |
| Test 1                   | #Raritan px1  |
| Custom Field 2           | Aaron's desk  |
| SNMP Version             | 1/2c  |
| Inlet Phase              | Single Phase  |
| Belongs to               | Aaron's Desk  |
| <b>Health</b>            | <b>Connectivity: In Maintenance Mode</b><br>This indicates that the device is in maintenance mode.<br><b>Active events: Maintenance Data collection</b> |

## Identify Facility Items in Maintenance Mode

To identify facility items in maintenance mode, you can either view the health of the facility items in the Facility Items list (for individual or multiple facility items) or view the Maintenance Mode and Health fields in the Details section of the facility item smart page (for individual facility items).

From the Facility Items list, look for the Maintenance state in the Health column to determine if the item is in maintenance mode.

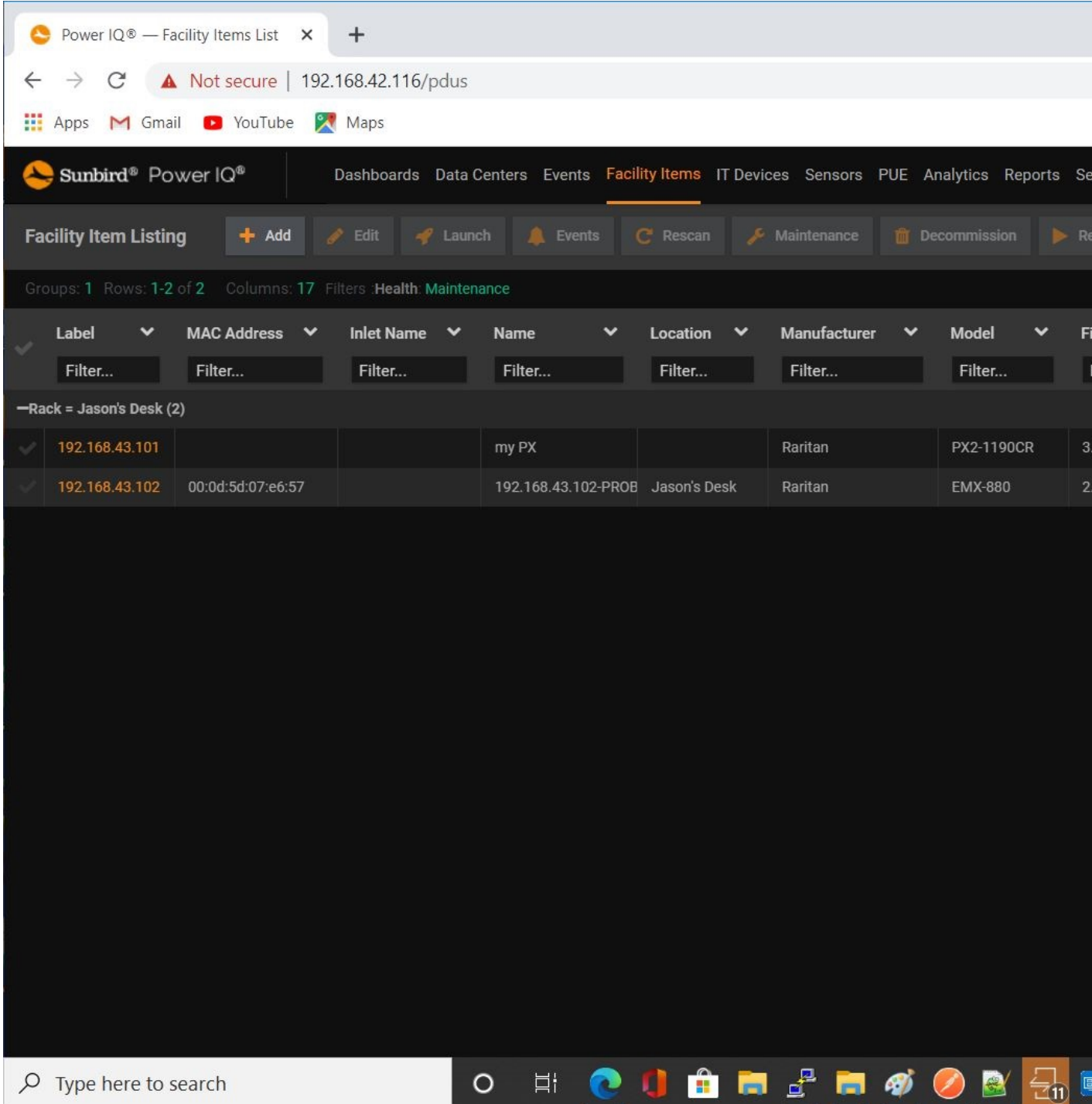
## Filtering the Facility Items List by Maintenance Health State

To filter the Facility Items list by the Maintenance Health state:

1. In the Facility Items list, click the Health column to display the Filter options.
2. Select "Maintenance".



3. The Facility Items list will display only those items with a Health state of Maintenance.



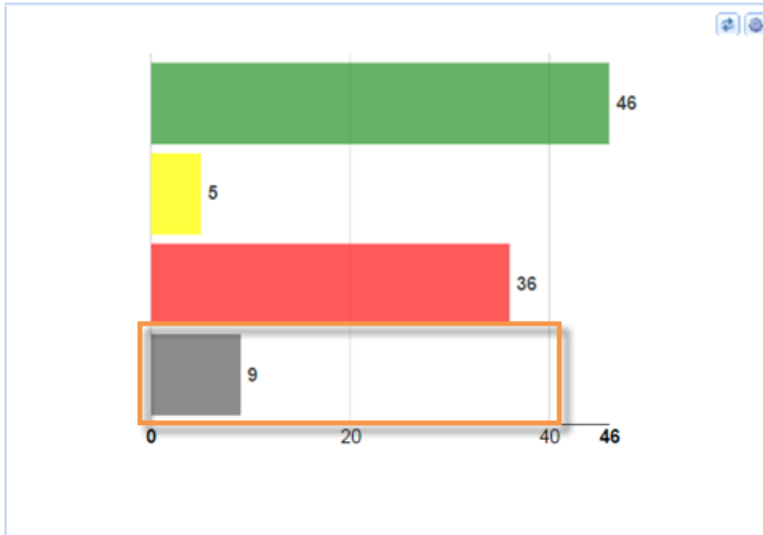
The screenshot shows a web browser window displaying the Sunbird Power IQ Facility Items List. The browser address bar shows the URL [192.168.42.116/pdus](http://192.168.42.116/pdus). The application header includes navigation tabs for Dashboards, Data Centers, Events, Facility Items (selected), IT Devices, Sensors, PUE, Analytics, Reports, and Settings. The main interface features a 'Facility Item Listing' section with a toolbar containing buttons for Add, Edit, Launch, Events, Rescan, Maintenance, and Decommission. Below the toolbar, the status indicates 'Groups: 1 Rows: 1-2 of 2 Columns: 17 Filters: Health: Maintenance'. A table with columns for Label, MAC Address, Inlet Name, Name, Location, Manufacturer, and Model is displayed. The table shows two rows of data under the group 'Rack = Jason's Desk (2)'. The first row has a Label of 192.168.43.101 and Name of my PX. The second row has a Label of 192.168.43.102, MAC Address of 00:0d:5d:07:e6:57, Name of 192.168.43.102-PROB, Location of Jason's Desk, and Manufacturer of Raritan. The Windows taskbar is visible at the bottom of the screenshot.

| Label          | MAC Address       | Inlet Name | Name                | Location     | Manufacturer | Model      |
|----------------|-------------------|------------|---------------------|--------------|--------------|------------|
| 192.168.43.101 |                   |            | my PX               |              | Raritan      | PX2-1190CR |
| 192.168.43.102 | 00:0d:5d:07:e6:57 |            | 192.168.43.102-PROB | Jason's Desk | Raritan      | EMX-880    |



## Viewing Facility Items in Maintenance from the PDU Health Chart



Additionally, clicking on the gray Maintenance bar in a PDU Health bar chart will display all items with a Health state of Maintenance in the Facility Items list.



## Viewing Maintenance Mode on the Facility Item Smart Page

The Details section of an individual facility item smart page also indicates maintenance mode.

1. Click an item to open the facility item smart page.
2. In the Details section of the facility item smart page, look for the following:
  - a. Maintenance Mode field displaying a value set to true.
  - b. Health field Connectivity displaying an In Maintenance Mode state.
  - c. Health field Active events displaying a Maintenance state.

| Details           |  |
|-------------------|--|
| Type              | Rack PDU   |
| IP Address        | 192.168.42.212   |
| Proxy Index       | 2  |
| Backup IP Address |  |
| External Key      | 192.168.42.212 - 2   |
| Maintenance Mode: | true   |
| Name              | avocent-pm3000-212a  |
| Manufacturer      | Avocent  |
| Model             | PM3000/3/30A   |
| Firmware          | 1.3.0  |
| Contact           | Owen Clark   |
| Location          | Raleigh Lab  |
| Test 1            |  |
| Custom Field 2    |  |
| SNMP Version      | 1/2c   |
| Inlet Phase       |  Single Phase   |
| Belongs to        |  <a href="#">Rack B6</a>  |
| Health            | <p><b>Connectivity:</b> In Maintenance Mode<br/>This indicates that the PDU is in maintenance mode. It is not being polled and no traps from this PDU will be acknowledged.</p> <p><b>Active events:</b> Maintenance<br/>No active events.</p> |

## Decommissioning in Power IQ

You can decommission facility items, IT devices, and sensors. Decommission a facility item when you physically remove, replace, or hot swap it with another one.

### Decommissioned Facility Items

After a facility item is decommissioned, Power IQ stops polling it. It also stops receiving the item's traps or events.

A decommissioned facility item's historical data is still included in tabular report and PUE search. You cannot change decommissioned item's configuration data.

The following features are prevented on a decommissioned item. Other features may also be prevented, depending on the item.

- No polling
- No rescanning
- No reception of traps or events associated with the decommissioned item
- No power control through the decommissioned item

---

*Note: Power control on the IT devices mapped to the outlets of the decommissioned item must be performed through a newly commissioned item, which replaces the decommissioned one and is associated with the IT devices.*

---

- All associated sensors become decommissioned and no longer display in the item smart view
- No firmware upgrade

### Decommissioned IT Devices

- Configuration can be changed
- If a device 1) has an outlet associated from a facility item in service and 2) has an outlet associated from a decommissioned facility item, power control on the device is allowed but it will only operate on the outlet from the facility item in service

### Decommissioned Sensors

- Decommissioned sensors no longer display in the item smart view; however, the last sensor reading is displayed on the item smart page
- Decommissioned external sensor readings are not displayed in EDM Tabular reports that contain historical sensor data



## Decommission a Facility Item

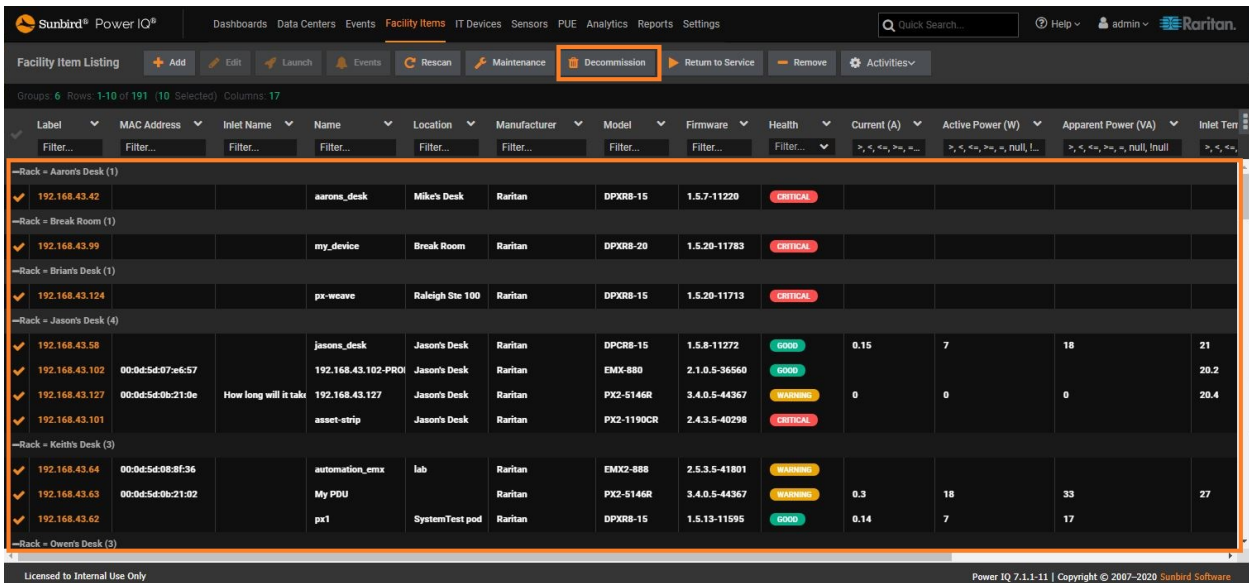
You can decommission a facility item and then add a new one to replace it by using the same IP address. The replacement facility item can be a different model. You can also return the decommissioned facility item to service. See *Return a Facility Item to Service* on page 802.

If you are integrated with dcTrack, which does not support decommissioned facility items, you must modify the decommissioned facility item's external key, which by default is the IP address.

After decommissioning a facility item, all sensors associated with it also get decommissioned.

To decommission individual or multiple facility items from the Facility Items list:

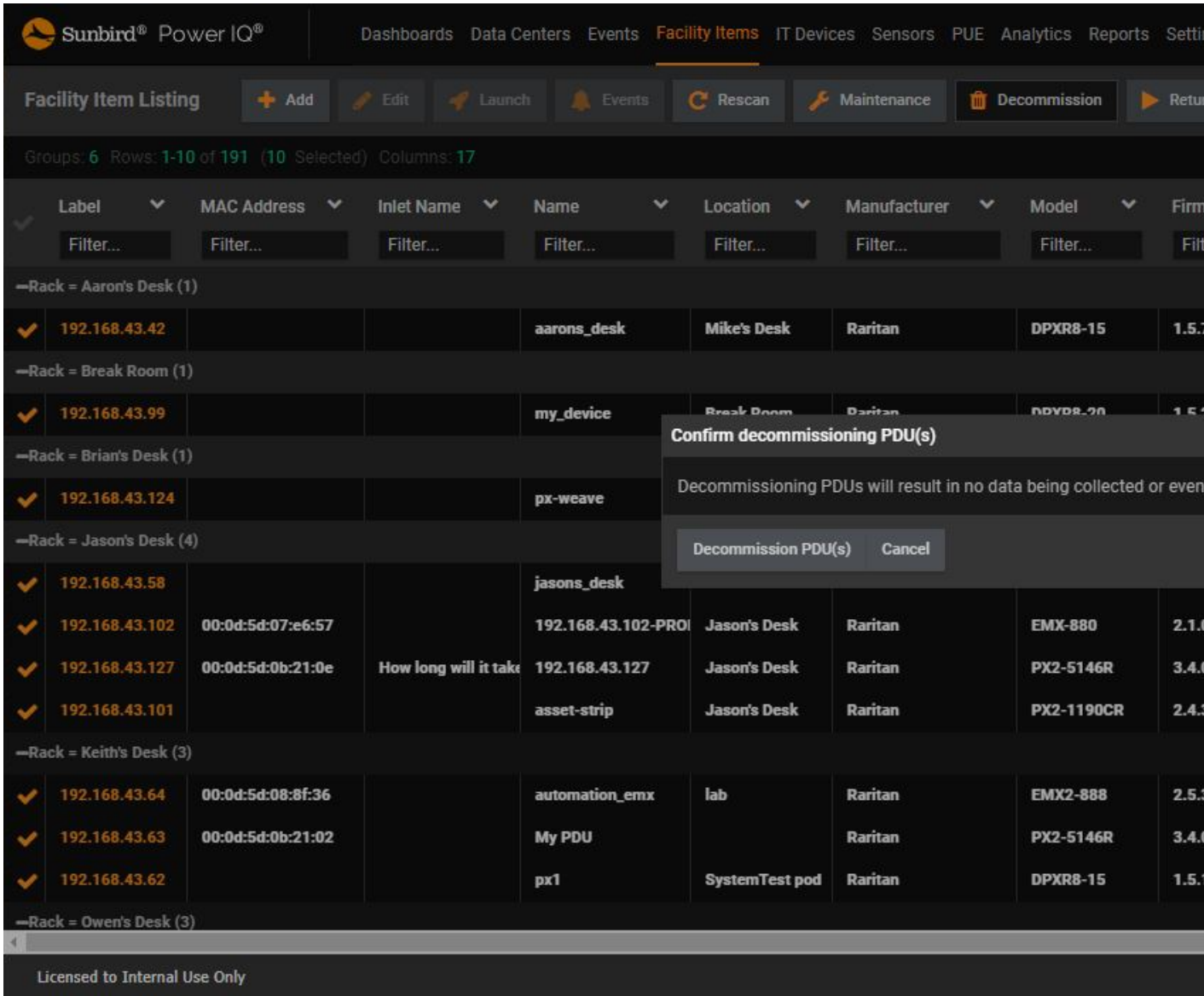
1. In the Facility Items tab > Facility Items list, select the item you would like to decommission. Click the Decommission link.



| Label                     | MAC Address    | Inlet Name        | Name                  | Location        | Manufacturer | Model      | Firmware      | Health   | Current (A) | Active Power (W) | Apparent Power (VA) | Inlet Temp |
|---------------------------|----------------|-------------------|-----------------------|-----------------|--------------|------------|---------------|----------|-------------|------------------|---------------------|------------|
| --Rack - Aaron's Desk (1) |                |                   |                       |                 |              |            |               |          |             |                  |                     |            |
| ✓                         | 192.168.43.42  |                   | aarons_desk           | Mike's Desk     | Raritan      | DPXRB-15   | 1.5.7-11220   | CRITICAL |             |                  |                     |            |
| --Rack - Break Room (1)   |                |                   |                       |                 |              |            |               |          |             |                  |                     |            |
| ✓                         | 192.168.43.99  |                   | my_device             | Break Room      | Raritan      | DPXRB-20   | 1.5.20-11783  | CRITICAL |             |                  |                     |            |
| --Rack - Brian's Desk (1) |                |                   |                       |                 |              |            |               |          |             |                  |                     |            |
| ✓                         | 192.168.43.124 |                   | pa-weave              | Raleigh Ste 100 | Raritan      | DPXRB-15   | 1.5.20-11713  | CRITICAL |             |                  |                     |            |
| --Rack - Jason's Desk (4) |                |                   |                       |                 |              |            |               |          |             |                  |                     |            |
| ✓                         | 192.168.43.58  |                   | jasons_desk           | Jason's Desk    | Raritan      | DPCRB-15   | 1.5.8-11272   | GOOD     | 0.15        | 7                | 18                  | 21         |
| ✓                         | 192.168.43.102 | 00:0d:5d:07:e6:57 | 192.168.43.102-PRO    | Jason's Desk    | Raritan      | EMX-880    | 2.1.0.5-36560 | GOOD     |             |                  |                     | 20.2       |
| ✓                         | 192.168.43.127 | 00:0d:5d:0b:21:0e | How long will it take | Jason's Desk    | Raritan      | PX2-5146R  | 3.4.0.5-44367 | WARNING  | 0           | 0                | 0                   | 20.4       |
| ✓                         | 192.168.43.101 |                   | asset-strip           | Jason's Desk    | Raritan      | PX2-1190CR | 2.4.3.5-40298 | CRITICAL |             |                  |                     |            |
| --Rack - Keith's Desk (3) |                |                   |                       |                 |              |            |               |          |             |                  |                     |            |
| ✓                         | 192.168.43.64  | 00:0d:5d:08:8f:36 | automation_emx        | lab             | Raritan      | EMX2-888   | 2.5.3.5-41801 | WARNING  |             |                  |                     |            |
| ✓                         | 192.168.43.63  | 00:0d:5d:0b:21:02 | My PDU                |                 | Raritan      | PX2-5146R  | 3.4.0.5-44367 | WARNING  | 0.3         | 18               | 33                  | 27         |
| ✓                         | 192.168.43.62  |                   | px1                   | SystemTest pod  | Raritan      | DPXRB-15   | 1.5.13-11595  | GOOD     | 0.14        | 7                | 17                  |            |
| --Rack - Owen's Desk (3)  |                |                   |                       |                 |              |            |               |          |             |                  |                     |            |



- On the confirmation popup, click the Decommission PDU(s) button.

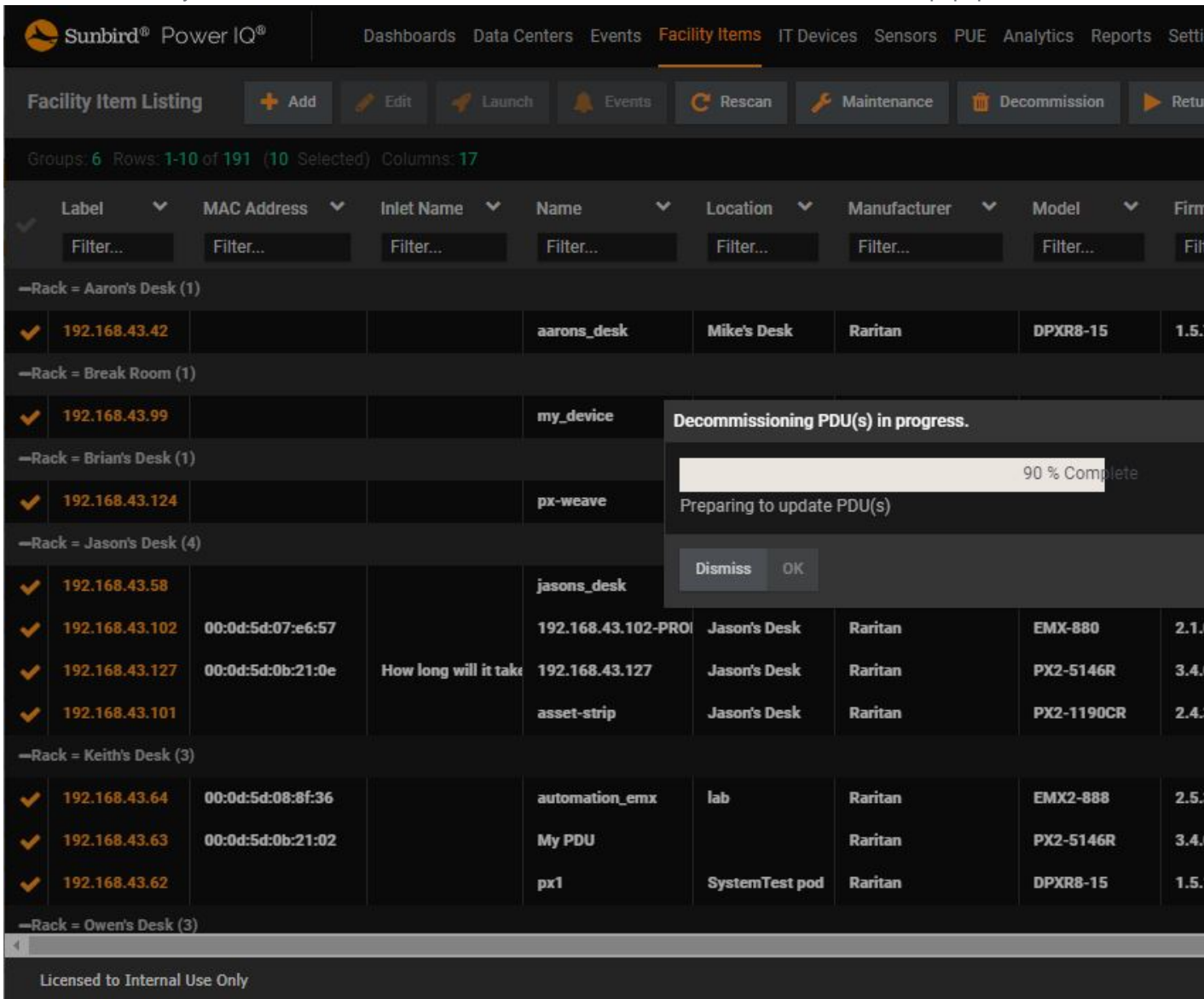


The screenshot shows the Sunbird Power IQ interface with the 'Facility Item Listing' page. A confirmation popup titled 'Confirm decommissioning PDU(s)' is displayed over the table. The popup contains the text: 'Decommissioning PDUs will result in no data being collected or even...' and two buttons: 'Decommission PDU(s)' and 'Cancel'.

| Label                    | MAC Address       | Inlet Name            | Name                | Location       | Manufacturer | Model      | Firm  |
|--------------------------|-------------------|-----------------------|---------------------|----------------|--------------|------------|-------|
| →Rack = Aaron's Desk (1) |                   |                       |                     |                |              |            |       |
| ✓ 192.168.43.42          |                   |                       | aarons_desk         | Mike's Desk    | Raritan      | DPXR8-15   | 1.5.7 |
| →Rack = Break Room (1)   |                   |                       |                     |                |              |            |       |
| ✓ 192.168.43.99          |                   |                       | my_device           | Break Room     | Raritan      | DPYR8-20   | 1.5.7 |
| →Rack = Brian's Desk (1) |                   |                       |                     |                |              |            |       |
| ✓ 192.168.43.124         |                   |                       | px-weave            |                |              |            |       |
| →Rack = Jason's Desk (4) |                   |                       |                     |                |              |            |       |
| ✓ 192.168.43.58          |                   |                       | jasons_desk         |                |              |            |       |
| ✓ 192.168.43.102         | 00:0d:5d:07:e6:57 |                       | 192.168.43.102-PROI | Jason's Desk   | Raritan      | EMX-880    | 2.1.0 |
| ✓ 192.168.43.127         | 00:0d:5d:0b:21:0e | How long will it take | 192.168.43.127      | Jason's Desk   | Raritan      | PX2-5146R  | 3.4.0 |
| ✓ 192.168.43.101         |                   |                       | asset-strip         | Jason's Desk   | Raritan      | PX2-1190CR | 2.4.3 |
| →Rack = Keith's Desk (3) |                   |                       |                     |                |              |            |       |
| ✓ 192.168.43.64          | 00:0d:5d:08:8f:36 |                       | automation_emx      | lab            | Raritan      | EMX2-888   | 2.5.3 |
| ✓ 192.168.43.63          | 00:0d:5d:0b:21:02 |                       | My PDU              |                | Raritan      | PX2-5146R  | 3.4.0 |
| ✓ 192.168.43.62          |                   |                       | px1                 | SystemTest pod | Raritan      | DPXR8-15   | 1.5.7 |
| →Rack = Owen's Desk (3)  |                   |                       |                     |                |              |            |       |

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- The selected facility items will be decommissioned. Click the Dismiss button to dismiss the status popup.



**Sunbird® Power IQ®**   Dashboards   Data Centers   Events   **Facility Items**   IT Devices   Sensors   PUE   Analytics   Reports   Settings

**Facility Item Listing**   + Add   Edit   Launch   Events   Rescan   Maintenance   Decommission   Return

Groups: 6   Rows: 1-10 of 191 (10 Selected)   Columns: 17

| Label                    | MAC Address       | Inlet Name            | Name                | Location       | Manufacturer | Model      | Firm |
|--------------------------|-------------------|-----------------------|---------------------|----------------|--------------|------------|------|
| -Rack = Aaron's Desk (1) |                   |                       |                     |                |              |            |      |
| ✓ 192.168.43.42          |                   |                       | aarons_desk         | Mike's Desk    | Raritan      | DPXR8-15   | 1.5  |
| -Rack = Break Room (1)   |                   |                       |                     |                |              |            |      |
| ✓ 192.168.43.99          |                   |                       | my_device           |                |              |            |      |
| -Rack = Brian's Desk (1) |                   |                       |                     |                |              |            |      |
| ✓ 192.168.43.124         |                   |                       | px-weave            |                |              |            |      |
| -Rack = Jason's Desk (4) |                   |                       |                     |                |              |            |      |
| ✓ 192.168.43.58          |                   |                       | jasons_desk         |                |              |            |      |
| ✓ 192.168.43.102         | 00:0d:5d:07:e6:57 |                       | 192.168.43.102-PROI | Jason's Desk   | Raritan      | EMX-880    | 2.1  |
| ✓ 192.168.43.127         | 00:0d:5d:0b:21:0e | How long will it take | 192.168.43.127      | Jason's Desk   | Raritan      | PX2-5146R  | 3.4  |
| ✓ 192.168.43.101         |                   |                       | asset-strip         | Jason's Desk   | Raritan      | PX2-1190CR | 2.4  |
| -Rack = Keith's Desk (3) |                   |                       |                     |                |              |            |      |
| ✓ 192.168.43.64          | 00:0d:5d:08:8f:36 |                       | automation_emx      | lab            | Raritan      | EMX2-888   | 2.5  |
| ✓ 192.168.43.63          | 00:0d:5d:0b:21:02 |                       | My PDU              |                | Raritan      | PX2-5146R  | 3.4  |
| ✓ 192.168.43.62          |                   |                       | px1                 | SystemTest pod | Raritan      | DPXR8-15   | 1.5  |
| -Rack = Owen's Desk (3)  |                   |                       |                     |                |              |            |      |

**Decommissioning PDU(s) in progress.**

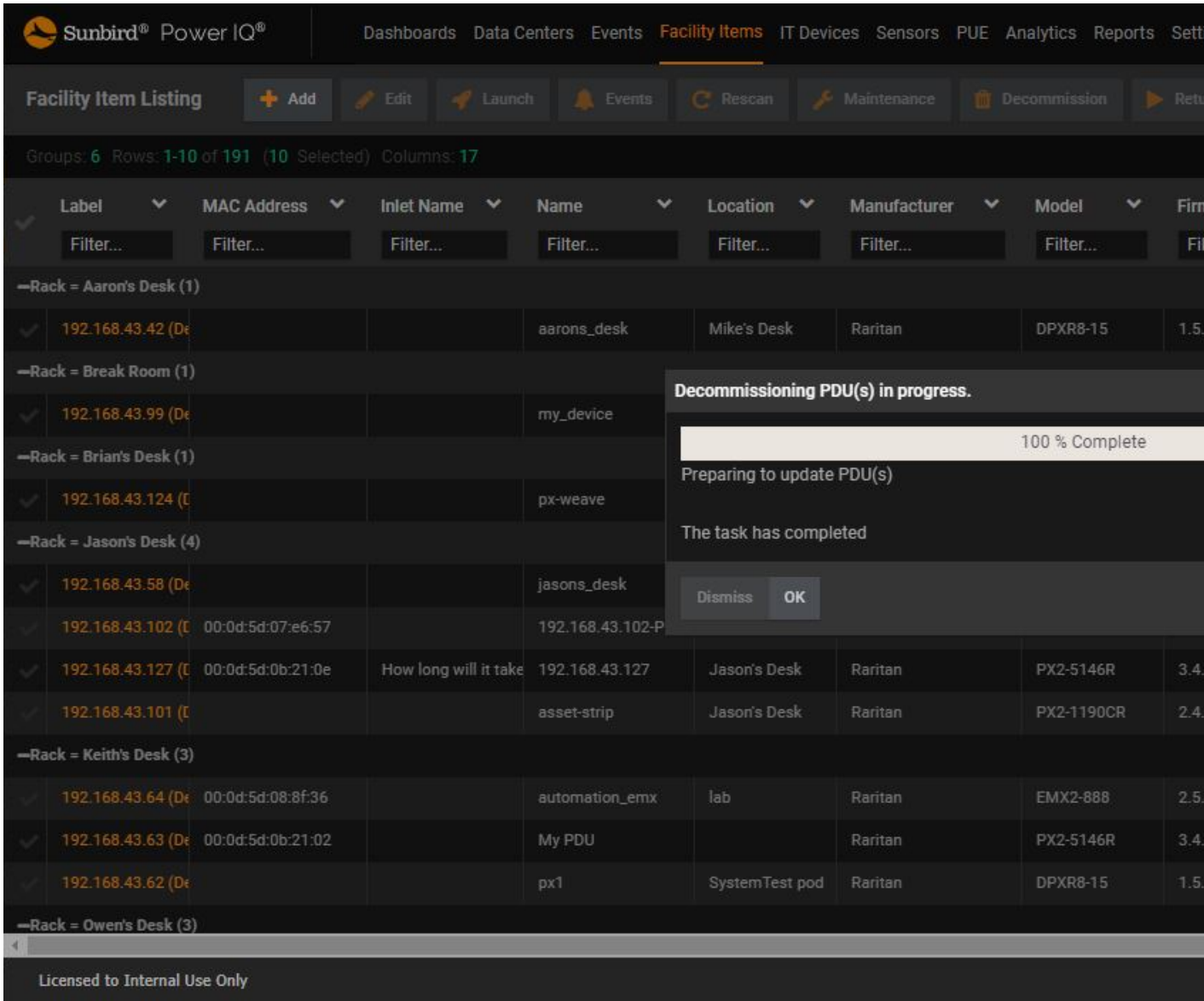
90 % Complete

Preparing to update PDU(s)

Dismiss   OK

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- When decommissioning is completed, click the OK button.

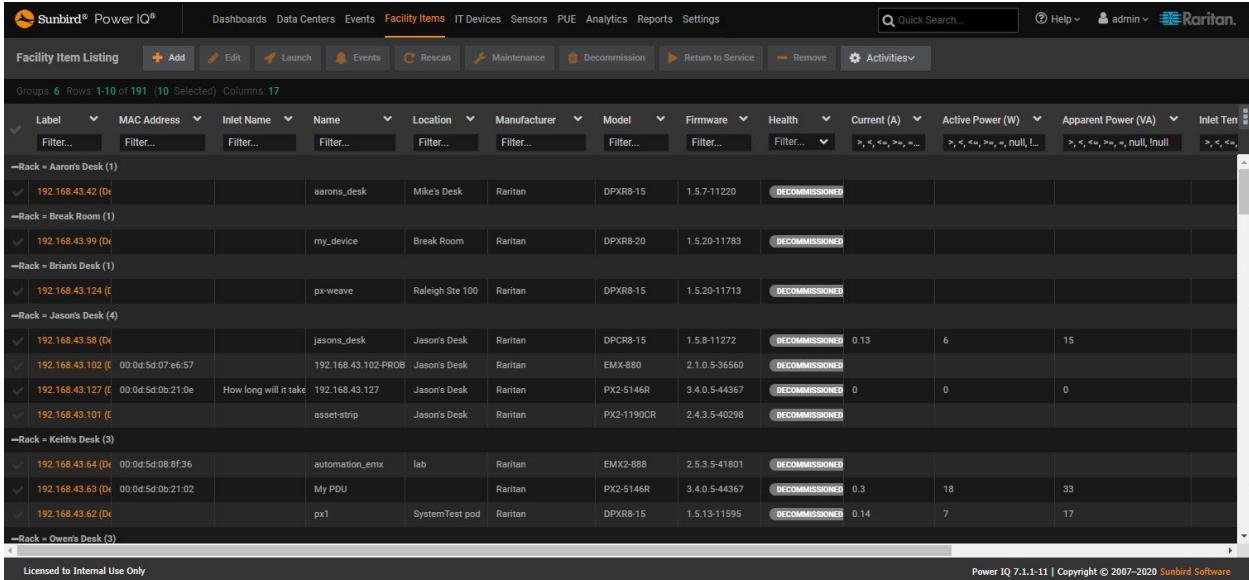


The screenshot shows the Sunbird Power IQ interface with the 'Facility Item Listing' page. A modal dialog is open, titled 'Decommissioning PDU(s) in progress.' The dialog shows a progress bar at 100% Complete and the text 'Preparing to update PDU(s)'. Below the progress bar, it says 'The task has completed' and provides 'Dismiss' and 'OK' buttons.

| Label                    | MAC Address       | Inlet Name            | Name             | Location       | Manufacturer | Model      | Firm |
|--------------------------|-------------------|-----------------------|------------------|----------------|--------------|------------|------|
| -Rack = Aaron's Desk (1) |                   |                       |                  |                |              |            |      |
| 192.168.43.42 (De        |                   |                       | aarons_desk      | Mike's Desk    | Raritan      | DPXR8-15   | 1.5  |
| -Rack = Break Room (1)   |                   |                       |                  |                |              |            |      |
| 192.168.43.99 (De        |                   |                       | my_device        |                |              |            |      |
| -Rack = Brian's Desk (1) |                   |                       |                  |                |              |            |      |
| 192.168.43.124 (C        |                   |                       | px-weave         |                |              |            |      |
| -Rack = Jason's Desk (4) |                   |                       |                  |                |              |            |      |
| 192.168.43.58 (De        |                   |                       | jasons_desk      |                |              |            |      |
| 192.168.43.102 (C        | 00:0d:5d:07:e6:57 |                       | 192.168.43.102-P |                |              |            |      |
| 192.168.43.127 (C        | 00:0d:5d:0b:21:0e | How long will it take | 192.168.43.127   | Jason's Desk   | Raritan      | PX2-5146R  | 3.4  |
| 192.168.43.101 (C        |                   |                       | asset-strip      | Jason's Desk   | Raritan      | PX2-1190CR | 2.4  |
| -Rack = Keith's Desk (3) |                   |                       |                  |                |              |            |      |
| 192.168.43.64 (De        | 00:0d:5d:08:8f:36 |                       | automation_emx   | lab            | Raritan      | EMX2-888   | 2.5  |
| 192.168.43.63 (De        | 00:0d:5d:0b:21:02 |                       | My PDU           |                | Raritan      | PX2-5146R  | 3.4  |
| 192.168.43.62 (De        |                   |                       | px1              | SystemTest pod | Raritan      | DPXR8-15   | 1.5  |
| -Rack = Owen's Desk (3)  |                   |                       |                  |                |              |            |      |

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5. The Health column for the selected items will display Decommissioned as the state.



The screenshot shows the Sunbird Power IQ interface with the 'Facility Items' tab selected. The table below displays a list of items, all of which have their 'Health' status set to 'DECOMMISSIONED'.

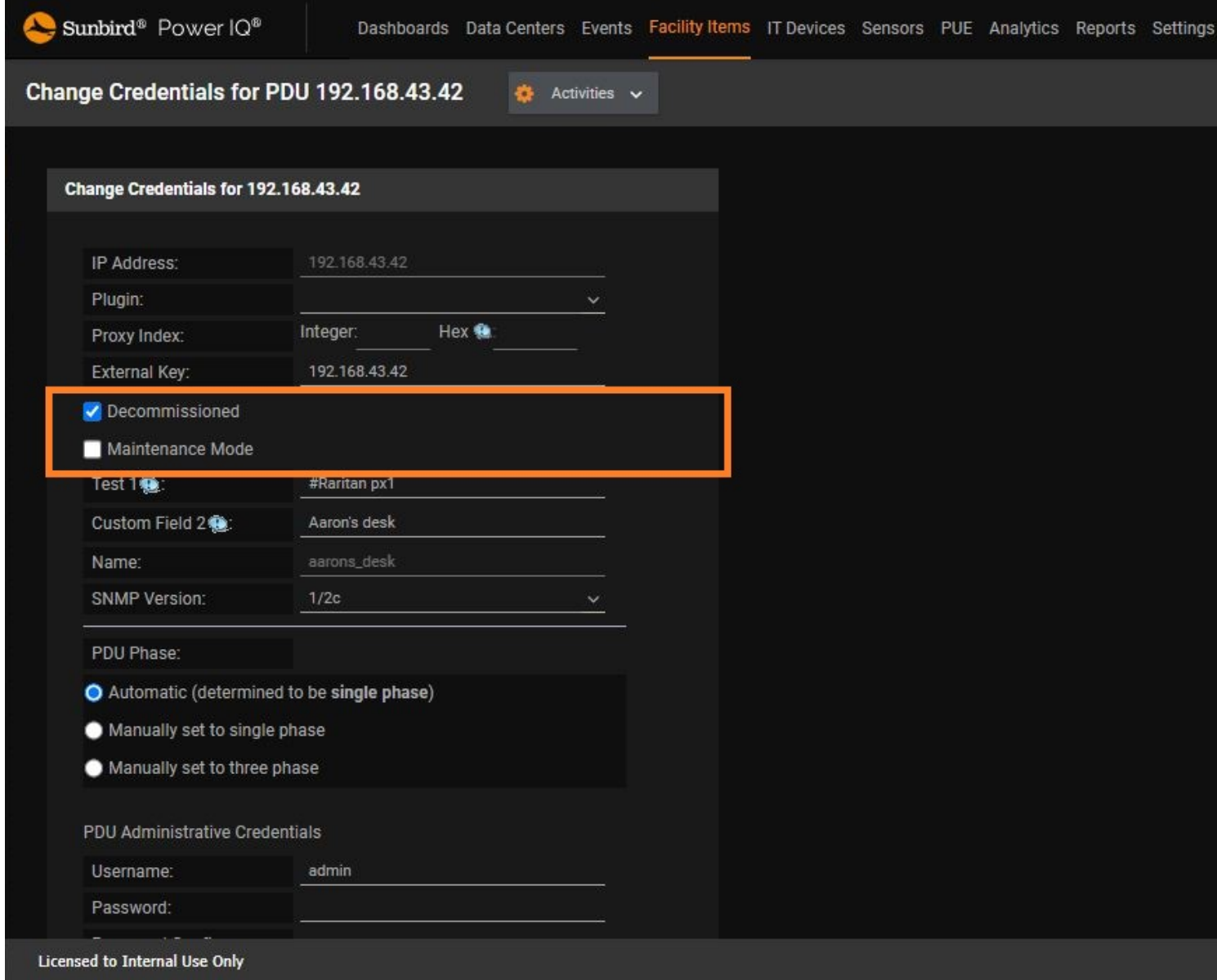
| Label                    | MAC Address       | Inlet Name            | Name                | Location        | Manufacturer | Model      | Firmware      | Health         | Current (A) | Active Power (W) | Apparent Power (VA) | Inlet Temp |
|--------------------------|-------------------|-----------------------|---------------------|-----------------|--------------|------------|---------------|----------------|-------------|------------------|---------------------|------------|
| -Rack = Aaron's Desk (1) |                   |                       |                     |                 |              |            |               |                |             |                  |                     |            |
| 192.168.43.42 (Dx)       |                   |                       | aarons_desk         | Mike's Desk     | Raritan      | DPXR8-15   | 1.5.7-11220   | DECOMMISSIONED |             |                  |                     |            |
| -Rack = Break Room (1)   |                   |                       |                     |                 |              |            |               |                |             |                  |                     |            |
| 192.168.43.99 (Dx)       |                   |                       | my_device           | Break Room      | Raritan      | DPXR8-20   | 1.5.20-11783  | DECOMMISSIONED |             |                  |                     |            |
| -Rack = Brian's Desk (1) |                   |                       |                     |                 |              |            |               |                |             |                  |                     |            |
| 192.168.43.124 (I)       |                   |                       | px-weave            | Raleigh Ste 100 | Raritan      | DPXR8-15   | 1.5.20-11713  | DECOMMISSIONED |             |                  |                     |            |
| -Rack = Jason's Desk (4) |                   |                       |                     |                 |              |            |               |                |             |                  |                     |            |
| 192.168.43.58 (Dx)       |                   |                       | jasons_desk         | Jason's Desk    | Raritan      | DPCR8-15   | 1.5.8-11272   | DECOMMISSIONED | 0.13        | 6                | 15                  |            |
| 192.168.43.102 (I)       | 00:0d:5d:d7:e6:57 |                       | 192.168.43.102-PROB | Jason's Desk    | Raritan      | EMX-880    | 2.1.0.5-36560 | DECOMMISSIONED |             |                  |                     |            |
| 192.168.43.127 (I)       | 00:0d:5d:0b:21:0e | How long will it take | 192.168.43.127      | Jason's Desk    | Raritan      | PX2-5146R  | 3.4.0.5-44367 | DECOMMISSIONED | 0           | 0                | 0                   |            |
| 192.168.43.101 (I)       |                   |                       | assetstrip          | Jason's Desk    | Raritan      | PX2-1190CR | 2.4.3.5-40298 | DECOMMISSIONED |             |                  |                     |            |
| -Rack = Keith's Desk (3) |                   |                       |                     |                 |              |            |               |                |             |                  |                     |            |
| 192.168.43.64 (Dx)       | 00:0d:5d:08:8f:36 |                       | automation_emx      | lab             | Raritan      | EMX2-888   | 2.5.3.5-41801 | DECOMMISSIONED |             |                  |                     |            |
| 192.168.43.63 (Dx)       | 00:0d:5d:0b:21:02 |                       | My PDU              |                 | Raritan      | PX2-5146R  | 3.4.0.5-44367 | DECOMMISSIONED | 0.3         | 18               | 33                  |            |
| 192.168.43.62 (Dx)       |                   |                       | px1                 | SystemTest pod  | Raritan      | DPXR8-15   | 1.5.13-11595  | DECOMMISSIONED | 0.14        | 7                | 17                  |            |
| -Rack = Owen's Desk (3)  |                   |                       |                     |                 |              |            |               |                |             |                  |                     |            |

To decommission a facility item from its smart page:

1. In the Facility Items tab, click a facility item link to open its smart page.
2. Choose Actions > Edit.
3. Optional. Modify the External Key field to make it different from the IP address. (This is required if you are using the dcTrack integration which does not support decommissioned facility items.)
4. Select the Decommissioned checkbox.
5. Click Save.








Sunbird® Power IQ®


Dashboards Data Centers Events **Facility Items** IT Devices Sensors PUE Analytics Reports Settings

Change Credentials for PDU 192.168.43.42  Activities ▾

**Change Credentials for 192.168.43.42**

IP Address: 192.168.43.42


Plugin: ▾


Proxy Index: Integer: \_\_\_\_\_ Hex  \_\_\_\_\_

External Key: 192.168.43.42

Decommissioned

Maintenance Mode

Test 1 : #Raritan px1

Custom Field 2 : Aaron's desk

Name: aarons\_desk

SNMP Version: 1/2c ▾

PDU Phase:

Automatic (determined to be **single phase**)

Manually set to single phase

Manually set to three phase

PDU Administrative Credentials

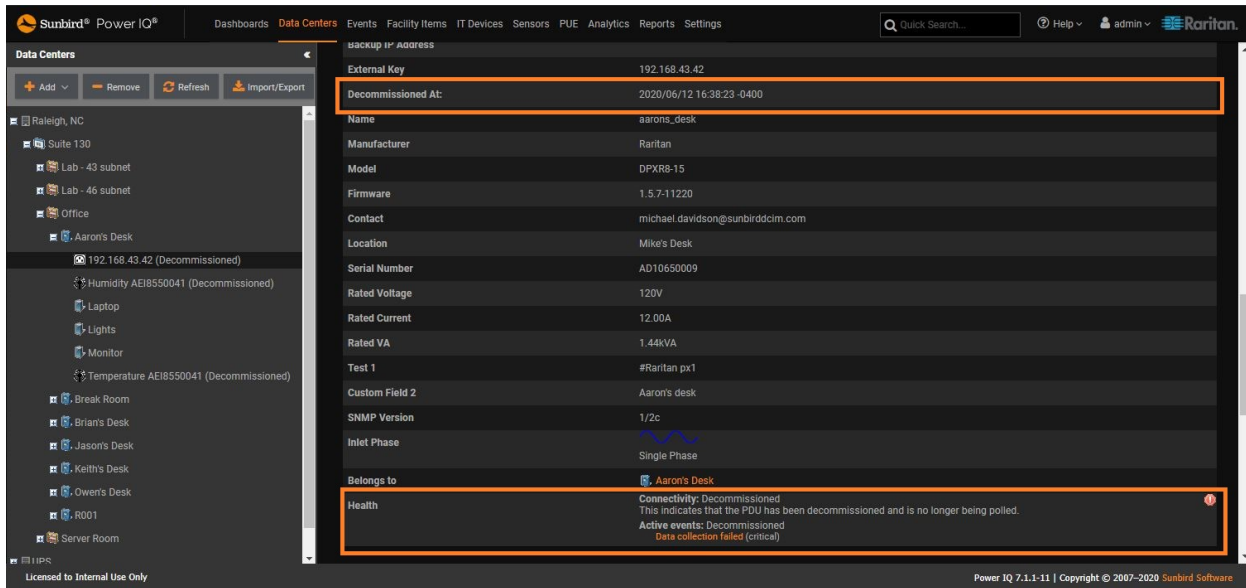
Username: admin

Password: \_\_\_\_\_

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The Details section of the facility item smart page will show the following:

- Decommissioned At field displaying a date and time stamp
- Health field Connectivity displaying a Decommissioned state
- Health field Active events displaying a Decommissioned state



The screenshot shows the Sunbird Power IQ interface. On the left, a sidebar lists various data center locations under 'Raleigh, NC', including 'Suite 130', 'Lab - 43 subnet', 'Lab - 46 subnet', 'Office', and 'Aaron's Desk'. The main panel displays details for a facility item with IP address 192.168.43.42, which is marked as 'Decommissioned'. The 'Decommissioned At' field is highlighted with an orange box and shows the date '2020/06/12 16:38:23 -0400'. The 'Health' section at the bottom is also highlighted with an orange box and contains the following information:

- Connectivity:** Decommissioned
- This indicates that the PDU has been decommissioned and is no longer being polled.
- Active events:** Decommissioned
- Data collection failed (critical)

Do all of the following when using a newly commissioned facility item to replace a decommissioned one:

- Assign the IP address used by the decommissioned facility item to the new facility item.
- Manually associate the new facility item with the original parent object of the decommissioned facility item, such as the rack.
- Manually associate outlets of the new facility item with all IT devices. Outlet associations of the new facility item can be different from the outlet associations of the decommissioned facility item, and it is NOT required to remove old outlet associations.
- Manually add mappings for IT devices connected to the new facility item in the EDM.



## Decommission an IT Device

1. In the IT Devices tab, click the IT device name link in the IT Devices tab to go to the IT device page in the Data Centers tab. The EDM expands to show the IT device.
2. Select the Decommissioned checkbox.
3. Click Save.

## Decommission a Sensor

There are two ways to decommission a sensor:

- Physically disconnect a sensor from the facility item.
- Decommission the facility item with which the sensor is associated.



## Identify a Decommissioned Facility Item

On the Facility Items list, you can sort items by Health state to display all items with the Decommissioned Health state.

To filter the Facility Items list by the Decommissioned Health state:

1. In the Facility Items list, click the Health column to display the Sort and Filter options.
2. Select Filters > Decommissioned.
3. The Facility Items list will display only those items with a Health state of Decommissioned.

| Health         | Current (A)         | Active Power (W) | Apparent Powe...   |
|----------------|---------------------|------------------|--|
| Decommissioned | Sort Ascending      |                  | 1410   |
| Decommissioned | Sort Descending     |                  | 988  |
| Decommissioned |                     | 359 / 2630       | 325 / 2384 / 2646  |
| Decommissioned | Columns             |                  | 87   |
| Decommissioned | Group By This Field |                  | 0  |
| Decommissioned | Show in Groups      |                  | 0  |
| Decommissioned | Filters             |                  |  |
|                |                     |                  | <input type="checkbox"/> Good<br><input type="checkbox"/> Warning<br><input type="checkbox"/> Critical<br><input type="checkbox"/> Maintenance<br><input checked="" type="checkbox"/> Decommissioned |

After decommissioning a PDU, it is marked as decommissioned everywhere throughout Power IQ. The following are a few illustrations.

In the Data Centers tab:

| Dashboards                          | Data Centers | Events | Facility Items |
|-------------------------------------|--------------|--------|----------------|
| <b>Data Centers</b> <<              |              |        |                |
| Add ▾ Remove Refresh Import/Export  |              |        |                |
| Raleigh, NC                         |              |        |                |
| 192.168.46.221 - 1 (Decommissioned) |              |        |                |
| Suite 130                           |              |        |                |
| UPS                                 |              |        |                |

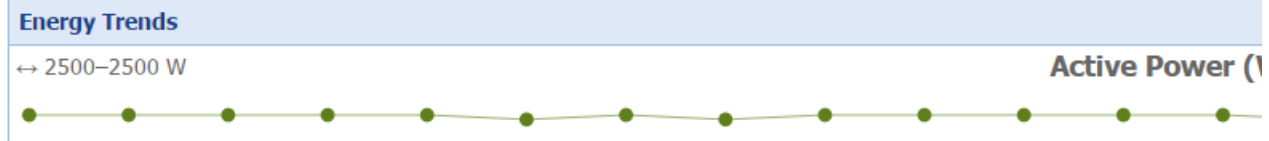
In the Facility Items tab:

| Facility Items List                                 |   |
|---|---|
| Add   Edit   Launch   Events   Rescan   Maintenance |   |
| <input type="checkbox"/> Name                       | Label   |
| <input type="checkbox"/> Owen-APC                   | <a href="#">192.168.42.219 (Decommissioned)</a> |
| <input type="checkbox"/> APC AP7723 RATS            | <a href="#">192.168.43.103 (Decommissioned)</a> |
| <input type="checkbox"/> PX2-Owen-Switching-...     | <a href="#">192.168.43.105 (Decommissioned)</a> |

Page 1 of 1 | 100



In the facility item smart view title:

**192.168.46.221 - 1 (Decommissioned) — Raleigh, NC**



The Details section of the facility item smart page will show the following:

- Decommissioned At field displaying a date and time stamp
- Health field Connectivity displaying a Decommissioned state
- Health field Active events displaying a Decommissioned state

| Details            |  |
|--------------------|--|
| Type               | Rack PDU   |
| IP Address         | 192.168.42.220   |
| Backup IP Address  |  |
| External Key       | 192.168.42.220   |
| Decommissioned At: | 2017/05/25 15:32:04 -0400  |
| Maintenance Mode:  | true   |
| Name               | RackPDU  |
| Manufacturer       | APC  |
| Model              | AP7998   |
| Firmware           | v3.7.4   |
| Contact            | Owen Clark   |
| Location           | Raleigh DC   |
| Serial Number      | ZA0746008415   |
| Test 1             | #APC   |
| Custom Field 2     |  |
| SNMP Version       | 1/2c   |
| Inlet Phase        |  Three Phase  |
| Belongs to         |  <a href="#">Rack B6</a>  |
| Health             | <b>Connectivity:</b> Decommissioned<br>This indicates that the PDU has been decommissioned and is no longer being polled.<br><b>Active events:</b> Decommissioned<br>No active events. |

## Identify a Decommissioned IT Device

Unlike decommissioned facility items, a decommissioned IT device is not marked as decommissioned. There are two ways to identify a decommissioned device.

In the Data Centers tab:

1. Select the IT device to open the IT device page.
2. Examine whether the Decommissioned checkbox has been selected. For details, see [Decommission a Device](#).
3. In the IT Devices tab:
  - Make the Decommissioned column visible in this tab.
  - To display the Decommissioned column, move the mouse pointer to any column header, and click the arrow which appears in the column header.

| IT Device List   |                                |                              |                        |
|--|--------------------------------|------------------------------|------------------------|
| <input type="button" value="Remove"/> <input type="button" value="Add to Device Group"/> |                                |                              |                        |
| <input type="checkbox"/>   | Name ▲                         | Rack                         | Device Groups ▼        |
| <input type="checkbox"/>   | <a href="#">43.62.outlet 6</a> | <a href="#">Keith's Desk</a> | <a href="#">J1, J2</a> |
| <input type="checkbox"/>   | <a href="#">43.62.outlet 7</a> | <a href="#">Keith's Desk</a> |                        |
| <input type="checkbox"/>   | <a href="#">43.62.outlet 8</a> | <a href="#">Keith's Desk</a> |                        |

4. Click the Columns, and select the Decommissioned checkbox. The Decommissioned column then displays.
5. Examine the value shown in the Decommissioned column.
  - true: Decommissioned.
  - false: Commissioned.

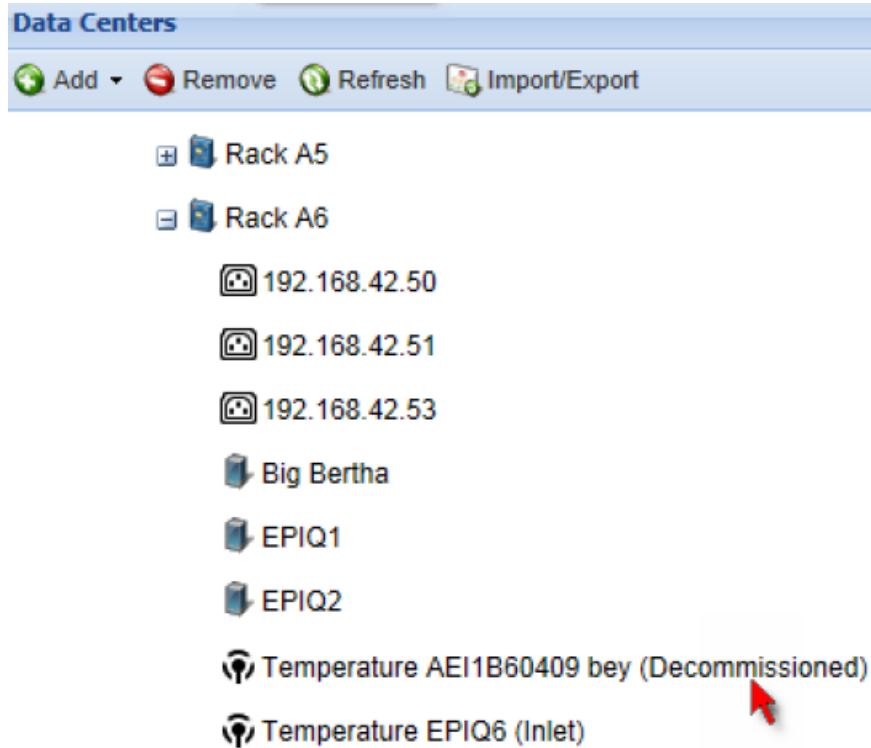
| IT Device List   |                                |                              |                        |          |             |  |                |
|--|--------------------------------|------------------------------|------------------------|----------|-------------|--|----------------|
| <input type="button" value="Remove"/> <input type="button" value="Add to Device Group"/> |                                |                              |                        |          |             | <input type="button" value="Power Control"/> |                |
| <input type="checkbox"/>   | Name ▲                         | Rack                         | Device Groups          | Customer | Device Type | Outlets Activated                            | Decommissioned |
| <input type="checkbox"/>   | <a href="#">43.62.outlet 6</a> | <a href="#">Keith's Desk</a> | <a href="#">J1, J2</a> |          |             | 100%   | true           |
| <input type="checkbox"/>   | <a href="#">43.62.outlet 7</a> | <a href="#">Keith's Desk</a> |                        |          |             | 100%   | false          |



## Identify a Decommissioned Sensor

A decommissioned sensor is marked as decommissioned in Power IQ, and it is no longer associated with its original PDU.

In the Data Centers tab:



The screenshot shows the 'Data Centers' tab in the Power IQ interface. At the top, there is a toolbar with buttons for 'Add', 'Remove', 'Refresh', and 'Import/Export'. Below the toolbar, there is a list of data centers and sensors. The list includes 'Rack A5', 'Rack A6', three IP addresses (192.168.42.50, 192.168.42.51, 192.168.42.53), 'Big Bertha', 'EPIQ1', 'EPIQ2', 'Temperature AEI1B60409 bey (Decommissioned)', and 'Temperature EPIQ6 (Inlet)'. A red mouse cursor is pointing to the 'Temperature AEI1B60409 bey (Decommissioned)' entry.

**Data Centers**

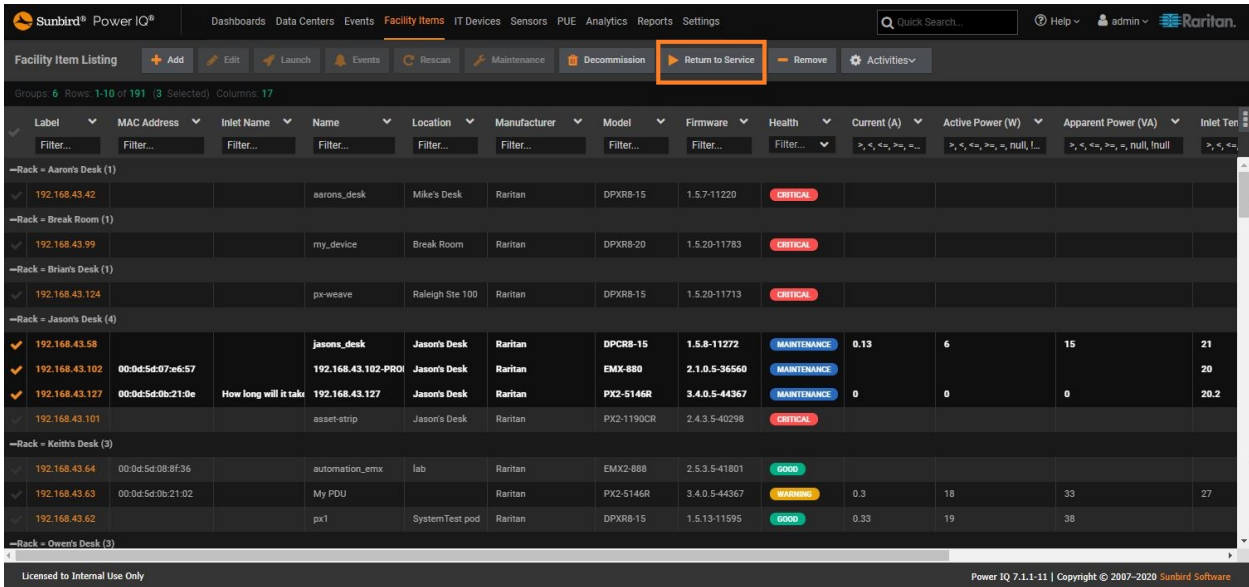
➕ Add   ➖ Remove   🔄 Refresh   📄 Import/Export

- ➕ 📁 Rack A5
- 📁 Rack A6
  - 🏠 192.168.42.50
  - 🏠 192.168.42.51
  - 🏠 192.168.42.53
  - 📁 Big Bertha
  - 📁 EPIQ1
  - 📁 EPIQ2
  - 🔊 Temperature AEI1B60409 bey (Decommissioned)
  - 🔊 Temperature EPIQ6 (Inlet)

# Return a Facility Item to Service

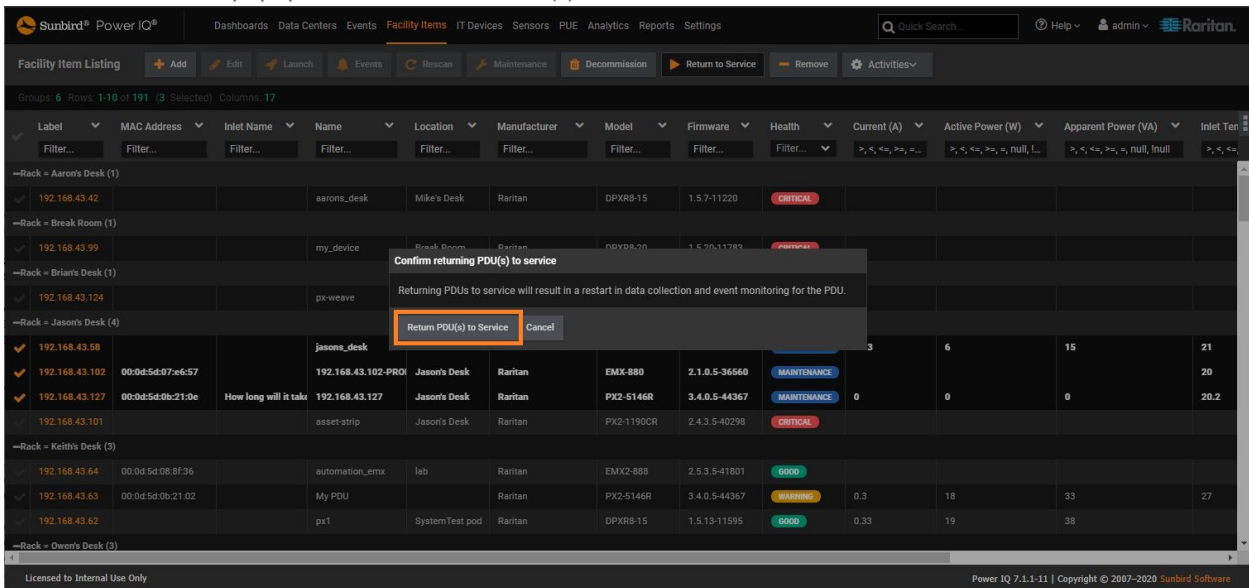
You can restore a Facility Item to service from being decommissioned or in maintenance from the Facility Items list.

1. In the Facility Items tab > Facility Items list, select the PDUs you would like to return to service. Click the Return to Service link.



The screenshot shows the Sunbird Power IQ interface. The top navigation bar includes 'Return to Service' which is highlighted with an orange box. Below the navigation bar is a table of Facility Items. The table has columns for Label, MAC Address, Inlet Name, Name, Location, Manufacturer, Model, Firmware, Health, Current (A), Active Power (W), Apparent Power (VA), and Inlet Ten. Several items are selected with checkmarks. The 'Return to Service' button is also visible in the table's action column for the selected items.

2. On the confirmation popup, click the Return PDU(s) to Service button.

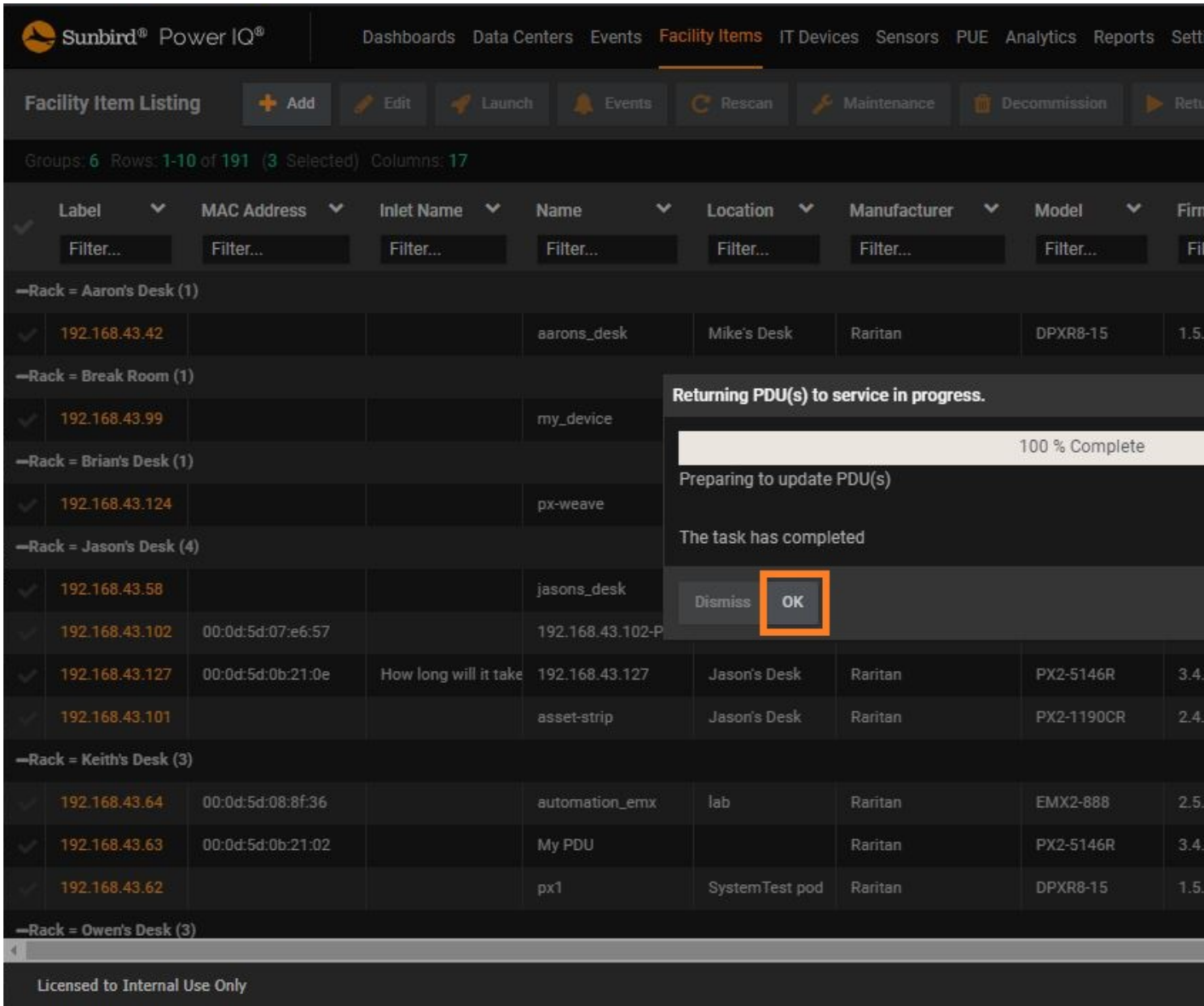


The screenshot shows the Sunbird Power IQ interface with a confirmation popup. The popup is titled 'Confirm returning PDU(s) to service' and contains the text 'Returning PDUs to service will result in a restart in data collection and event monitoring for the PDU.' Below the text are two buttons: 'Return PDU(s) to Service' (highlighted with an orange box) and 'Cancel'.

3. The selected items will be returned to service. Click the Dismiss button to dismiss the status popup.



4. When the task is completed, click the OK button.



The screenshot shows the Sunbird Power IQ interface with a 'Facility Item Listing' table. A modal dialog box is open over the table, titled 'Returning PDU(s) to service in progress.' The dialog shows a progress bar at 100% Complete and the text 'The task has completed'. There are 'Dismiss' and 'OK' buttons at the bottom of the dialog, with the 'OK' button highlighted by an orange box.

| Label                    | MAC Address       | Inlet Name            | Name             | Location       | Manufacturer | Model      | Firm |
|--------------------------|-------------------|-----------------------|------------------|----------------|--------------|------------|------|
| →Rack = Aaron's Desk (1) |                   |                       |                  |                |              |            |      |
| ✓ 192.168.43.42          |                   |                       | aarons_desk      | Mike's Desk    | Raritan      | DPXR8-15   | 1.5  |
| →Rack = Break Room (1)   |                   |                       |                  |                |              |            |      |
| ✓ 192.168.43.99          |                   |                       | my_device        |                |              |            |      |
| →Rack = Brian's Desk (1) |                   |                       |                  |                |              |            |      |
| ✓ 192.168.43.124         |                   |                       | px-weave         |                |              |            |      |
| →Rack = Jason's Desk (4) |                   |                       |                  |                |              |            |      |
| ✓ 192.168.43.58          |                   |                       | jasons_desk      |                |              |            |      |
| ✓ 192.168.43.102         | 00:0d:5d:07:e6:57 |                       | 192.168.43.102-P |                |              |            |      |
| ✓ 192.168.43.127         | 00:0d:5d:0b:21:0e | How long will it take | 192.168.43.127   | Jason's Desk   | Raritan      | PX2-5146R  | 3.4  |
| ✓ 192.168.43.101         |                   |                       | asset-strip      | Jason's Desk   | Raritan      | PX2-1190CR | 2.4  |
| →Rack = Keith's Desk (3) |                   |                       |                  |                |              |            |      |
| ✓ 192.168.43.64          | 00:0d:5d:08:8f:36 |                       | automation_emx   | lab            | Raritan      | EMX2-888   | 2.5  |
| ✓ 192.168.43.63          | 00:0d:5d:0b:21:02 |                       | My PDU           |                | Raritan      | PX2-5146R  | 3.4  |
| ✓ 192.168.43.62          |                   |                       | px1              | SystemTest pod | Raritan      | DPXR8-15   | 1.5  |
| →Rack = Owen's Desk (3)  |                   |                       |                  |                |              |            |      |

Returning PDU(s) to service in progress.

100 % Complete

Preparing to update PDU(s)

The task has completed

Dismiss OK

Licensed to Internal Use Only

# Chapter 24: Support and Licensing

## Support Connections

A support connection allows Sunbird Technical Support to access your Power IQ to diagnose a problem.

You should open a support connection only when Sunbird Technical Support requests one.



## Prerequisites for Support Connections

The Power IQ device must be able to use DNS to resolve `poweriq-access.sunbirdcim.com`. The DNS server must be able to do name resolution for external host names.

The Power IQ device must be able to make an outbound HTTPS request on port 443 to `poweriq-access.sunbirdcim.com`. You may have to require your firewall to allow this connection.

The Power IQ device must be able to make an outbound SSH request on port 22 to `poweriq-access.sunbirdcim.com`. You may have to require your firewall to allow this connection.



## Creating a Support Connection

Make sure your Power IQ device meets the prerequisites before creating a support connection. See [Prerequisites for Support Connections](#).

To create a support connection:

1. In the Settings tab, click Get Support in the Appliance Services section.
2. Click Start. A log appears.
3. Make sure the final line of the log includes this text: support connection initialization complete.
4. Contact Sunbird Technical Support with your Appliance ID number. The Appliance ID number is on the Settings tab, in the Appliance Information section.

### Example

e3b123f8-669e-4007-97bf-ca9d85c431f8. Sunbird Technical Support uses this number to identify your support connection.



## Stop a Support Connection

Once Sunbird Technical Support has finished using the support connection, you can stop it. Stopping the support connection will close the SSH connection from your Power IQ device to `poweriq-access.sunbirdcim.com`.

1. In the Settings tab, click Get Support in the Appliance Services section.
2. Click Stop.



## Save Support Logs

If you have trouble creating a support connection, the support logs may help Technical Support find the problem.

1. In the Settings tab, click Get Support in the Appliance Services section.
2. Choose Activities > Download All System Logs.
3. Click Save, then save the file using the dialog that appears.





## Enable or Disable the Root Accounts for Support

Power IQ has the "sunbird" user account in place for Sunbird use when supporting the product. You may be asked to access the console as the "config" user to enable this account during the support process. You cannot change the password for this account. When disabled, there is no external access to the system using this account.

New installations of Power IQ have this account disabled by default. Upgrading will not change the enable/disable status of this account.

---

*Note: Upgrading the system will reset the sunbird user account password to the default password.*

---



## Licensing

Power IQ requires a license. Licenses allow you to add a certain number of rack PDUs and facility items to Power IQ. You may need more than one license file to be allowed to add your full number of PDUs.



## View Licenses

The licenses that you have uploaded to Power IQ are available to view.

1. If you have not already done so, get a Power IQ license file by contacting Customer Support.
2. In the Web Client, click Admin > Appliance Settings. The Settings window opens.
3. Click Product Licensing in the Application Administration panel.
4. Click Add in the Licenses section.
5. Use the browse function to locate and add the license file. The Licenses list contains all license files that you have uploaded to Power IQ.

| Item     | Description   |
|----------|---|
| Feature  | The feature that is allowed by this license.  |
| Type     | Initial: A required license to activate Power IQ and set the initial PDU capacity allowed.<br>Incremental: A secondary license type that allows you to add to the initial license's PDU capacity. |
| Count    | The number of PDUs that you can add to Power IQ under this license.   |
| Licensee | Your company name.  |

To view licensing summary:

- Licensing Summary contains information about how many PDUs your combined licenses allow you to add to Power IQ.

| Item                   | Description   |
|------------------------|---|
| Customer Name          | Your company name.  |
| PDU License Capacity   | The total number of PDUs allowed by all your licenses.    |
| PDU Licenses Available | The number of PDUs remaining that you are allowed to add. |



## Adding a License File

If this is your first time logging in and you need to add a license file, see [Connecting to Power IQ](#). Once you add a license file and log in for the first time, you can follow the instructions in this topic to add or remove license files as needed.

1. If you have not already done so, get a Power IQ license file by contacting Customer Support.
2. In the Web Client, click Admin > Appliance Settings. The Settings window opens.
3. Click Product Licensing in the Application Administration panel.
4. Click Add in the Licenses section.
5. Use the browse function to locate and add the license file.

Licenses are .LIC files. Repeat this step to add incremental licenses if needed.

---

*Note: You will receive an email with your license from Sunbird..*

---

6. If you see error messages AND you're unable to use Power IQ or to add the total licensed number of PDUs, contact Sunbird Support. There may be a problem with your license file.



## License Count Rules for Rack PDUs and Facility Items

Your license count defines how many rack PDUs you can add to Power IQ under your purchased license.

Different types of facility items count against your license count at higher rates.

| Facility Item    | License Count |
|------------------|---------------|
| CRAC             | 5             |
| Floor PDU        | 5             |
| Floor UPS        | 5             |
| Power Panel      | 5             |
| Standalone Meter | 1             |



# Appendix A: ODBC Access

Power IQ's ODBC interface allows ODBC compliant applications access to the power data of managed devices. For example, an ODBC compliant reporting application like Crystal Reports can access Power IQ data to create customized reports.

The Power IQ ODBC server listens on TCP Port 5432

Roll-up tables summarize data over one hour, twenty four hours, and one month. Upon summarization, detailed readings are purged. For example, when you create a daily roll-up, the hourly poll data is purged from the database. You can configure the data retention settings. See [Configuring Data Rollup Retention](#).

Power IQ ODBC Interface is backed by an PostgreSQL database.



## Configuring ODBC Access to Power IQ

1. Specify the IP addresses that you authorize to make connections to the database.
2. Click Settings.
3. Click ODBC Access in the Data Management section. The ODBC Access page opens.
4. Click Add, then double-click the 0.0.0.0/0 addresses to enter edit mode and type the ODBC network address with the mask in CIDR format.
5. CIDR format example: 192.168.43.0/24 instead of 192.168.43.0 and 255.255.255.0.
6. Use the network mask value to specify a single address or a range of addresses.
7. Use the default value 0.0.0.0/0 to allow access from all IP addresses.
8. Repeat to add new addresses as needed. Select an address and click Remove to remove authorization from the address.
9. Click Save when all authorized addresses have been added. The Power IQ database restarts.
10. After the restart, ODBC compliant applications are allowed to access the database from the authorized IP addresses.



## Configuring ODBC User Credentials

Factory default user credentials for ODBC access in Power IQ are:

- Username: *odbcuser*
- Password: *sunbird*

The ODBC user credentials can be customized as needed. After ODBC user credentials are modified, you must also change the user credentials entered in the ODBC Client and driver.

1. Click Settings.
2. Click ODBC Access in the Data Management section. The ODBC Access page opens.
3. In the Configure ODBC Security section, type the user name and password intended for ODBC authentication.

---

*Note: For restrictions that apply to the ODBC user credentials, see [Restrictions of ODBC User Credentials](#).*

---

4. Click Save.





## Restrictions of ODBC User Credentials

The ODBC username is NOT subject to the restrictions applied to a Power IQ user name.

Certain restrictions apply to the ODBC user name and password.

ODBC username:

- Support 1 to 63 characters long
- Consist of alphanumeric characters and/or underscores only, including 0 to 9, a to z, and \_
- No number used for the first character
- No uppercase characters
- No support for multi-byte characters

Do not use names such as public, postgres, raritan, sunbird, odbc and floormaps

ODBC password:

- The password must follow the requirements selected in Settings > Password Requirements. See [Configuring Password Requirements](#).



## ODBC Client Configuration

ODBC Client must install and configure a suitable PostgreSQL driver. PostgreSQL drivers are available at <http://www.postgresql.org/ftp/odbc/versions/msi/>.

ODBC Client must configure Power IQ as a ODBC Data Source with the following credentials:

|                             |  |
|-----------------------------|--|
| <b>Database Name</b>        | <a href="#">raritan</a>                                  |
| <b>User ID and Password</b> | Same as the ODBC user credentials specified in Power IQ* |
| <b>Port Number</b>          | 5432   |
| <b>Server</b>               | Power IQ IP Address                                      |

---

\* For information on ODBC user credentials, see [Configuring ODBC User Credentials](#).

---



## Timezone Configuration for ODBC Data

ODBC tables use the Power IQ system time setting, which is EST/EDT. This setting is converted to your selected timezone when you are using the Power IQ web interface, but this conversion is not applied to ODBC connections.

The time data available via the ODBC connection can be changed on a per session basis. By using a specific SQL statement to adjust the client session, you can run reports and view information in the desired timezone.

This link contains documentation on setting the timezone for the database using an SQL statement: <http://www.postgresql.org/docs/9.2/static/sql-set.html>

Use the "SET SESSION ...." syntax, because Power IQ ODBC users do not have super user privileges.



## Advanced Reporting with Database and Reporting Programs

Create advanced reports and charts with reporting programs such as SQL report writer, Crystal Reports<sup>®</sup>, and Microsoft Access<sup>®</sup>. Follow these instructions to use Microsoft Access.

ODBC Access must be enabled. For more information, see *Appendix A: ODBC Access* on page 814.

You must install a PostgreSQL driver first. See *Install and Configure a PostgreSQL Driver* on the next page.



## Install and Configure a PostgreSQL Driver

You must install and configure a PostgreSQL driver before you can use Microsoft® Access® to create table reports of your Power IQ™ data.

To install and configure a PostgreSQL driver:

1. Configure Power IQ to allow ODBC access from your client IP address. See [Configuring ODBC Access to Power IQ](#).
2. Go to <http://www.postgresql.org/ftp/odbc/versions/msi/> and download the latest driver .ZIP file. Run the .MSI file contained in the .ZIP to install the driver on your client.
3. Go to Control Panel > Administrative Tools > Data Sources (ODBC).
4. Click Add then select the driver, PostgreSQL Unicode, and click Finish.
5. In the dialog that appears, enter the Power IQ database information:
  - Database: raritan
  - Server: Power IQ IP address
  - Description: Enter a name for this data source
  - SSL Mode: disable
  - Port: 5432
  - User Name and Password: Same as the ODBC user credentials specified in Power IQ\*

---

\* For information on ODBC user credentials, see [Configuring ODBC User Credentials](#).

---

6. Click Test. If the test is successful, click Save.
7. Click OK.



## Link Database Tables in Microsoft® Access®

Use Microsoft Access to create links between the Power IQ database tables you want to query. See [Correlated Fields in ODBC Tables](#) for details on which Power IQ tables can be linked.

These instructions refer to Access 2003. Other versions may vary.

---

*Note: You only have to link database tables once in Microsoft Access, and the links are retained. You do not have to repeat this task each time you want to create queries or run reports.*

---

1. Choose File > New then select Blank Database.
2. Name the file and click Create.
3. In the dialog that appears, Tables is selected by default in the Object list. Click New.
4. Select Link Table and click OK.
5. In the dialog that appears, select ODBC Databases in the "Files of type" list.
6. In the dialog that appears, click the Machine Data Source tab, select the ODBC driver you installed, and click OK.
7. A list of all ODBC tables appears. Select the table you want to link and click OK.
8. Select the unique record identifier for the table and click OK. The unique record identifier is typically the first item in the list. See the table details in this guide to check. See [Power IQ ODBC Schema](#).

The linked table appears in the list. Repeat these steps to add other tables you want to query.

9. Identify the relationships between the linked tables.
10. Choose Tools > Relationships.
11. Select all the tables in the list and click Add. The tables appear with lists of their fields. Resize the tables to view the field names.
12. Link the fields that relate by dragging and dropping a field from one table to the field it relates to in another table. See the Microsoft Access help on "Define relationships between tables" for details.

---

*Note: Fields that have relationships are marked as "foreign key relationships" in the ODBC schema. See [Power IQ ODBC Schema](#) view the lists of fields. See [Correlated Fields in ODBC Tables](#) for details and an example.*

---



## Correlated Fields in ODBC Tables

To find how tables in Power IQ relate to each other, look for the foreign key reference fields in each table. The tables are listed in this help. See [Power IQ ODBC Schema](#).

### Example

The relationship between the PDUOutlets table and the PDUs table:

The PDUOutlets table has a relationship to the PDUs table, via the PDUID field in the PDUOutlets table.

**PDUID**

**Integer**

**Foreign key reference to PDUs table**

See [PDUOutlets](#) and [PDUs](#).

Both tables contain a field called PDUID. Link these fields in Microsoft® Access® to enable these tables to be queried together. See [Link Database Tables in Microsoft Access®](#).



## Power IQ ODBC Schema

Power IQ makes a number of its data views available through the ODBC interface.

### PDUOutlets

The PDUOutlets view shows the outlets associated with a PDU.

| Field           | Type        | Notes                               |
|-----------------|-------------|-------------------------------------|
| PDUOutletsID    | Integer     | Unique outlet number                |
| PDUID           | Integer     | Foreign key reference to PDUs table |
| OutletID        | Integer     | PDU outlet number                   |
| OutletName      | VarChar(64) | Outlet name                         |
| OutletState     | VarChar(64) | Outlet state                        |
| ITDeviceID      | Integer     | Associated IT Device ID foreign key |
| PDUOutletNumber | Integer     | PDU outlet number                   |
| OutletRatedAmps | Integer     | The rated amps of the outlet        |

### PDUCircuitPoles

| Field              | Type        | Notes                                      |
|--------------------|-------------|--|
| PDUCircuitPoleID   | Integer     | Unique circuit pole ID                     |
| PDUCircuitID       | Integer     | Foreign key reference to PDUCircuits table |
| PDUPanelID         | Integer     | Foreign key reference to PDUPanels table   |
| PDUID              | Integer     | Foreign key reference to PDUs table        |
| CircuitPoleOrdinal | Integer     | The circuit pole's number                  |
| Phase              | VarChar(64) | The circuit pole's phase                   |





## PDUCircuits

| Field          | Type         | Notes  |
|----------------|--------------|--|
| PDUCircuitID   | Integer      | Unique circuit ID                            |
| PDUID          | Integer      | Foreign key reference to PDUs table          |
| PDUPanelID     | Integer      | Foreign key reference to the PDUPanels table |
| CircuitOrdinal | Integer      | Circuit number on the PDU                    |
| CircuitName    | VarChar (64) | Name of the circuit                          |
| RatedAmps      | Integer      | Rated amps of the circuit                    |

## PDUCircuitBreakers

The PDUCircuitBreakers view shows the circuit breakers associated with a PDU.

| Field                   | Type        | Notes   |
|-------------------------|-------------|---|
| PDUCircuitBreakersID    | Integer     | Unique CB Number                              |
| PDUID                   | Integer     | Foreign key reference to PDUs table           |
| CircuitBreakerOrdinal   | Integer     | Circuit breaker number on the PDU             |
| CircuitBreakerState     | Integer     | 0 (closed) 1 (open) 3 (unknown)               |
| CircuitBreakerLabel     | VarChar(64) | Label assigned to a CB                        |
| CircuitBreakerRating    | Integer     | The rated amps of the circuit breaker in amps |
| CircuitBreakerRatedAmps | Integer     | The rated amps of the circuit breaker in amps |

## PDULines

| Field       | Type    | Notes                                    |
|-------------|---------|--|
| PDULinesID  | Integer | Primary key for the table.               |
| PDUInletsID | Integer | Foreign key reference to PDUInlets table |
| PDUID       | Integer | Foreign key reference to PDUs table      |
| LineNumber  | Integer | The inlet line number on the PDU         |

## PDUInlets

| Field          | Type    | Notes                                |
|----------------|---------|--------------------------------------|
| PDUInletsID    | Integer | Primary key for the PDUInlets table. |
| PDUID          | Integer | Foreign key reference to PDUs table  |
| InletNumber    | Integer | The number of the inlet on the PDU.  |
| InletRatedAmps | Integer | The rated amps on the inlet.         |
| PDUPanelID     | Integer | Foreign key reference to PDUPanels   |
| Source         | Boolean | Whether main inlet                   |

## PDUPanels

| Field        | Type    | Notes                                |
|--------------|---------|--------------------------------------|
| PDUPanelID   | Integer | Unique ID for each panel             |
| PDUID        | Integer | Foreign key reference to PDUs table  |
| PanelOrdinal | Integer | The panel's number on the floor PDU. |

| Field     | Type          | Notes   |
|-----------|---------------|---|
| PanelName | VarChar (255) | The panel's name, only for floor PDU panels, not standalone power panels. |

## PDUReadings

Note: This table will be deprecated soon. It is recommended to stop using it, and use the new [PDUInletReadings](#) table. See [PDUInletReadings](#) (on page 1).

The PDUReadings view shows the raw power data collected from PDUs. A data record is added for each PDU polled. This data is summarized hourly in a PDUReadingsRollup view, and the readings in this view are purged.

| Field            | Type                    | Notes   |
|------------------|-------------------------|---|
| PDUReadingsID    | Integer                 | Unique ID for each reading  |
| PDUID            | Integer                 | Foreign key reference to PDU  |
| Time             | Timestamp with Timezone | Local timestamp   |
| ActivePower      | Real                    | Active power drawn by PDU   |
| ApparentPower    | Real                    | Apparent power drawn by PDU   |
| WattHour         | Real                    | Cumulative watt-hours consumed by the PDU, if available for the PDU |
| MaxActivePower   | Real                    | Maximum active power drawn by PDU                                   |
| MinActivePower   | Real                    | Minimum active power drawn by PDU                                   |
| MaxApparentPower | Real                    | Maximum apparent power drawn by PDU                                 |
| MinApparentPower | Real                    | Minimum apparent power drawn by PDU                                 |

## PDUInletReadings

A PDU can have multiple inlets. To get a total reading for the PDU, you must to request the values for all inlets on a PDU.



| Field              | Type                     | Notes  |
|--------------------|--------------------------|--|
| PDUInletReadingsID | bigint                   | Unique ID for each reading   |
| PDUID              | Integer                  | Foreign key reference to PDUs table  |
| InletID            | Integer                  | Foreign key reference to PDUInlets table   |
| InletNumber        | Integer                  | Inlet number on the PDU  |
| Time               | timestamp with time zone | Local timestamp  |
| Voltage            | Real                     | Voltage at the inlet   |
| MinVoltage         | Real                     | Minimum voltage reading over the sample period. Applies to devices with data buffering enabled.              |
| MaxVoltage         | Real                     | Maximum voltage reading over the sample period. Applies to devices with data buffering enabled.              |
| Current            | Real                     | Current (Amps) drawn by the inlet  |
| MinCurrent         | Real                     | Minimum current (Amps) reading over the sample period. Applies to devices with data buffering enabled.       |
| MaxCurrent         | Real                     | Maximum current (Amps) reading over the sample period (applies to devices with data buffering enabled).      |
| PowerFactor        | Real                     | Power factor of the inlet  |
| MinPowerFactor     | Real                     | Minimum power factor reading over the sample period. Applies to devices with data buffering enabled)         |
| MaxPowerFactor     | Real                     | Maximum power factor reading over the sample period. Applies to devices with data buffering enabled.         |
| ActivePower        | Real                     | Active power (Watts) drawn by the inlet  |
| MinActivePower     | Real                     | Minimum active power (Watts) reading over the sample period. Applies to devices with data buffering enabled. |
| MaxActivePower     | Real                     | Maximum active power (Watts) reading over the sample period. Applies to devices with data buffering enabled. |



| Field              | Type | Notes  |
|--------------------|------|--|
| ApparentPower      | Real | Apparent power (VA) drawn by the inlet   |
| MinApparentPower   | Real | Minimum apparent power (VA) reading over the sample period (applies to devices with data buffering enabled)          |
| MaxApparentPower   | Real | Maximum apparent power (VA) reading over the sample period. Applies to devices with data buffering enabled.          |
| VoltAmpHours       | Real | Cumulative volt-amp-hours consumed by the inlet, if available for the PDU  |
| WattHours          | Real | Cumulative watt-hours consumed by the inlet, if available for the PDU  |
| ResidualCurrent    | Real | The Residual Current (Amps) value as measured at the inlet.  |
| MinResidualCurrent | Real | The Minimum Residual Current (Amps) reading over the sample period. Applies to devices with data buffering enabled.  |
| MaxResidualCurrent | Real | The Maximum Residual Current (Amps) reading over the sample period (applies to devices with data buffering enabled). |

## PDUInletReadingHourlyRollups

| Field                    | Type      | Notes  |
|--------------------------|-----------|--|
| PDUInletReadingsRollupID | Bigint    | Primary key for the table                      |
| PDUID                    | Integer   | Foreign key reference to PDUs table            |
| InletID                  | Integer   | Foreign key reference to PDUInlets table       |
| InletNumber              | Integer   | The number of the inlet on the PDU.            |
| Time                     | Timestamp | Local timestamp                                |
| Voltage                  | Real      | Average voltage reading during rollup interval |

| Field                 | Type | Notes   |
|-----------------------|------|---|
| MinVoltage            | Real | Minimum voltage reading during rollup interval  |
| MaxVoltage            | Real | Maximum voltage reading during rollup interval  |
| Current               | Real | Average current reading (Amps) during rollup interval                                 |
| MinCurrent            | Real | Minimum current reading (Amps) during rollup interval                                 |
| MaxCurrent            | Real | Maximum current reading (Amps) during rollup interval                                 |
| PowerFactor           | Real | Average Power factor reading during rollup interval                                   |
| MinPowerFactor        | Real | Minimum power factor reading during rollup interval                                   |
| MaxPowerFactor        | Real | Maximum power factor reading during rollup interval                                   |
| ActivePower           | Real | Average active power (Watts) reading during rollup interval                           |
| MinActivePower        | Real | Minimum active power (Watts) reading during rollup interval                           |
| MaxActivePower        | Real | Maximum active power (Watts) reading during rollup interval                           |
| ApparentPower         | Real | Average apparent power (VA) reading during rollup interval                            |
| MinApparentPower      | Real | Minimum apparent power (VA) reading during rollup interval                            |
| MaxApparentPower      | Real | Maximum apparent power (VA) reading during rollup interval                            |
| MaxUnutilizedCapacity | Real | Maximum unutilized capacity (rated amps minus current) reading during rollup interval |
| MinUnutilizedCapacity | Real | Minimum unutilized capacity (rated amps minus current) reading during rollup interval |
| UnutilizedCapacity    | Real | Average unutilized capacity (rated amps minus current) reading during rollup interval |
| VoltAmpHours          | Real | Maximum of the cumulative volt-amp-hour meter readings over the rollup interval       |
| WattHours             | Real | Maximum of the cumulative watt-hour meter readings over the rollup interval           |

| Field              | Type | Notes  |
|--------------------|------|--|
| ResidualCurrent    | Real | Average Residual Current reading (Amps) during rollup interval |
| MinResidualCurrent | Real | Minimum Residual Current reading (Amps) during rollup interval |
| MaxResidualCurrent | Real | Maximum Residual Current reading (Amps) during rollup interval |

## PDUInletReadingDailyRollups

| Field                    | Type      | Notes   |
|--------------------------|-----------|---|
| PDUInletReadingsRollupID | Bigint    | Primary key for the table                             |
| PDUID                    | Integer   | Foreign key reference to PDUs table                   |
| InletID                  | Integer   | Foreign key reference to PDUInlets table              |
| InletNumber              | Integer   | The number of the inlet on the PDU.                   |
| Time                     | Timestamp | Local timestamp                                       |
| Voltage                  | Real      | Average voltage reading during rollup interval        |
| MinVoltage               | Real      | Minimum voltage reading during rollup interval        |
| MaxVoltage               | Real      | Maximum voltage reading during rollup interval        |
| Current                  | Real      | Average current reading (Amps) during rollup interval |
| MinCurrent               | Real      | Minimum current reading (Amps) during rollup interval |
| MaxCurrent               | Real      | Maximum current reading (Amps) during rollup interval |
| PowerFactor              | Real      | Average Power factor reading during rollup interval   |
| MinPowerFactor           | Real      | Minimum power factor reading during rollup interval   |
| MaxPowerFactor           | Real      | Maximum power factor reading during rollup interval   |

| Field              | Type | Notes   |
|--------------------|------|---|
| ActivePower        | Real | Average active power (Watts) reading during rollup interval                     |
| MinActivePower     | Real | Minimum active power (Watts) reading during rollup interval                     |
| MaxActivePower     | Real | Maximum active power (Watts) reading during rollup interval                     |
| ApparentPower      | Real | Average apparent power (VA) reading during rollup interval                      |
| MinApparentPower   | Real | Minimum apparent power (VA) reading during rollup interval                      |
| MaxApparentPower   | Real | Maximum apparent power (VA) reading during rollup interval                      |
| VoltAmpHours       | Real | Maximum of the cumulative volt-amp-hour meter readings over the rollup interval |
| WattHours          | Real | Maximum of the cumulative watt-hour meter readings over the rollup interval     |
| ResidualCurrent    | Real | Average Residual Current reading (Amps) during rollup interval                  |
| MinResidualCurrent | Real | Minimum Residual Current reading (Amps) during rollup interval                  |
| MaxResidualCurrent | Real | Maximum Residual Current reading (Amps) during rollup interval                  |

## PDUInletReadingMonthlyRollups

| Field                    | Type      | Notes  |
|--------------------------|-----------|--|
| PDUInletReadingsRollupID | Bigint    | Unique ID for each reading   |
| PDUID                    | Integer   | Foreign key reference to PDUs table  |
| InletID                  | Integer   | Foreign key reference to PDUInlets table   |
| InletNumber              | Integer   | Inlet number on the PDU  |
| Time                     | Timestamp | Local timestamp for the first day of the month over which the rollup was calculated. |





| Field              | Type | Notes   |
|--------------------|------|---|
| Voltage            | Real | Average voltage reading during rollup interval                            |
| MinVoltage         | Real | Minimum voltage reading during rollup interval                            |
| MaxVoltage         | Real | Maximum voltage reading during rollup interval                            |
| Current            | Real | Average current reading (Amps) during rollup interval                     |
| MinCurrent         | Real | Minimum current reading (Amps) during rollup interval                     |
| MaxCurrent         | Real | Maximum current reading (Amps) during rollup interval                     |
| PowerFactor        | Real | Average Power factor reading during rollup interval                       |
| MinPowerFactor     | Real | Minimum power factor reading during rollup interval                       |
| MaxPowerFactor     | Real | Maximum power factor reading during rollup interval                       |
| ActivePower        | Real | Active power drawn by the inlet in Watts                                  |
| MinActivePower     | Real | Minimum active power (Watts) reading during rollup interval               |
| MaxActivePower     | Real | Maximum active power (Watts) reading during rollup interval               |
| ApparentPower      | Real | Apparent power (VA) drawn by the inlet                                    |
| MinApparentPower   | Real | Minimum apparent power (VA) reading during rollup interval                |
| MaxApparentPower   | Real | Maximum apparent power (VA) reading during rollup interval                |
| VoltAmpHours       | Real | Cumulative volt-amp-hours consumed by the inlet, if available for the PDU |
| WattHours          | Real | Cumulative watt-hours consumed by the inlet, if available for the PDU     |
| ResidualCurrent    | Real | Average Residual Current reading (Amps) during rollup interval            |
| MinResidualCurrent | Real | Minimum Residual Current reading (Amps) during rollup interval            |
| MaxResidualCurrent | Real | Maximum Residual Current reading (Amps) during rollup interval            |

## PDUOutletReadings

The PDUOutletReadings view shows the raw power data collected from PDU outlets. A data record is added for each outlet polled. This data is summarized hourly in a PDUOutletReadingsRollup view, and the outlet records in this view are purged.

| Field               | Type                    | Notes  |
|---------------------|-------------------------|--|
| PDUOutletReadingsID | Integer                 | Unique ID for each reading   |
| PDUID               | Integer                 | Foreign key reference to PDUs table                                    |
| OutletID            | Integer                 | Foreign key reference to PDUOutlets table                              |
| OutletNumber        | Integer                 | PDU outlet number  |
| Time                | Timestamp with Timezone | Local timestamp  |
| CurrentAmps         | Real                    | Amps drawn by the outlet   |
| ActivePower         | Real                    | Active power drawn by the outlet                                       |
| ApparentPower       | Real                    | Apparent power drawn by the outlet                                     |
| WattHour            | Real                    | Cumulative watt-hours consumed by the outlet, if available for the PDU |
| MaxCurrentAmps      | Real                    | Maximum amps drawn by the outlet                                       |
| MinCurrentAmps      | Real                    | Minimum amps drawn by the outlet                                       |
| MaxActivePower      | Real                    | Maximum active power drawn by the outlet                               |
| MinActivePower      | Real                    | Minimum active power drawn by the outlet                               |
| MaxApparentPower    | Real                    | Maximum apparent power drawn by the outlet                             |
| MinApparentPower    | Real                    | Minimum apparent power drawn by the outlet                             |
| Voltage             | Real                    | Voltage drawn by the outlet  |

| Field          | Type | Notes  |
|----------------|------|--|
| MinVoltage     | Real | Minimum voltage reading  |
| MaxVoltage     | Real | Maximum voltage reading  |
| PowerFactor    | Real | Power factor of the outlet   |
| MinPowerFactor | Real | Minimum power factor   |
| MaxPowerFactor | Real | Maximum power factor   |
| VoltAmpHours   | Real | Cumulative volt-amp-hours consumed by the outlet, if available for the PDU |

## PDULineReadings

The PDULineReadings view shows the power data collected from PDU current-carrying lines. A data record is added for each line polled. Single-phase PDUs have 1 line. Three-phase PDUs have 3 lines. This data is summarized hourly in a PDULineReadingsRollup view, and the line readings in this view are purged.

| Field              | Type                    | Notes                                 |
|--------------------|-------------------------|---------------------------------------|
| PDULineReadingsID  | Integer                 | Unique ID for each reading            |
| PDUID              | Integer                 | Foreign Key Reference To PDUs table   |
| InletNumber        | Integer                 | Inlet number on the PDU               |
| LineNumber         | Integer                 | Line number on this PDU               |
| Time               | Timestamp with Timezone | Local timestamp                       |
| CurrentAmps        | Real                    | Amps drawn on this line               |
| UnutilizedCapacity | Real                    | Available amps remaining on this line |
| MaxCurrentAmps     | Real                    | Maximum amps drawn on this line       |
| MinCurrentAmps     | Real                    | Minimum amps drawn on this line       |

| Field      | Type | Notes   |
|------------|------|---|
| Voltage    | Real | Voltage for the line  |
| MinVoltage | Real | Minimum voltage reading over the sample period. Applies to devices with data buffering enabled. |
| MaxVoltage | Real | Maximum voltage reading over the sample period. Applies to devices with data buffering enabled. |

## PDUCircuitReadings

| Field                 | Type                     | Notes                                    |
|-----------------------|--------------------------|--|
| PDUCircuitReadingsID  | Big Integer              | Unique circuit number                    |
| PDUID                 | Integer                  | Foreign key reference to PDUs table      |
| PDUCircuitID          | Integer                  | Circuit number on the PDU                |
| Time                  | timestamp with time zone | Local timestamp                          |
| Voltage               | Real                     | Voltage drawn by the circuit             |
| MinVoltage            | Real                     | Minimum voltage reading                  |
| MaxVoltage            | Real                     | Maximum voltage reading                  |
| Current               | Real                     | Amps drawn by the circuit                |
| MinCurrent            | Real                     | Minimum amps drawn by the circuit        |
| MaxCurrent            | Real                     | Maximum amps drawn by the circuit        |
| UnutilizedCapacity    | Real                     | Available amps remaining on this circuit |
| MinUnutilizedCapacity | Real                     | Minimum amps remaining on this circuit   |
| MaxUnutilizedCapacity | Real                     | Maximum amps remaining on this circuit   |
| PowerFactor           | Real                     | Power factor of the circuit              |

| Field            | Type | Notes   |
|------------------|------|---|
| MinPowerFactor   | Real | Minimum power factor                              |
| MaxPowerFactor   | Real | Maximum power factor                              |
| ActivePower      | Real | Active power drawn by the circuit                 |
| MinActivePower   | Real | Minimum active power drawn by the circuit         |
| MaxActivePower   | Real | Maximum active power drawn by the circuit         |
| ApparentPower    | Real | Apparent power drawn by the circuit               |
| MinApparentPower | Real | Minimum apparent power drawn by the circuit       |
| MaxApparentPower | Real | Maximum apparent power drawn by the circuit       |
| VoltAmpHour      | Real | Cumulative volt-amp-hours consumed by the circuit |
| WattHour         | Real | Cumulative watt-hours consumed by the circuit     |

## PDUCircuitPoleReadings

| Field                    | Type                     | Notes                               |
|--------------------------|--------------------------|-------------------------------------|
| PDUCircuitPoleReadingsID | Big Integer              | Unique circuit pole number          |
| PDUCircuitPoleID         | Integer                  | Circuit pole number on the PDU      |
| PDUID                    | Integer                  | Foreign key reference to PDUs table |
| Time                     | timestamp with time zone | Local timestamp                     |
| Voltage                  | Real                     | Voltage drawn by the circuit pole   |
| MinVoltage               | Real                     | Minimum voltage reading             |
| MaxVoltage               | Real                     | Maximum voltage reading             |
| Current                  | Real                     | Amps drawn by the circuit pole      |

| Field                 | Type | Notes   |
|-----------------------|------|---|
| MinCurrent            | Real | Minimum amps drawn by the circuit pole        |
| MaxCurrent            | Real | Maximum amps drawn by the circuit pole        |
| UnutilizedCapacity    | Real | Available amps remaining on this circuit pole |
| MinUnutilizedCapacity | Real | Minimum amps remaining on this circuit pole   |
| MaxUnutilizedCapacity | Real | Maximum amps remaining on this circuit pole   |

## PDUCircuitBreakerReadings

The PDUCircuitBreakerReadings view shows the power data collected from circuit breakers on the PDU. This view does not contain any data for PDUs that do not have circuit breakers. A data record is added for each circuit breaker polled. This data is summarized hourly in a PDUCircuitBreakerReadingsRollup view, and the circuit breaker readings in this view are purged.

| Field                       | Type                    | Notes   |
|-----------------------------|-------------------------|---|
| PDUCircuitBreakerReadingsID | Integer                 | Unique ID for each reading                        |
| PDUID                       | Integer                 | Foreign key reference to PDUs table               |
| CircuitBreakerNumber        | Integer                 | Circuit breaker number on the PDU                 |
| CircuitBreakerID            | Integer                 | Foreign key reference to PDUCircuitBreakers table |
| Time                        | Timestamp with Timezone | Local timestamp                                   |
| CurrentAmps                 | Real                    | Current value in Amps                             |
| UnutilizedCapacity          | Real                    | Available amps remaining on this circuit breaker  |
| MaxCurrentAmps              | Real                    | Maximum amps drawn on the circuit breaker         |
| MinCurrentAmps              | Real                    | Minimum amps drawn on the circuit breaker         |

## PDUSensorReadings

The PDUSensorReadings view shows the data collected from PDU sensors. A data record is added for each sensor polled. This data is summarized hourly in a PDUSensorReadingsRollup view and the sensor readings in this view are purged.

| Field               | Type                    | Notes  |
|---------------------|-------------------------|--|
| PDUSensorReadingsID | Integer                 | Unique ID for each reading   |
| SensorID            | Integer                 | Database ID of the sensor as seen in PDUSensors  |
| Time                | Timestamp with Timezone | Local timestamp when the reading occurred  |
| Value               | Real                    | Sensor value   |
| MinimumValue        | Real                    | Minimum sensor value over the sample period. Applies to devices with data buffering enabled. |
| MaximumValue        | Real                    | Maximum sensor value over the sample period. Applies to devices with data buffering enabled. |

## PDUOutletReadingsRollup - To Be Deprecated

*Note: This table will be deprecated soon. It is recommended to stop using it, and use the new PDUOutletReadingsHourlyRollup, PDUOutletReadingsDailyRollup, and PDUOutletReadingsMonthlyRollup tables. If you experience any performance issues, move to the new tables.*

The PDUOutletReadingsRollup view summarizes the outlet readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDUOutletReadingsRollup view are purged.

| Field                    | Type    | Notes                                     |
|--------------------------|---------|---|
| PDUOutletReadingRollupID | Integer | Non-unique ID for each reading            |
| PDUID                    | Integer | Foreign key reference to PDUs table       |
| OutletID                 | Integer | Foreign key reference to PDUOutlets table |
| OutletNumber             | Integer | Outlet number on the PDU                  |

| Field                | Type                    | Notes   |
|----------------------|-------------------------|---|
| RollupInterval       | Integer                 | 1: one hour<br>2: one day<br>3: one month                                   |
| Time                 | Timestamp with Timezone | Timestamp when rollup was created   |
| MinimumCurrent       | Real                    | Lowest current (Amps) reading during rollup interval                        |
| MaximumCurrent       | Real                    | Maximum current (Amps) reading during rollup interval                       |
| AverageCurrent       | Real                    | Average current (Amps) reading during rollup interval                       |
| MinimumActivePower   | Real                    | Lowest active power (Watts) reading during rollup interval                  |
| MaximumActivePower   | Real                    | Maximum active power (Watts) reading during rollup interval                 |
| AverageActivePower   | Real                    | Average active power (Watts) reading during rollup interval                 |
| MinimumApparentPower | Real                    | Lowest apparent power (VA) reading during rollup interval                   |
| MaximumApparentPower | Real                    | Maximum apparent power (VA) reading during rollup interval                  |
| AverageApparentPower | Real                    | Average apparent power (VA) reading during rollup interval                  |
| MinimumPowerFactor   | Real                    | Minimum power factor reading during rollup interval                         |
| MaximumPowerFactor   | Real                    | Maximum power factor reading during rollup interval                         |
| AverageActivePower   | Real                    | Average power factor reading during rollup interval                         |
| MinimumVoltage       | Real                    | Minimum voltage reading during rollup interval                              |
| MaximumVoltage       | Real                    | Maximum voltage reading during rollup interval                              |
| AverageVoltage       | Real                    | Average voltage reading during rollup interval                              |
| WattHours            | Real                    | Maximum of the cumulative watt-hour meter readings over the rollup interval |



## PDUOutletReadingHourlyRollups

| Field                    | Type                    | Notes   |
|--------------------------|-------------------------|---|
| PDUOutletReadingRollupID | Integer                 | Unique ID for each reading  |
| PDUID                    | Integer                 | Foreign key reference to PDUs table   |
| OutletID                 | Integer                 | Foreign key reference to PDUOutlets table                                       |
| OutletNumber             | Integer                 | Outlet number on the PDU  |
| Time                     | Timestamp with Timezone | Timestamp when rollup was created   |
| MinimumCurrent           | Real                    | Lowest current (Amps) reading during rollup interval                            |
| MaximumCurrent           | Real                    | Maximum current (Amps) reading during rollup interval                           |
| AverageCurrent           | Real                    | Average current (Amps) reading during rollup interval                           |
| MinimumActivePower       | Real                    | Lowest active power (Watts) reading during rollup interval                      |
| MaximumActivePower       | Real                    | Maximum active power (Watts) reading during rollup interval                     |
| AverageActivePower       | Real                    | Average active power (Watts) reading during rollup interval                     |
| MinimumApparentPower     | Real                    | Lowest apparent power (VA) reading during rollup interval                       |
| MaximumApparentPower     | Real                    | Maximum apparent power (VA) reading during rollup interval                      |
| AverageApparentPower     | Real                    | Average apparent power (VA) reading during rollup interval                      |
| MinimumVoltage           | Real                    | Minimum voltage reading during rollup interval                                  |
| MaximumVoltage           | Real                    | Maximum voltage reading during rollup interval                                  |
| AverageVoltage           | Real                    | Average voltage reading during rollup interval                                  |
| VoltAmpHours             | Real                    | Maximum of the cumulative volt-amp-hour meter readings over the rollup interval |

| Field              | Type | Notes   |
|--------------------|------|---|
| WattHours          | Real | Maximum of the cumulative watt-hour meter readings over the rollup interval |
| AveragePowerFactor | Real | Average power factor reading during rollup interval                         |
| MinimumPowerFactor | Real | Minimum power factor reading during rollup interval                         |
| MaximumPowerFactor | Real | Maximum power factor reading during rollup interval                         |

## PDUOutletReadingDailyRollups

| Field                    | Type                    | Notes   |
|--------------------------|-------------------------|---|
| PDUOutletReadingRollupID | Integer                 | Unique ID for each reading                                  |
| PDUID                    | Integer                 | Foreign key reference to PDUs table                         |
| OutletID                 | Integer                 | Foreign key reference to PDUOutlets table                   |
| OutletNumber             | Integer                 | Outlet number on the PDU                                    |
| Time                     | Timestamp with Timezone | Timestamp when rollup was created                           |
| MinimumCurrent           | Real                    | Lowest current (Amps) reading during rollup interval        |
| MaximumCurrent           | Real                    | Maximum current (Amps) reading during rollup interval       |
| AverageCurrent           | Real                    | Average current (Amps) reading during rollup interval       |
| MinimumActivePower       | Real                    | Lowest active power (Watts) reading during rollup interval  |
| MaximumActivePower       | Real                    | Maximum active power (Watts) reading during rollup interval |
| AverageActivePower       | Real                    | Average active power (Watts) reading during rollup interval |
| MinimumApparentPower     | Real                    | Lowest apparent power (VA) reading during rollup interval   |

| Field                | Type | Notes   |
|----------------------|------|---|
| MaximumApparentPower | Real | Maximum apparent power (VA) reading during rollup interval                      |
| AverageApparentPower | Real | Average apparent power (VA) reading during rollup interval                      |
| MinimumVoltage       | Real | Minimum voltage reading during rollup interval                                  |
| MaximumVoltage       | Real | Maximum voltage reading during rollup interval                                  |
| AverageVoltage       | Real | Average voltage reading during rollup interval                                  |
| VoltAmpHours         | Real | Maximum of the cumulative volt-amp-hour meter readings over the rollup interval |
| WattHours            | Real | Maximum of the cumulative watt-hour meter readings over the rollup interval     |
| AveragePowerFactor   | Real | Average power factor reading during rollup interval                             |
| MinimumPowerFactor   | Real | Minimum power factor reading during rollup interval                             |
| MaximumPowerFactor   | Real | Maximum power factor reading during rollup interval                             |

## PDUOutletReadingMonthlyRollups

| Field                    | Type                    | Notes   |
|--------------------------|-------------------------|---|
| PDUOutletReadingRollupID | Integer                 | Unique ID for each reading  |
| PDUID                    | Integer                 | Foreign key reference to PDUs table   |
| OutletID                 | Integer                 | Foreign key reference to PDUOutlets table   |
| OutletNumber             | Integer                 | Outlet number on the PDU  |
| Time                     | Timestamp with Timezone | Local timestamp for the first day of the month over which the rollup was calculated |

| Field                | Type | Notes   |
|----------------------|------|---|
| MinimumCurrent       | Real | Lowest current (Amps) reading during rollup interval                            |
| MaximumCurrent       | Real | Maximum current (Amps) reading during rollup interval                           |
| AverageCurrent       | Real | Average current (Amps) reading during rollup interval                           |
| MinimumActivePower   | Real | Lowest active power (Watts) reading during rollup interval                      |
| MaximumActivePower   | Real | Maximum active power (Watts) reading during rollup interval                     |
| AverageActivePower   | Real | Average active power (Watts) reading during rollup interval                     |
| MinimumApparentPower | Real | Lowest apparent power (VA) reading during rollup interval                       |
| MaximumApparentPower | Real | Maximum apparent power (VA) reading during rollup interval                      |
| AverageApparentPower | Real | Average apparent power (VA) reading during rollup interval                      |
| MinimumVoltage       | Real | Minimum voltage reading during rollup interval                                  |
| MaximumVoltage       | Real | Maximum voltage reading during rollup interval                                  |
| AverageVoltage       | Real | Average voltage reading during rollup interval                                  |
| VoltAmpHours         | Real | Maximum of the cumulative volt-amp-hour meter readings over the rollup interval |
| WattHours            | Real | Maximum of the cumulative watt-hour meter readings over the rollup interval     |
| AveragePowerFactor   | Real | Average power factor reading during rollup interval                             |
| MinimumPowerFactor   | Real | Minimum power factor reading during rollup interval                             |
| MaximumPowerFactor   | Real | Maximum power factor reading during rollup interval                             |

## PDUReadingsRollup - To Be Deprecated

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*Note: This table will be deprecated soon. It is recommended to stop using it, and use the new PDUInletReadings tables.*

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The PDUReadingsRollup view summarizes the PDU readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDUReadingsRollup are purged.

| Field                | Type                    | Notes   |
|----------------------|-------------------------|---|
| PDUReadingsRollup    | Integer                 | Non-unique ID for each reading  |
| PDUID                | Integer                 | Foreign key reference to PDU  |
| RollupInterval       | Integer                 | 1: one hour<br>2: one day<br>3: one month                                   |
| Time                 | Timestamp with Timezone | Timestamp when rollup was created   |
| MinimumActivePower   | Real                    | Lowest active power (Watts) reading during rollup interval                  |
| MaximumActivePower   | Real                    | Maximum active power (Watts) reading during rollup interval                 |
| AverageActivePower   | Real                    | Average active power (Watts) reading during rollup interval                 |
| MinimumApparentPower | Real                    | Lowest apparent power (VA) reading during rollup interval                   |
| MaximumApparentPower | Real                    | Maximum apparent power (VA) reading during rollup interval                  |
| AverageApparentPower | Real                    | Average apparent power (VA) reading during rollup interval                  |
| WattHours            | Real                    | Maximum of the cumulative watt-hour meter readings over the rollup interval |

## PDULineReadingsRollup - To Be Deprecated

Note: This table will be deprecated soon. It is recommended to stop using it, and use the new PDULineReadingsHourlyRollup, PDULineReadingsDailyRollup, PDULineReadingsMonthlyRollup tables.

The PDULineReadingsRollup view summarizes the line readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDULineReadingsRollup is purged.

| Field                     | Type                    | Notes   |
|---------------------------|-------------------------|---|
| PDULineReadingsRollupID   | Integer                 | Non-unique ID for each reading                            |
| PDUID                     | Integer                 | Foreign key reference to PDU                              |
| LineNumber                | Integer                 | Line number on the PDU                                    |
| InletNumber               | Integer                 | Inlet number on the PDU                                   |
| RollupInterval            | Integer                 | 1: one hour<br>2: one day<br>3: one month                 |
| Time                      | Timestamp with Timezone | Timestamp when rollup was created                         |
| MinimumCurrent            | Real                    | Lowest current (Amps) reading during rollup interval      |
| MaximumCurrent            | Real                    | Maximum current (Amps) reading during rollup interval     |
| AverageCurrent            | Real                    | Average current (Amps) reading during rollup interval     |
| MinimumUnutilizedCapacity | Real                    | Lowest unutilized capacity (Amps) during rollup interval  |
| MaximumUnutilizedCapacity | Real                    | Maximum unutilized capacity (Amps) during rollup interval |
| AverageUnutilizedCapacity | Real                    | Average unutilized capacity (Amps) during rollup interval |

## PDULineReadingHourlyRollups

The PDULineReadingsHourlyRollup view summarizes the line readings power data over the hourly roll-up interval.

| Field                   | Type    | Notes                        |
|-------------------------|---------|------------------------------|
| PDULineReadingsRollupID | Integer | Unique ID for each reading   |
| PDUID                   | Integer | Foreign key reference to PDU |

| Field                     | Type                    | Notes   |
|---------------------------|-------------------------|---|
| LineNumber                | Integer                 | Line number on the PDU                                    |
| InletNumber               | Integer                 | Inlet number on the PDU                                   |
| Time                      | Timestamp with Timezone | Timestamp when rollup was created                         |
| MinimumCurrent            | Real                    | Lowest current (Amps) reading during rollup interval      |
| MaximumCurrent            | Real                    | Maximum current (Amps) reading during rollup interval     |
| AverageCurrent            | Real                    | Average current (Amps) reading during rollup interval     |
| MinimumUnutilizedCapacity | Real                    | Lowest unutilized capacity (Amps) during rollup interval  |
| MaximumUnutilizedCapacity | Real                    | Maximum unutilized capacity (Amps) during rollup interval |
| AverageUnutilizedCapacity | Real                    | Average unutilized capacity (Amps) during rollup interval |

## PDULineReadingDailyRollups

The PDULineReadingsDailyRollup view summarizes the line readings power data over the daily roll-up interval.

| Field                   | Type                    | Notes  |
|-------------------------|-------------------------|--|
| PDULineReadingsRollupID | Integer                 | Unique ID for each reading                           |
| PDUID                   | Integer                 | Foreign key reference to PDU                         |
| LineNumber              | Integer                 | Line number on the PDU                               |
| InletNumber             | Integer                 | Inlet number on the PDU                              |
| Time                    | Timestamp with Timezone | Timestamp when rollup was created                    |
| MinimumCurrent          | Real                    | Lowest current (Amps) reading during rollup interval |

| Field                     | Type | Notes   |
|---------------------------|------|---|
| MaximumCurrent            | Real | Maximum current (Amps) reading during rollup interval     |
| AverageCurrent            | Real | Average current (Amps) reading during rollup interval     |
| MinimumUnutilizedCapacity | Real | Lowest unutilized capacity (Amps) during rollup interval  |
| MaximumUnutilizedCapacity | Real | Maximum unutilized capacity (Amps) during rollup interval |
| AverageUnutilizedCapacity | Real | Average unutilized capacity (Amps) during rollup interval |

## PDULineReadingMonthlyRollups

The PDULineReadingsMonthlyRollup view summarizes the line readings power data over the monthly roll-up interval.

| Field                     | Type                    | Notes   |
|---------------------------|-------------------------|---|
| PDULineReadingsRollupID   | Integer                 | Unique ID for each reading  |
| PDUID                     | Integer                 | Foreign key reference to PDU  |
| LineNumber                | Integer                 | Line number on the PDU  |
| InletNumber               | Integer                 | Inlet number on the PDU   |
| Time                      | Timestamp with Timezone | Local timestamp for the first day of the month over which the rollup was calculated |
| MinimumCurrent            | Real                    | Lowest current (Amps) reading during rollup interval                                |
| MaximumCurrent            | Real                    | Maximum current (Amps) reading during rollup interval                               |
| AverageCurrent            | Real                    | Average current (Amps) reading during rollup interval                               |
| MinimumUnutilizedCapacity | Real                    | Lowest unutilized capacity (Amps) during rollup interval                            |
| MaximumUnutilizedCapacity | Real                    | Maximum unutilized capacity (Amps) during rollup interval                           |



| Field                     | Type | Notes   |
|---------------------------|------|---|
| AverageUnutilizedCapacity | Real | Average unutilized capacity (Amps) during rollup interval |

## PDUcircuitReadingMonthlyRollups

| Field                             | Type                     | Notes   |
|-----------------------------------|--------------------------|---|
| PDUcircuitReadingMonthlyRollupsID | Big Integer              | Unique ID for each reading  |
| PDUID                             | Integer                  | Foreign key reference to PDUs table   |
| PDUcircuitID                      | Integer                  | Foreign key reference to the PDUcircuits table  |
| Time                              | timestamp with time zone | Timestamp when rollup was created   |
| Year                              | double precision         | Year when rollup was created  |
| Month                             | double precision         | Month when rollup was created   |
| Voltage                           | Real                     | Average voltage reading during rollup interval  |
| MinVoltage                        | Real                     | Minimum voltage reading during rollup interval  |
| MaxVoltage                        | Real                     | Maximum voltage reading during rollup interval  |
| Current                           | Real                     | Average current reading (Amps) during rollup interval                                 |
| MinCurrent                        | Real                     | Minimum current reading (Amps) during rollup interval                                 |
| MaxCurrent                        | Real                     | Maximum current reading (Amps) during rollup interval                                 |
| UnutilizedCapacity                | Real                     | Average unutilized capacity (rated amps minus current) reading during rollup interval |
| MinUnutilizedCapacity             | Real                     | Minimum unutilized capacity (rated amps minus current) reading during rollup interval |



| Field                 | Type | Notes   |
|-----------------------|------|---|
| MaxUnutilizedCapacity | Real | Maximum unutilized capacity (rated amps minus current) reading during rollup interval |
| PowerFactor           | Real | Average Power factor reading during rollup interval                                   |
| MinPowerFactor        | Real | Minimum power factor reading during rollup interval                                   |
| MaxPowerFactor        | Real | Maximum power factor reading during rollup interval                                   |
| ActivePower           | Real | Average active power (Watts) reading during rollup interval                           |
| MinActivePower        | Real | Minimum active power (Watts) reading during rollup interval                           |
| MaxActivePower        | Real | Maximum active power (Watts) reading during rollup interval                           |
| ApparentPower         | Real | Average apparent power (VA) reading during rollup interval                            |
| MinApparentPower      | Real | Minimum apparent power (VA) reading during rollup interval                            |
| MaxApparentPower      | Real | Maximum apparent power (VA) reading during rollup interval                            |
| VoltAmpHour           | Real | Maximum of the cumulative volt-amp-hour meter readings over the rollup interval       |
| WattHour              | Real | Maximum of the cumulative watt-hour meter readings over the rollup interval           |

## PDUCircuitReadingHourlyRollups

| Field                            | Type        | Notes                      |
|----------------------------------|-------------|----------------------------|
| PDUCircuitReadingHourlyRollupsID | Big Integer | Unique ID for each reading |



| Field                 | Type                     | Notes   |
|-----------------------|--------------------------|---|
| PDUID                 | Integer                  | Foreign key reference to PDUs table   |
| PDUCircuitID          | Integer                  | Foreign key reference to the PDUCircuits table  |
| Time                  | timestamp with time zone | Timestamp when rollup was created   |
| Voltage               | Real                     | Average voltage reading during rollup interval  |
| MinVoltage            | Real                     | Minimum voltage reading during rollup interval  |
| MaxVoltage            | Real                     | Maximum voltage reading during rollup interval  |
| Current               | Real                     | Average current reading (Amps) during rollup interval                                 |
| MinCurrent            | Real                     | Minimum current reading (Amps) during rollup interval                                 |
| MaxCurrent            | Real                     | Maximum current reading (Amps) during rollup interval                                 |
| UnutilizedCapacity    | Real                     | Average unutilized capacity (rated amps minus current) reading during rollup interval |
| MinUnutilizedCapacity | Real                     | Minimum unutilized capacity (rated amps minus current) reading during rollup interval |
| MaxUnutilizedCapacity | Real                     | Maximum unutilized capacity (rated amps minus current) reading during rollup interval |
| PowerFactor           | Real                     | Average Power factor reading during rollup interval                                   |
| MinPowerFactor        | Real                     | Minimum power factor reading during rollup interval                                   |
| MaxPowerFactor        | Real                     | Maximum power factor reading during rollup interval                                   |
| ActivePower           | Real                     | Average active power (Watts) reading during rollup interval                           |
| MinActivePower        | Real                     | Minimum active power (Watts) reading during rollup interval                           |
| MaxActivePower        | Real                     | Maximum active power (Watts) reading during rollup interval                           |

| Field            | Type | Notes   |
|------------------|------|---|
| ApparentPower    | Real | Average apparent power (VA) reading during rollup interval                      |
| MinApparentPower | Real | Minimum apparent power (VA) reading during rollup interval                      |
| MaxApparentPower | Real | Maximum apparent power (VA) reading during rollup interval                      |
| VoltAmpHour      | Real | Maximum of the cumulative volt-amp-hour meter readings over the rollup interval |
| WattHour         | Real | Maximum of the cumulative watt-hour meter readings over the rollup interval     |

## PDUCircuitPoleReadingDailyRollups

| Field                               | Type                     | Notes   |
|-------------------------------------|--------------------------|---|
| PDUCircuitPoleReadingDailyRollupsID | Big Integer              | Unique ID for each reading                            |
| PDUCircuitPoleID                    | Integer                  | Circuit pole number on the PDU                        |
| PDUID                               | Integer                  | Foreign key reference to PDUs table                   |
| Time                                | timestamp with time zone | Timestamp when rollup was created                     |
| Date                                | date                     | Date when rollup was created                          |
| Voltage                             | Real                     | Average voltage reading during rollup interval        |
| MinVoltage                          | Real                     | Minimum voltage reading during rollup interval        |
| MaxVoltage                          | Real                     | Maximum voltage reading during rollup interval        |
| Current                             | Real                     | Average current reading (Amps) during rollup interval |
| MinCurrent                          | Real                     | Minimum current reading (Amps) during rollup interval |

| Field                 | Type | Notes   |
|-----------------------|------|---|
| MaxCurrent            | Real | Maximum current reading (Amps) during rollup interval                                 |
| UnutilizedCapacity    | Real | Average unutilized capacity (rated amps minus current) reading during rollup interval |
| MinUnutilizedCapacity | Real | Minimum unutilized capacity (rated amps minus current) reading during rollup interval |
| MaxUnutilizedCapacity | Real | Maximum unutilized capacity (rated amps minus current) reading during rollup interval |

## PDUCircuitPoleReadingMonthlyRollups

| Field                                 | Type                     | Notes   |
|---------------------------------------|--------------------------|---|
| PDUCircuitPoleReadingMonthlyRollupsID | Big Integer              | Unique ID for each reading                            |
| PDUCircuitPoleID                      | Integer                  | Circuit pole number on the PDU                        |
| PDUID                                 | Integer                  | Foreign key reference to PDUs table                   |
| Time                                  | timestamp with time zone | Timestamp when rollup was created                     |
| Year                                  | double precision         | Year when rollup was created                          |
| Month                                 | double precision         | Month when rollup was created                         |
| Voltage                               | Real                     | Average voltage reading during rollup interval        |
| MinVoltage                            | Real                     | Minimum voltage reading during rollup interval        |
| MaxVoltage                            | Real                     | Maximum voltage reading during rollup interval        |
| Current                               | Real                     | Average current reading (Amps) during rollup interval |



| Field                 | Type | Notes   |
|-----------------------|------|---|
| MinCurrent            | Real | Minimum current reading (Amps) during rollup interval                                 |
| MaxCurrent            | Real | Maximum current reading (Amps) during rollup interval                                 |
| UnutilizedCapacity    | Real | Average unutilized capacity (rated amps minus current) reading during rollup interval |
| MinUnutilizedCapacity | Real | Minimum unutilized capacity (rated amps minus current) reading during rollup interval |
| MaxUnutilizedCapacity | Real | Maximum unutilized capacity (rated amps minus current) reading during rollup interval |

## PDUCircuitPoleReadingHourlyRollups

| Field                                | Type                     | Notes   |
|--------------------------------------|--------------------------|---|
| PDUCircuitPoleReadingHourlyRollupsID | Big Integer              | Unique ID for each reading                            |
| PDUCircuitPoleID                     | Integer                  | Circuit pole number on the PDU                        |
| PDUID                                | Integer                  | Foreign key reference to PDUs table                   |
| Time                                 | timestamp with time zone | Timestamp when rollup was created                     |
| Voltage                              | Real                     | Average voltage reading during rollup interval        |
| MinVoltage                           | Real                     | Minimum voltage reading during rollup interval        |
| MaxVoltage                           | Real                     | Maximum voltage reading during rollup interval        |
| Current                              | Real                     | Average current reading (Amps) during rollup interval |
| MinCurrent                           | Real                     | Minimum current reading (Amps) during rollup interval |

| Field                 | Type | Notes   |
|-----------------------|------|---|
| MaxCurrent            | Real | Maximum current reading (Amps) during rollup interval                                 |
| UnutilizedCapacity    | Real | Average unutilized capacity (rated amps minus current) reading during rollup interval |
| MinUnutilizedCapacity | Real | Minimum unutilized capacity (rated amps minus current) reading during rollup interval |
| MaxUnutilizedCapacity | Real | Maximum unutilized capacity (rated amps minus current) reading during rollup interval |

## PDUCircuitReadingDailyRollups

| Field                           | Type                     | Notes   |
|---------------------------------|--------------------------|---|
| PDUCircuitReadingDailyRollupsID | Big Integer              |   |
| PDUID                           | Integer                  | Foreign key reference to PDUs table                   |
| PDUCircuitID                    | Integer                  | Foreign key reference to the PDUCircuits table        |
| Time                            | timestamp with time zone | Timestamp when rollup was created                     |
| Date                            | date                     | Date when rollup was created                          |
| Voltage                         | Real                     | Average voltage reading during rollup interval        |
| MinVoltage                      | Real                     | Minimum voltage reading during rollup interval        |
| MaxVoltage                      | Real                     | Maximum voltage reading during rollup interval        |
| Current                         | Real                     | Average current reading (Amps) during rollup interval |
| MinCurrent                      | Real                     | Minimum current reading (Amps) during rollup interval |
| MaxCurrent                      | Real                     | Maximum current reading (Amps) during rollup interval |

| Field                 | Type | Notes   |
|-----------------------|------|---|
| UnutilizedCapacity    | Real | Average unutilized capacity (rated amps minus current) reading during rollup interval |
| MinUnutilizedCapacity | Real | Minimum unutilized capacity (rated amps minus current) reading during rollup interval |
| MaxUnutilizedCapacity | Real | Maximum unutilized capacity (rated amps minus current) reading during rollup interval |
| PowerFactor           | Real | Average Power factor reading during rollup interval                                   |
| MinPowerFactor        | Real | Minimum power factor reading during rollup interval                                   |
| MaxPowerFactor        | Real | Maximum power factor reading during rollup interval                                   |
| ActivePower           | Real | Average active power (Watts) reading during rollup interval                           |
| MinActivePower        | Real | Minimum active power (Watts) reading during rollup interval                           |
| MaxActivePower        | Real | Maximum active power (Watts) reading during rollup interval                           |
| ApparentPower         | Real | Average apparent power (VA) reading during rollup interval                            |
| MinApparentPower      | Real | Minimum apparent power (VA) reading during rollup interval                            |
| MaxApparentPower      | Real | Maximum apparent power (VA) reading during rollup interval                            |
| VoltAmpHour           | Real | Maximum of the cumulative volt-amp-hour meter readings over the rollup interval       |
| WattHour              | Real | Maximum of the cumulative watt-hour meter readings over the rollup interval           |



## PDUcircuitPoleReadingMonthlyRollups

| Field                                 | Type                     | Notes   |
|---------------------------------------|--------------------------|---|
| PDUcircuitPoleReadingMonthlyRollupsID | Big Integer              | Unique ID for each reading  |
| PDUcircuitPoleID                      | Integer                  | Circuit pole number on the PDU  |
| PDUID                                 | Integer                  | Foreign key reference to PDUs table   |
| Time                                  | timestamp with time zone | Timestamp when rollup was created   |
| Year                                  | double precision         | Year when rollup was created  |
| Month                                 | double precision         | Month when rollup was created   |
| Voltage                               | Real                     | Average voltage reading during rollup interval  |
| MinVoltage                            | Real                     | Minimum voltage reading during rollup interval  |
| MaxVoltage                            | Real                     | Maximum voltage reading during rollup interval  |
| Current                               | Real                     | Average current reading (Amps) during rollup interval                                 |
| MinCurrent                            | Real                     | Minimum current reading (Amps) during rollup interval                                 |
| MaxCurrent                            | Real                     | Maximum current reading (Amps) during rollup interval                                 |
| UnutilizedCapacity                    | Real                     | Average unutilized capacity (rated amps minus current) reading during rollup interval |
| MinUnutilizedCapacity                 | Real                     | Minimum unutilized capacity (rated amps minus current) reading during rollup interval |
| MaxUnutilizedCapacity                 | Real                     | Maximum unutilized capacity (rated amps minus current) reading during rollup interval |

## PDUCircuitBreakerReadingsRollup - To Be Deprecated

*Note: This table will be deprecated soon. It is recommended to stop using it, and use the new PDUCircuitBreakerReadingsHourlyRollup, PDUCircuitBreakerReadingDailyRollups, and PDUCircuitBreakerReadingMonthlyRollups tables. If you experience any performance issues, move to the new tables.*

The PDUCircuitBreakerReadingsRollup view summarizes the circuit breaker readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDUCircuitBreakerReadingsRollup view are purged.

| Field                             | Type                    | Notes   |
|-----------------------------------|-------------------------|---|
| PDUCircuitBreakerReadingsRollupID | Integer                 | Non-unique ID for each reading                            |
| PDUID                             | Integer                 | Foreign key reference to PDU                              |
| CircuitBreakerNumber              | Integer                 | Circuit breaker number on the PDU                         |
| CircuitBreakerID                  | Integer                 | Foreign key reference to PDUCircuitBreakers table         |
| RollupInterval                    | Integer                 | 1: one hour<br>2: one day<br>3: one month                 |
| Time                              | Timestamp with Timezone | Timestamp when rollup was created                         |
| MinimumCurrent                    | Real                    | Lowest current (Amps) reading during rollup interval      |
| MaximumCurrent                    | Real                    | Maximum current (Amps) reading during rollup interval     |
| AverageCurrent                    | Real                    | Average current (Amps) reading during rollup interval     |
| MinimumUnutilizedCapacity         | Real                    | Lowest unutilized capacity (Amps) during rollup interval  |
| MaximumUnutilizedCapacity         | Real                    | Maximum unutilized capacity (Amps) during rollup interval |

| Field                     | Type | Notes   |
|---------------------------|------|---|
| AverageUnutilizedCapacity | Real | Average unutilized capacity (Amps) during rollup interval |

## PDUCircuitBreakerReadingHourlyRollups

The PDUCircuitBreakerReadingHourlyRollup view summarizes the circuit breaker readings power data over the hourly roll-up interval.

| Field                             | Type                    | Notes   |
|-----------------------------------|-------------------------|---|
| PDUCircuitBreakerReadingsRollupID | Integer                 | Unique ID for each reading                                |
| PDUID                             | Integer                 | Foreign key reference to PDU                              |
| CircuitBreakerNumber              | Integer                 | Circuit breaker number on the PDU                         |
| CircuitBreakerID                  | Integer                 | Foreign key reference to PDUCircuitBreakers table         |
| Time                              | Timestamp with Timezone | Timestamp when rollup was created                         |
| MinimumCurrent                    | Real                    | Lowest current (Amps) reading during rollup interval      |
| MaximumCurrent                    | Real                    | Maximum current (Amps) reading during rollup interval     |
| AverageCurrent                    | Real                    | Average current (Amps) reading during rollup interval     |
| MinimumUnutilizedCapacity         | Real                    | Lowest unutilized capacity (Amps) during rollup interval  |
| MaximumUnutilizedCapacity         | Real                    | Maximum unutilized capacity (Amps) during rollup interval |
| AverageUnutilizedCapacity         | Real                    | Average unutilized capacity (Amps) during rollup interval |

## PDUcircuitBreakerReadingDailyRollups

The PDUcircuitBreakerReadingsDailyRollup view summarizes the circuit breaker readings power data over the daily roll-up interval.

| Field                             | Type                    | Notes   |
|-----------------------------------|-------------------------|---|
| PDUcircuitBreakerReadingsRollupID | Integer                 | Unique ID for each reading                                |
| PDUID                             | Integer                 | Foreign key reference to PDU                              |
| CircuitBreakerNumber              | Integer                 | Circuit breaker number on the PDU                         |
| CircuitBreakerID                  | Integer                 | Foreign key reference to PDUcircuitBreakers table         |
| Time                              | Timestamp with Timezone | Timestamp when rollup was created                         |
| MinimumCurrent                    | Real                    | Lowest current (Amps) reading during rollup interval      |
| MaximumCurrent                    | Real                    | Maximum current (Amps) reading during rollup interval     |
| AverageCurrent                    | Real                    | Average current (Amps) reading during rollup interval     |
| MinimumUnutilizedCapacity         | Real                    | Lowest unutilized capacity (Amps) during rollup interval  |
| MaximumUnutilizedCapacity         | Real                    | Maximum unutilized capacity (Amps) during rollup interval |
| AverageUnutilizedCapacity         | Real                    | Average unutilized capacity (Amps) during rollup interval |

## PDUCircuitBreakerReadingMonthlyRollups

The PDUCircuitBreakerReadingsMonthlyRollup view summarizes the circuit breaker readings power data over the monthly roll-up interval.

| Field                             | Type                    | Notes   |
|-----------------------------------|-------------------------|---|
| PDUCircuitBreakerReadingsRollupID | Integer                 | Unique ID for each reading  |
| PDUID                             | Integer                 | Foreign key reference to PDU  |
| CircuitBreakerNumber              | Integer                 | Circuit breaker number on the PDU   |
| CircuitBreakerID                  | Integer                 | Foreign key reference to PDUCircuitBreakers table                                   |
| Time                              | Timestamp with Timezone | Local timestamp for the first day of the month over which the rollup was calculated |
| MinimumCurrent                    | Real                    | Lowest current (Amps) reading during rollup interval                                |
| MaximumCurrent                    | Real                    | Maximum current (Amps) reading during rollup interval                               |
| AverageCurrent                    | Real                    | Average current (Amps) reading during rollup interval                               |
| MinimumUnutilizedCapacity         | Real                    | Lowest unutilized capacity (Amps) during rollup interval                            |
| MaximumUnutilizedCapacity         | Real                    | Maximum unutilized capacity (Amps) during rollup interval                           |
| AverageUnutilizedCapacity         | Real                    | Average unutilized capacity (Amps) during rollup interval                           |

## PDUSensorReadingsRollup - To Be Deprecated

*Note: This table will be deprecated soon. It is recommended to stop using it, and use the new PDUSensorReadingsHourlyRollups, PDUSensorReadingsDailyRollups, and PDUSensorReadingsMonthlyRollups tables. If you experience any performance issues, move to the new tables.*

The PDUSensorReadingsRollup view summarizes the sensor readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDUSensorReadingsRollup view are purged.

| Field                     | Type                    | Notes   |
|---------------------------|-------------------------|---|
| PDUSensorReadingsRollupID | Integer                 | Non-unique ID for each reading                  |
| SensorID                  | Integer                 | Database ID of the sensor as seen in PDUSensors |
| RollupInterval            | Integer                 | 1: one hour<br>2: one day<br>3: one month       |
| Time                      | Timestamp with Timezone | Timestamp when rollup was created               |
| MinimumValue              | Real                    | Lowest sensor reading during rollup interval    |
| MaximumValue              | Real                    | Maximum sensor reading during rollup interval   |
| AverageValue              | Real                    | Average sensor reading during rollup interval   |

## PDUSensorReadingHourlyRollup

The PDUSensorReadingsHourlyRollup view summarizes the sensor readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDUSensorReadingsRollup view are purged.

| Field                     | Type                    | Notes   |
|---------------------------|-------------------------|---|
| PDUSensorReadingsRollupID | Integer                 | Unique ID for each reading                      |
| SensorID                  | Integer                 | Database ID of the sensor as seen in PDUSensors |
| Time                      | Timestamp with Timezone | Timestamp when rollup was created               |
| MinimumValue              | Real                    | Lowest sensor reading during rollup interval    |
| MaximumValue              | Real                    | Maximum sensor reading during rollup interval   |
| AverageValue              | Real                    | Average sensor reading during rollup interval   |

## PDUSensorReadingDailyRollup

The PDUSensorReadingsDailyRollup view summarizes the sensor readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDUSensorReadingsRollup view are purged.

| Field                     | Type                    | Notes   |
|---------------------------|-------------------------|---|
| PDUSensorReadingsRollupID | Integer                 | Unique ID for each reading                      |
| SensorID                  | Integer                 | Database ID of the sensor as seen in PDUSensors |
| Time                      | Timestamp with Timezone | Timestamp when rollup was created               |
| MinimumValue              | Real                    | Lowest sensor reading during rollup interval    |
| MaximumValue              | Real                    | Maximum sensor reading during rollup interval   |
| AverageValue              | Real                    | Average sensor reading during rollup interval   |

## PDUSensorReadingMonthlyRollup

The PDUSensorReadingsMonthlyRollup view summarizes the sensor readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDUSensorReadingsRollup view are purged.

| Field                     | Type                    | Notes   |
|---------------------------|-------------------------|---|
| PDUSensorReadingsRollupID | Integer                 | Unique ID for each reading  |
| SensorID                  | Integer                 | Database ID of the sensor as seen in PDUSensors                                     |
| Time                      | Timestamp with Timezone | Local timestamp for the first day of the month over which the rollup was calculated |
| MinimumValue              | Real                    | Lowest sensor reading during rollup interval  |
| MaximumValue              | Real                    | Maximum sensor reading during rollup interval                                       |
| AverageValue              | Real                    | Average sensor reading during rollup interval                                       |

## PDUSensors

The PDUSensors view contains information about sensors attached to PDUs that Power IQ manages.

| Field         | Type         | Notes  |
|---------------|--------------|--|
| SensorID      | Integer      | Auto-generated ID  |
| PDUID         | Integer      | Foreign key reference to PDUs table                                      |
| PDUSensorID   | Integer      | ID of the sensor on the PDU, as gathered from the pdu                    |
| SensorNumber  | Integer      | Sensor number on the PDU   |
| AttributeName | VarChar(64)  | Type of sensor   |
| Label         | VarChar(255) | Sensor's label as gathered from the PDU                                  |
| Removed       | VarChar(64)  | When the sensor was removed from the system, or null for current sensors |
| Position      | VarChar(10)  | Sensor position on the PDU: inlet, outlet or outside air                 |

## PDUTransferSwitchStates

This view represents the state of a Transfer Switch at a particular moment in time, normally recorded when the state of the switch has changed.

| Field                     | Type                    | Notes   |
|---------------------------|-------------------------|---|
| PDUTransferSwitchStatesID | BigInt                  | The primary key for this view   |
| PDUTransferSwitchesID     | Integer                 | Foreign key reference to the PDUTransferSwitches view.                |
| ActivePDUInletNumber      | VarChar(32)             | The ordinal of the active inlet.                                      |
| OperatingStatus           | VarChar(32)             | A string representing the operating status reported by the PDU's MIB. |
| Time                      | Timestamp with Timezone | Local timestamp   |



## PDUTransferSwitches

This view represents the physical transfer switch inside of a PDU of type 'Rack Transfer Switch'.

| Field                 | Type                    | Notes   |
|-----------------------|-------------------------|---|
| PDUTransferSwitchesID | Integer                 | The primary key for this view                                       |
| PDUID                 | Integer                 | Foreign key reference to the PDUs view.                             |
| CreatedAt             | Timestamp with Timezone | The date and time that the Transfer Switch was added to the system. |
| UpdatedAt             | Timestamp with Timezone | The date and time this Transfer Switch was last updated.            |



## PDU's

The PDUs view contains information about the PDU device.

| Field              | Type          | Notes  |
|--------------------|---------------|--|
| ID                 | Integer       | Unique PDU number  |
| Caption            | VarChar (64)  | PDU Name   |
| Description        | TEXT          | MIB II SysDescr  |
| IPAddress          | inet          | IP Address   |
| PDUType            | VarChar (64)  | Rack PDU or facility items   |
| ProxyIndex         | Integer       | Subtending unit ID applicable only to daisy-chained and console server connected PDU units |
| NameFormat         | VarChar (64)  |  |
| ModelName          | TEXT          | PDU Model  |
| Manufacturer       | TEXT          | PDU Manufacturer   |
| Location           | TEXT          | MIB II SysLocation   |
| Contact            | VarChar (256) | Contact name   |
| PDUName            | TEXT          | PDU Name   |
| Firmware           | TEXT          | PDU Firmware version   |
| Serial Number      | TEXT          | PDU Serial Number  |
| CurrentStatus      | TEXT          | PDU overall health status: Good, Warning, or Critical                                      |
| EventHealth        | TEXT          | PDU active events health status: Good, Warning, or Critical                                |
| ConnectivityHealth | TEXT          | PDU connectivity health status: OK, LostComm,  |

| Field                                 | Type          | Notes  |
|---------------------------------------|---------------|--|
|                                       |               | NoContact, NoPlugin, and others.   |
| PrimaryOwnerName                      | VarChar (64)  | Owner name   |
| PrimaryOwnerContact                   | VarChar (256) | MIB II SysContact  |
| InletTemperature                      | Float         | Temperature at the inlet of the PDU. Latest reading in Celsius from the first temperature sensor attached to the PDU |
| External Key                          | TEXT          | An external key, such as asset tag number, associated with the PDU.  |
| Custom Field 1                        | TEXT          | A custom field for the user to specify.  |
| Custom Field 2                        | TEXT          | A custom field for the user to specify.  |
| Current                               | Float         | Latest line current reading for the PDU, or the maximum of the line currents for three-phase PDUs                    |
| RatedVoltage                          | TEXT          | The PDU's rated voltage.   |
| RatedAmps                             | TEXT          | The PDU's rated current.   |
| RatedVoltAmps                         | TEXT          | The PDU's rated volt-amps.   |
| DefaultAssetStripConnectedLEDColor    | VarChar       | The color of the LED in hex when asset is connected.   |
| DefaultAssetStripDisconnectedLEDColor | VarChar       | The color of the LED in hex when asset is disconnected.  |

## PDUOutlets

The PDUOutlets view shows the outlets associated with a PDU.

| Field        | Type    | Notes                               |
|--------------|---------|-------------------------------------|
| PDUOutletsID | Integer | Unique outlet number                |
| PDUID        | Integer | Foreign key reference to PDUs table |

| Field           | Type        | Notes                               |
|-----------------|-------------|-------------------------------------|
| OutletID        | Integer     | PDU outlet number                   |
| OutletName      | VarChar(64) | Outlet name                         |
| OutletState     | VarChar(64) | Outlet state                        |
| ITDeviceID      | Integer     | Associated IT Device ID foreign key |
| PDUOutletNumber | Integer     | PDU outlet number                   |
| OutletRatedAmps | Integer     | The rated amps of the outlet        |

## PDUCircuitPoles

| Field              | Type        | Notes                                      |
|--------------------|-------------|--|
| PDUCircuitPoleID   | Integer     | Unique circuit pole ID                     |
| PDUCircuitID       | Integer     | Foreign key reference to PDUCircuits table |
| PDUPanelID         | Integer     | Foreign key reference to PDUPanels table   |
| PDUID              | Integer     | Foreign key reference to PDUs table        |
| CircuitPoleOrdinal | Integer     | The circuit pole's number                  |
| Phase              | VarChar(64) | The circuit pole's phase                   |

## PDUCircuits

| Field          | Type    | Notes  |
|----------------|---------|--|
| PDUCircuitID   | Integer | Unique circuit ID                            |
| PDUID          | Integer | Foreign key reference to PDUs table          |
| PDUPanelID     | Integer | Foreign key reference to the PDUPanels table |
| CircuitOrdinal | Integer | Circuit number on the PDU                    |

| Field       | Type         | Notes                     |
|-------------|--------------|---------------------------|
| CircuitName | VarChar (64) | Name of the circuit       |
| RatedAmps   | Integer      | Rated amps of the circuit |

## PDUcircuitBreakers

The PDUcircuitBreakers view shows the circuit breakers associated with a PDU.

| Field                   | Type        | Notes   |
|-------------------------|-------------|---|
| PDUcircuitBreakersID    | Integer     | Unique CB Number                              |
| PDUID                   | Integer     | Foreign key reference to PDUs table           |
| CircuitBreakerOrdinal   | Integer     | Circuit breaker number on the PDU             |
| CircuitBreakerState     | Integer     | 0 (closed) 1 (open) 3 (unknown)               |
| CircuitBreakerLabel     | VarChar(64) | Label assigned to a CB                        |
| CircuitBreakerRating    | Integer     | The rated amps of the circuit breaker in amps |
| CircuitBreakerRatedAmps | Integer     | The rated amps of the circuit breaker in amps |

## PDULines

| Field       | Type    | Notes                                    |
|-------------|---------|--|
| PDULinesID  | Integer | Primary key for the table.               |
| PDUInletsID | Integer | Foreign key reference to PDUInlets table |
| PDUID       | Integer | Foreign key reference to PDUs table      |
| LineNumber  | Integer | The inlet line number on the PDU         |

## PDUInlets

| Field          | Type    | Notes                                |
|----------------|---------|--------------------------------------|
| PDUInletsID    | Integer | Primary key for the PDUInlets table. |
| PDUID          | Integer | Foreign key reference to PDUs table  |
| InletNumber    | Integer | The number of the inlet on the PDU.  |
| InletRatedAmps | Integer | The rated amps on the inlet.         |
| PDUPanelID     | Integer | Foreign key reference to PDUPanels   |
| Source         | Boolean | Whether main inlet                   |

## PDUPanels

| Field        | Type          | Notes   |
|--------------|---------------|---|
| PDUPanelID   | Integer       | Unique ID for each panel  |
| PDUID        | Integer       | Foreign key reference to PDUs table                                       |
| PanelOrdinal | Integer       | The panel's number on the floor PDU.                                      |
| PanelName    | VarChar (255) | The panel's name, only for floor PDU panels, not standalone power panels. |

## PDUReadings

Note: This table will be deprecated soon. It is recommended to stop using it, and use the new [PDUInletReadings](#) table. See [PDUInletReadings](#) (on page 1).

The PDUReadings view shows the raw power data collected from PDUs. A data record is added for each PDU polled. This data is summarized hourly in a PDUReadingsRollup view, and the readings in this view are purged.

| Field         | Type    | Notes                      |
|---------------|---------|----------------------------|
| PDUReadingsID | Integer | Unique ID for each reading |

| Field            | Type                    | Notes   |
|------------------|-------------------------|---|
| PDUID            | Integer                 | Foreign key reference to PDU  |
| Time             | Timestamp with Timezone | Local timestamp   |
| ActivePower      | Real                    | Active power drawn by PDU   |
| ApparentPower    | Real                    | Apparent power drawn by PDU   |
| WattHour         | Real                    | Cumulative watt-hours consumed by the PDU, if available for the PDU |
| MaxActivePower   | Real                    | Maximum active power drawn by PDU                                   |
| MinActivePower   | Real                    | Minimum active power drawn by PDU                                   |
| MaxApparentPower | Real                    | Maximum apparent power drawn by PDU                                 |
| MinApparentPower | Real                    | Minimum apparent power drawn by PDU                                 |

## PDUInletReadings

A PDU can have multiple inlets. To get a total reading for the PDU, you must to request the values for all inlets on a PDU.

| Field              | Type                     | Notes   |
|--------------------|--------------------------|---|
| PDUInletReadingsID | bigint                   | Unique ID for each reading  |
| PDUID              | Integer                  | Foreign key reference to PDUs table   |
| InletID            | Integer                  | Foreign key reference to PDUInlets table  |
| InletNumber        | Integer                  | Inlet number on the PDU   |
| Time               | timestamp with time zone | Local timestamp   |
| Voltage            | Real                     | Voltage at the inlet  |
| MinVoltage         | Real                     | Minimum voltage reading over the sample period. Applies to devices with data buffering enabled. |

| Field            | Type | Notes  |
|------------------|------|--|
| MaxVoltage       | Real | Maximum voltage reading over the sample period. Applies to devices with data buffering enabled.              |
| Current          | Real | Current (Amps) drawn by the inlet  |
| MinCurrent       | Real | Minimum current (Amps) reading over the sample period. Applies to devices with data buffering enabled.       |
| MaxCurrent       | Real | Maximum current (Amps) reading over the sample period (applies to devices with data buffering enabled).      |
| PowerFactor      | Real | Power factor of the inlet  |
| MinPowerFactor   | Real | Minimum power factor reading over the sample period. Applies to devices with data buffering enabled)         |
| MaxPowerFactor   | Real | Maximum power factor reading over the sample period. Applies to devices with data buffering enabled.         |
| ActivePower      | Real | Active power (Watts) drawn by the inlet  |
| MinActivePower   | Real | Minimum active power (Watts) reading over the sample period. Applies to devices with data buffering enabled. |
| MaxActivePower   | Real | Maximum active power (Watts) reading over the sample period. Applies to devices with data buffering enabled. |
| ApparentPower    | Real | Apparent power (VA) drawn by the inlet   |
| MinApparentPower | Real | Minimum apparent power (VA) reading over the sample period (applies to devices with data buffering enabled)  |
| MaxApparentPower | Real | Maximum apparent power (VA) reading over the sample period. Applies to devices with data buffering enabled.  |
| VoltAmpHours     | Real | Cumulative volt-amp-hours consumed by the inlet, if available for the PDU                                    |
| WattHours        | Real | Cumulative watt-hours consumed by the inlet, if available for the PDU  |



## PDUInletReadingHourlyRollups

| Field                    | Type      | Notes   |
|--------------------------|-----------|---|
| PDUInletReadingsRollupID | Bigint    | Primary key for the table                                   |
| PDUID                    | Integer   | Foreign key reference to PDUs table                         |
| InletID                  | Integer   | Foreign key reference to PDUInlets table                    |
| InletNumber              | Integer   | The number of the inlet on the PDU.                         |
| Time                     | Timestamp | Local timestamp   |
| Voltage                  | Real      | Average voltage reading during rollup interval              |
| MinVoltage               | Real      | Minimum voltage reading during rollup interval              |
| MaxVoltage               | Real      | Maximum voltage reading during rollup interval              |
| Current                  | Real      | Average current reading (Amps) during rollup interval       |
| MinCurrent               | Real      | Minimum current reading (Amps) during rollup interval       |
| MaxCurrent               | Real      | Maximum current reading (Amps) during rollup interval       |
| PowerFactor              | Real      | Average Power factor reading during rollup interval         |
| MinPowerFactor           | Real      | Minimum power factor reading during rollup interval         |
| MaxPowerFactor           | Real      | Maximum power factor reading during rollup interval         |
| ActivePower              | Real      | Average active power (Watts) reading during rollup interval |
| MinActivePower           | Real      | Minimum active power (Watts) reading during rollup interval |
| MaxActivePower           | Real      | Maximum active power (Watts) reading during rollup interval |
| ApparentPower            | Real      | Average apparent power (VA) reading during rollup interval  |
| MinApparentPower         | Real      | Minimum apparent power (VA) reading during rollup interval  |

| Field                 | Type | Notes   |
|-----------------------|------|---|
| MaxApparentPower      | Real | Maximum apparent power (VA) reading during rollup interval                            |
| MaxUnutilizedCapacity | Real | Maximum unutilized capacity (rated amps minus current) reading during rollup interval |
| MinUnutilizedCapacity | Real | Minimum unutilized capacity (rated amps minus current) reading during rollup interval |
| UnutilizedCapacity    | Real | Average unutilized capacity (rated amps minus current) reading during rollup interval |
| VoltAmpHours          | Real | Maximum of the cumulative volt-amp-hour meter readings over the rollup interval       |
| WattHours             | Real | Maximum of the cumulative watt-hour meter readings over the rollup interval           |

## PDUInletReadingDailyRollups

| Field                    | Type      | Notes   |
|--------------------------|-----------|---|
| PDUInletReadingsRollupID | Bigint    | Primary key for the table                             |
| PDUID                    | Integer   | Foreign key reference to PDUs table                   |
| InletID                  | Integer   | Foreign key reference to PDUInlets table              |
| InletNumber              | Integer   | The number of the inlet on the PDU.                   |
| Time                     | Timestamp | Local timestamp                                       |
| Voltage                  | Real      | Average voltage reading during rollup interval        |
| MinVoltage               | Real      | Minimum voltage reading during rollup interval        |
| MaxVoltage               | Real      | Maximum voltage reading during rollup interval        |
| Current                  | Real      | Average current reading (Amps) during rollup interval |

| Field            | Type | Notes   |
|------------------|------|---|
| MinCurrent       | Real | Minimum current reading (Amps) during rollup interval                           |
| MaxCurrent       | Real | Maximum current reading (Amps) during rollup interval                           |
| PowerFactor      | Real | Average Power factor reading during rollup interval                             |
| MinPowerFactor   | Real | Minimum power factor reading during rollup interval                             |
| MaxPowerFactor   | Real | Maximum power factor reading during rollup interval                             |
| ActivePower      | Real | Average active power (Watts) reading during rollup interval                     |
| MinActivePower   | Real | Minimum active power (Watts) reading during rollup interval                     |
| MaxActivePower   | Real | Maximum active power (Watts) reading during rollup interval                     |
| ApparentPower    | Real | Average apparent power (VA) reading during rollup interval                      |
| MinApparentPower | Real | Minimum apparent power (VA) reading during rollup interval                      |
| MaxApparentPower | Real | Maximum apparent power (VA) reading during rollup interval                      |
| VoltAmpHours     | Real | Maximum of the cumulative volt-amp-hour meter readings over the rollup interval |
| WattHours        | Real | Maximum of the cumulative watt-hour meter readings over the rollup interval     |

## PDUInletReadingMonthlyRollups

| Field                    | Type    | Notes                                    |
|--------------------------|---------|--|
| PDUInletReadingsRollupID | Bigint  | Unique ID for each reading               |
| PDUID                    | Integer | Foreign key reference to PDUs table      |
| InletID                  | Integer | Foreign key reference to PDUInlets table |
| InletNumber              | Integer | Inlet number on the PDU                  |



| Field            | Type      | Notes  |
|------------------|-----------|--|
| Time             | Timestamp | Local timestamp for the first day of the month over which the rollup was calculated. |
| Voltage          | Real      | Average voltage reading during rollup interval                                       |
| MinVoltage       | Real      | Minimum voltage reading during rollup interval                                       |
| MaxVoltage       | Real      | Maximum voltage reading during rollup interval                                       |
| Current          | Real      | Average current reading (Amps) during rollup interval                                |
| MinCurrent       | Real      | Minimum current reading (Amps) during rollup interval                                |
| MaxCurrent       | Real      | Maximum current reading (Amps) during rollup interval                                |
| PowerFactor      | Real      | Average Power factor reading during rollup interval                                  |
| MinPowerFactor   | Real      | Minimum power factor reading during rollup interval                                  |
| MaxPowerFactor   | Real      | Maximum power factor reading during rollup interval                                  |
| ActivePower      | Real      | Active power drawn by the inlet in Watts   |
| MinActivePower   | Real      | Minimum active power (Watts) reading during rollup interval                          |
| MaxActivePower   | Real      | Maximum active power (Watts) reading during rollup interval                          |
| ApparentPower    | Real      | Apparent power (VA) drawn by the inlet   |
| MinApparentPower | Real      | Minimum apparent power (VA) reading during rollup interval                           |
| MaxApparentPower | Real      | Maximum apparent power (VA) reading during rollup interval                           |
| VoltAmpHours     | Real      | Cumulative volt-amp-hours consumed by the inlet, if available for the PDU            |
| WattHours        | Real      | Cumulative watt-hours consumed by the inlet, if available for the PDU                |

## PDUOutletReadings

The PDUOutletReadings view shows the raw power data collected from PDU outlets. A data record is added for each outlet polled. This data is summarized hourly in a PDUOutletReadingsRollup view, and the outlet records in this view are purged.

| Field               | Type                    | Notes  |
|---------------------|-------------------------|--|
| PDUOutletReadingsID | Integer                 | Unique ID for each reading   |
| PDUID               | Integer                 | Foreign key reference to PDUs table                                    |
| OutletID            | Integer                 | Foreign key reference to PDUOutlets table                              |
| OutletNumber        | Integer                 | PDU outlet number  |
| Time                | Timestamp with Timezone | Local timestamp  |
| CurrentAmps         | Real                    | Amps drawn by the outlet   |
| ActivePower         | Real                    | Active power drawn by the outlet                                       |
| ApparentPower       | Real                    | Apparent power drawn by the outlet                                     |
| WattHour            | Real                    | Cumulative watt-hours consumed by the outlet, if available for the PDU |
| MaxCurrentAmps      | Real                    | Maximum amps drawn by the outlet                                       |
| MinCurrentAmps      | Real                    | Minimum amps drawn by the outlet                                       |
| MaxActivePower      | Real                    | Maximum active power drawn by the outlet                               |
| MinActivePower      | Real                    | Minimum amps drawn by the outlet                                       |
| MaxApparentPower    | Real                    | Maximum apparent power drawn by the outlet                             |
| MinApparentPower    | Real                    | Minimum apparent power drawn by the outlet                             |
| Voltage             | Real                    | Voltage drawn by the outlet  |
| MinVoltage          | Real                    | Minimum voltage reading  |
| MaxVoltage          | Real                    | Maximum voltage reading  |

| Field          | Type | Notes  |
|----------------|------|--|
| PowerFactor    | Real | Power factor of the outlet   |
| MinPowerFactor | Real | Minimum power factor   |
| MaxPowerFactor | Real | Maximum power factor   |
| VoltAmpHours   | Real | Cumulative volt-amp-hours consumed by the outlet, if available for the PDU |

## PDULineReadings

The PDULineReadings view shows the power data collected from PDU current-carrying lines. A data record is added for each line polled. Single-phase PDUs have 1 line. Three-phase PDUs have 3 lines. This data is summarized hourly in a PDULineReadingsRollup view, and the line readings in this view are purged.

| Field              | Type                    | Notes   |
|--------------------|-------------------------|---|
| PDULineReadingsID  | Integer                 | Unique ID for each reading  |
| PDUID              | Integer                 | Foreign Key Reference To PDUs table   |
| InletNumber        | Integer                 | Inlet number on the PDU   |
| LineNumber         | Integer                 | Line number on this PDU   |
| Time               | Timestamp with Timezone | Local timestamp   |
| CurrentAmps        | Real                    | Amps drawn on this line   |
| UnutilizedCapacity | Real                    | Available amps remaining on this line   |
| MaxCurrentAmps     | Real                    | Maximum amps drawn on this line   |
| MinCurrentAmps     | Real                    | Minimum amps drawn on this line   |
| Voltage            | Real                    | Voltage for the line  |
| MinVoltage         | Real                    | Minimum voltage reading over the sample period. Applies to devices with data buffering enabled. |

| Field      | Type | Notes   |
|------------|------|---|
| MaxVoltage | Real | Maximum voltage reading over the sample period. Applies to devices with data buffering enabled. |

## PDUCircuitReadings

| Field                 | Type                     | Notes                                    |
|-----------------------|--------------------------|--|
| PDUCircuitReadingsID  | Big Integer              | Unique circuit number                    |
| PDUID                 | Integer                  | Foreign key reference to PDUs table      |
| PDUCircuitID          | Integer                  | Circuit number on the PDU                |
| Time                  | timestamp with time zone | Local timestamp                          |
| Voltage               | Real                     | Voltage drawn by the circuit             |
| MinVoltage            | Real                     | Minimum voltage reading                  |
| MaxVoltage            | Real                     | Maximum voltage reading                  |
| Current               | Real                     | Amps drawn by the circuit                |
| MinCurrent            | Real                     | Minimum amps drawn by the circuit        |
| MaxCurrent            | Real                     | Maximum amps drawn by the circuit        |
| UnutilizedCapacity    | Real                     | Available amps remaining on this circuit |
| MinUnutilizedCapacity | Real                     | Minimum amps remaining on this circuit   |
| MaxUnutilizedCapacity | Real                     | Maximum amps remaining on this circuit   |
| PowerFactor           | Real                     | Power factor of the circuit              |
| MinPowerFactor        | Real                     | Minimum power factor                     |
| MaxPowerFactor        | Real                     | Maximum power factor                     |
| ActivePower           | Real                     | Active power drawn by the circuit        |

| Field            | Type | Notes   |
|------------------|------|---|
| MinActivePower   | Real | Minimum active power drawn by the circuit         |
| MaxActivePower   | Real | Maximum active power drawn by the circuit         |
| ApparentPower    | Real | Apparent power drawn by the circuit               |
| MinApparentPower | Real | Minimum apparent power drawn by the circuit       |
| MaxApparentPower | Real | Maximum apparent power drawn by the circuit       |
| VoltAmpHour      | Real | Cumulative volt-amp-hours consumed by the circuit |
| WattHour         | Real | Cumulative watt-hours consumed by the circuit     |

## PDUcircuitPoleReadings

| Field                    | Type                     | Notes   |
|--------------------------|--------------------------|---|
| PDUcircuitPoleReadingsID | Big Integer              | Unique circuit pole number                    |
| PDUcircuitPoleID         | Integer                  | Circuit pole number on the PDU                |
| PDUID                    | Integer                  | Foreign key reference to PDUs table           |
| Time                     | timestamp with time zone | Local timestamp                               |
| Voltage                  | Real                     | Voltage drawn by the circuit pole             |
| MinVoltage               | Real                     | Minimum voltage reading                       |
| MaxVoltage               | Real                     | Maximum voltage reading                       |
| Current                  | Real                     | Amps drawn by the circuit pole                |
| MinCurrent               | Real                     | Minimum amps drawn by the circuit pole        |
| MaxCurrent               | Real                     | Maximum amps drawn by the circuit pole        |
| UnutilizedCapacity       | Real                     | Available amps remaining on this circuit pole |



| Field                 | Type | Notes                                       |
|-----------------------|------|---|
| MinUnutilizedCapacity | Real | Minimum amps remaining on this circuit pole |
| MaxUnutilizedCapacity | Real | Maximum amps remaining on this circuit pole |

## PDUcircuitBreakersReadings

The PDUcircuitBreakerReadings view shows the power data collected from circuit breakers on the PDU. This view does not contain any data for PDUs that do not have circuit breakers. A data record is added for each circuit breaker polled. This data is summarized hourly in a PDUcircuitBreakerReadingsRollup view, and the circuit breaker readings in this view are purged.

| Field                       | Type                    | Notes   |
|-----------------------------|-------------------------|---|
| PDUcircuitBreakerReadingsID | Integer                 | Unique ID for each reading                        |
| PDUID                       | Integer                 | Foreign key reference to PDUs table               |
| CircuitBreakerNumber        | Integer                 | Circuit breaker number on the PDU                 |
| CircuitBreakerID            | Integer                 | Foreign key reference to PDUcircuitBreakers table |
| Time                        | Timestamp with Timezone | Local timestamp                                   |
| CurrentAmps                 | Real                    | Current value in Amps                             |
| UnutilizedCapacity          | Real                    | Available amps remaining on this circuit breaker  |
| MaxCurrentAmps              | Real                    | Maximum amps drawn on the circuit breaker         |
| MinCurrentAmps              | Real                    | Minimum amps drawn on the circuit breaker         |

## PDU Sensor Readings

The PDU Sensor Readings view shows the data collected from PDU sensors. A data record is added for each sensor polled. This data is summarized hourly in a PDU Sensor Readings Rollup view and the sensor readings in this view are purged.

| Field                  | Type    | Notes                      |
|------------------------|---------|----------------------------|
| PDU Sensor Readings ID | Integer | Unique ID for each reading |

| Field        | Type                    | Notes  |
|--------------|-------------------------|--|
| SensorID     | Integer                 | Database ID of the sensor as seen in PDUSensors  |
| Time         | Timestamp with Timezone | Local timestamp when the reading occurred  |
| Value        | Real                    | Sensor value   |
| MinimumValue | Real                    | Minimum sensor value over the sample period. Applies to devices with data buffering enabled. |
| MaximumValue | Real                    | Maximum sensor value over the sample period. Applies to devices with data buffering enabled. |

## PDUOutletReadingsRollup - To Be Deprecated

*Note: This table will be deprecated soon. It is recommended to stop using it, and use the new PDUOutletReadingsHourlyRollup, PDUOutletReadingsDailyRollup, and PDUOutletReadingsMonthlyRollup tables. If you experience any performance issues, move to the new tables.*

The PDUOutletReadingsRollup view summarizes the outlet readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDUOutletReadingsRollup view are purged.

| Field                    | Type                    | Notes                                     |
|--------------------------|-------------------------|---|
| PDUOutletReadingRollupID | Integer                 | Non-unique ID for each reading            |
| PDUID                    | Integer                 | Foreign key reference to PDUs table       |
| OutletID                 | Integer                 | Foreign key reference to PDUOutlets table |
| OutletNumber             | Integer                 | Outlet number on the PDU                  |
| RollupInterval           | Integer                 | 1: one hour<br>2: one day<br>3: one month |
| Time                     | Timestamp with Timezone | Timestamp when rollup was created         |

| Field                | Type | Notes   |
|----------------------|------|---|
| MinimumCurrent       | Real | Lowest current (Amps) reading during rollup interval                        |
| MaximumCurrent       | Real | Maximum current (Amps) reading during rollup interval                       |
| AverageCurrent       | Real | Average current (Amps) reading during rollup interval                       |
| MinimumActivePower   | Real | Lowest active power (Watts) reading during rollup interval                  |
| MaximumActivePower   | Real | Maximum active power (Watts) reading during rollup interval                 |
| AverageActivePower   | Real | Average active power (Watts) reading during rollup interval                 |
| MinimumApparentPower | Real | Lowest apparent power (VA) reading during rollup interval                   |
| MaximumApparentPower | Real | Maximum apparent power (VA) reading during rollup interval                  |
| AverageApparentPower | Real | Average apparent power (VA) reading during rollup interval                  |
| MinimumPowerFactor   | Real | Minimum power factor reading during rollup interval                         |
| MaximumPowerFactor   | Real | Maximum power factor reading during rollup interval                         |
| AverageActivePower   | Real | Average power factor reading during rollup interval                         |
| MinimumVoltage       | Real | Minimum voltage reading during rollup interval                              |
| MaximumVoltage       | Real | Maximum voltage reading during rollup interval                              |
| AverageVoltage       | Real | Average voltage reading during rollup interval                              |
| WattHours            | Real | Maximum of the cumulative watt-hour meter readings over the rollup interval |

## PDUOutletReadingHourlyRollups

| Field                    | Type    | Notes                      |
|--------------------------|---------|----------------------------|
| PDUOutletReadingRollupID | Integer | Unique ID for each reading |

| Field                | Type                    | Notes   |
|----------------------|-------------------------|---|
| PDUID                | Integer                 | Foreign key reference to PDUs table   |
| OutletID             | Integer                 | Foreign key reference to PDUOutlets table                                       |
| OutletNumber         | Integer                 | Outlet number on the PDU  |
| Time                 | Timestamp with Timezone | Timestamp when rollup was created   |
| MinimumCurrent       | Real                    | Lowest current (Amps) reading during rollup interval                            |
| MaximumCurrent       | Real                    | Maximum current (Amps) reading during rollup interval                           |
| AverageCurrent       | Real                    | Average current (Amps) reading during rollup interval                           |
| MinimumActivePower   | Real                    | Lowest active power (Watts) reading during rollup interval                      |
| MaximumActivePower   | Real                    | Maximum active power (Watts) reading during rollup interval                     |
| AverageActivePower   | Real                    | Average active power (Watts) reading during rollup interval                     |
| MinimumApparentPower | Real                    | Lowest apparent power (VA) reading during rollup interval                       |
| MaximumApparentPower | Real                    | Maximum apparent power (VA) reading during rollup interval                      |
| AverageApparentPower | Real                    | Average apparent power (VA) reading during rollup interval                      |
| MinimumVoltage       | Real                    | Minimum voltage reading during rollup interval                                  |
| MaximumVoltage       | Real                    | Maximum voltage reading during rollup interval                                  |
| AverageVoltage       | Real                    | Average voltage reading during rollup interval                                  |
| VoltAmpHours         | Real                    | Maximum of the cumulative volt-amp-hour meter readings over the rollup interval |
| WattHours            | Real                    | Maximum of the cumulative watt-hour meter readings over the rollup interval     |
| AveragePowerFactor   | Real                    | Average power factor reading during rollup interval                             |
| MinimumPowerFactor   | Real                    | Minimum power factor reading during rollup interval                             |

| Field              | Type | Notes   |
|--------------------|------|---|
| MaximumPowerFactor | Real | Maximum power factor reading during rollup interval |

## PDUOutletReadingDailyRollups

| Field                    | Type                    | Notes   |
|--------------------------|-------------------------|---|
| PDUOutletReadingRollupID | Integer                 | Unique ID for each reading                                  |
| PDUID                    | Integer                 | Foreign key reference to PDUs table                         |
| OutletID                 | Integer                 | Foreign key reference to PDUOutlets table                   |
| OutletNumber             | Integer                 | Outlet number on the PDU                                    |
| Time                     | Timestamp with Timezone | Timestamp when rollup was created                           |
| MinimumCurrent           | Real                    | Lowest current (Amps) reading during rollup interval        |
| MaximumCurrent           | Real                    | Maximum current (Amps) reading during rollup interval       |
| AverageCurrent           | Real                    | Average current (Amps) reading during rollup interval       |
| MinimumActivePower       | Real                    | Lowest active power (Watts) reading during rollup interval  |
| MaximumActivePower       | Real                    | Maximum active power (Watts) reading during rollup interval |
| AverageActivePower       | Real                    | Average active power (Watts) reading during rollup interval |
| MinimumApparentPower     | Real                    | Lowest apparent power (VA) reading during rollup interval   |
| MaximumApparentPower     | Real                    | Maximum apparent power (VA) reading during rollup interval  |
| AverageApparentPower     | Real                    | Average apparent power (VA) reading during rollup interval  |
| MinimumVoltage           | Real                    | Minimum voltage reading during rollup interval              |
| MaximumVoltage           | Real                    | Maximum voltage reading during rollup interval              |



| Field              | Type | Notes   |
|--------------------|------|---|
| AverageVoltage     | Real | Average voltage reading during rollup interval                                  |
| VoltAmpHours       | Real | Maximum of the cumulative volt-amp-hour meter readings over the rollup interval |
| WattHours          | Real | Maximum of the cumulative watt-hour meter readings over the rollup interval     |
| AveragePowerFactor | Real | Average power factor reading during rollup interval                             |
| MinimumPowerFactor | Real | Minimum power factor reading during rollup interval                             |
| MaximumPowerFactor | Real | Maximum power factor reading during rollup interval                             |

## PDUOutletReadingMonthlyRollups

| Field                    | Type                    | Notes   |
|--------------------------|-------------------------|---|
| PDUOutletReadingRollupID | Integer                 | Unique ID for each reading  |
| PDUID                    | Integer                 | Foreign key reference to PDUs table   |
| OutletID                 | Integer                 | Foreign key reference to PDUOutlets table   |
| OutletNumber             | Integer                 | Outlet number on the PDU  |
| Time                     | Timestamp with Timezone | Local timestamp for the first day of the month over which the rollup was calculated |
| MinimumCurrent           | Real                    | Lowest current (Amps) reading during rollup interval                                |
| MaximumCurrent           | Real                    | Maximum current (Amps) reading during rollup interval                               |
| AverageCurrent           | Real                    | Average current (Amps) reading during rollup interval                               |
| MinimumActivePower       | Real                    | Lowest active power (Watts) reading during rollup interval                          |
| MaximumActivePower       | Real                    | Maximum active power (Watts) reading during rollup interval                         |

| Field                | Type | Notes   |
|----------------------|------|---|
| AverageActivePower   | Real | Average active power (Watts) reading during rollup interval                     |
| MinimumApparentPower | Real | Lowest apparent power (VA) reading during rollup interval                       |
| MaximumApparentPower | Real | Maximum apparent power (VA) reading during rollup interval                      |
| AverageApparentPower | Real | Average apparent power (VA) reading during rollup interval                      |
| MinimumVoltage       | Real | Minimum voltage reading during rollup interval                                  |
| MaximumVoltage       | Real | Maximum voltage reading during rollup interval                                  |
| AverageVoltage       | Real | Average voltage reading during rollup interval                                  |
| VoltAmpHours         | Real | Maximum of the cumulative volt-amp-hour meter readings over the rollup interval |
| WattHours            | Real | Maximum of the cumulative watt-hour meter readings over the rollup interval     |
| AveragePowerFactor   | Real | Average power factor reading during rollup interval                             |
| MinimumPowerFactor   | Real | Minimum power factor reading during rollup interval                             |
| MaximumPowerFactor   | Real | Maximum power factor reading during rollup interval                             |

## PDUReadingsRollup - To Be Deprecated

*Note: This table will be deprecated soon. It is recommended to stop using it, and use the new PDUInletReadings tables.*

The PDUReadingsRollup view summarizes the PDU readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDUReadingsRollup are purged.

| Field             | Type    | Notes                          |
|-------------------|---------|--------------------------------|
| PDUReadingsRollup | Integer | Non-unique ID for each reading |
| PDUID             | Integer | Foreign key reference to PDU   |
| RollupInterval    | Integer | 1: one hour                    |

| Field                | Type                    | Notes   |
|----------------------|-------------------------|---|
|                      |                         | 2: one day<br>3: one month  |
| Time                 | Timestamp with Timezone | Timestamp when rollup was created   |
| MinimumActivePower   | Real                    | Lowest active power (Watts) reading during rollup interval                  |
| MaximumActivePower   | Real                    | Maximum active power (Watts) reading during rollup interval                 |
| AverageActivePower   | Real                    | Average active power (Watts) reading during rollup interval                 |
| MinimumApparentPower | Real                    | Lowest apparent power (VA) reading during rollup interval                   |
| MaximumApparentPower | Real                    | Maximum apparent power (VA) reading during rollup interval                  |
| AverageApparentPower | Real                    | Average apparent power (VA) reading during rollup interval                  |
| WattHours            | Real                    | Maximum of the cumulative watt-hour meter readings over the rollup interval |

## PDULineReadingsRollup - To Be Deprecated

Note: This table will be deprecated soon. It is recommended to stop using it, and use the new PDULineReadingsHourlyRollup, PDULineReadingsDailyRollup, PDULineReadingsMonthlyRollup tables.

The PDULineReadingsRollup view summarizes the line readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDULineReadingsRollup is purged.

| Field                   | Type    | Notes                          |
|-------------------------|---------|--------------------------------|
| PDULineReadingsRollupID | Integer | Non-unique ID for each reading |
| PDUID                   | Integer | Foreign key reference to PDU   |
| LineNumber              | Integer | Line number on the PDU         |
| InletNumber             | Integer | Inlet number on the PDU        |
| RollupInterval          | Integer | 1: one hour                    |



| Field                     | Type                    | Notes   |
|---------------------------|-------------------------|---|
|                           |                         | 2: one day<br>3: one month                                |
| Time                      | Timestamp with Timezone | Timestamp when rollup was created                         |
| MinimumCurrent            | Real                    | Lowest current (Amps) reading during rollup interval      |
| MaximumCurrent            | Real                    | Maximum current (Amps) reading during rollup interval     |
| AverageCurrent            | Real                    | Average current (Amps) reading during rollup interval     |
| MinimumUnutilizedCapacity | Real                    | Lowest unutilized capacity (Amps) during rollup interval  |
| MaximumUnutilizedCapacity | Real                    | Maximum unutilized capacity (Amps) during rollup interval |
| AverageUnutilizedCapacity | Real                    | Average unutilized capacity (Amps) during rollup interval |

## PDULineReadingHourlyRollups

The PDULineReadingsHourlyRollup view summarizes the line readings power data over the hourly roll-up interval.

| Field                   | Type                    | Notes  |
|-------------------------|-------------------------|--|
| PDULineReadingsRollupID | Integer                 | Unique ID for each reading                           |
| PDUID                   | Integer                 | Foreign key reference to PDU                         |
| LineNumber              | Integer                 | Line number on the PDU                               |
| InletNumber             | Integer                 | Inlet number on the PDU                              |
| Time                    | Timestamp with Timezone | Timestamp when rollup was created                    |
| MinimumCurrent          | Real                    | Lowest current (Amps) reading during rollup interval |

| Field                     | Type | Notes   |
|---------------------------|------|---|
| MaximumCurrent            | Real | Maximum current (Amps) reading during rollup interval     |
| AverageCurrent            | Real | Average current (Amps) reading during rollup interval     |
| MinimumUnutilizedCapacity | Real | Lowest unutilized capacity (Amps) during rollup interval  |
| MaximumUnutilizedCapacity | Real | Maximum unutilized capacity (Amps) during rollup interval |
| AverageUnutilizedCapacity | Real | Average unutilized capacity (Amps) during rollup interval |

## PDULineReadingDailyRollups

The PDULineReadingsDailyRollup view summarizes the line readings power data over the daily roll-up interval.

| Field                     | Type                    | Notes   |
|---------------------------|-------------------------|---|
| PDULineReadingsRollupID   | Integer                 | Unique ID for each reading                                |
| PDUID                     | Integer                 | Foreign key reference to PDU                              |
| LineNumber                | Integer                 | Line number on the PDU                                    |
| InletNumber               | Integer                 | Inlet number on the PDU                                   |
| Time                      | Timestamp with Timezone | Timestamp when rollup was created                         |
| MinimumCurrent            | Real                    | Lowest current (Amps) reading during rollup interval      |
| MaximumCurrent            | Real                    | Maximum current (Amps) reading during rollup interval     |
| AverageCurrent            | Real                    | Average current (Amps) reading during rollup interval     |
| MinimumUnutilizedCapacity | Real                    | Lowest unutilized capacity (Amps) during rollup interval  |
| MaximumUnutilizedCapacity | Real                    | Maximum unutilized capacity (Amps) during rollup interval |



| Field                     | Type | Notes   |
|---------------------------|------|---|
| AverageUnutilizedCapacity | Real | Average unutilized capacity (Amps) during rollup interval |

## PDULineReadingMonthlyRollups

The PDULineReadingsMonthlyRollup view summarizes the line readings power data over the monthly roll-up interval.

| Field                     | Type                    | Notes   |
|---------------------------|-------------------------|---|
| PDULineReadingsRollupID   | Integer                 | Unique ID for each reading  |
| PDUID                     | Integer                 | Foreign key reference to PDU  |
| LineNumber                | Integer                 | Line number on the PDU  |
| InletNumber               | Integer                 | Inlet number on the PDU   |
| Time                      | Timestamp with Timezone | Local timestamp for the first day of the month over which the rollup was calculated |
| MinimumCurrent            | Real                    | Lowest current (Amps) reading during rollup interval                                |
| MaximumCurrent            | Real                    | Maximum current (Amps) reading during rollup interval                               |
| AverageCurrent            | Real                    | Average current (Amps) reading during rollup interval                               |
| MinimumUnutilizedCapacity | Real                    | Lowest unutilized capacity (Amps) during rollup interval                            |
| MaximumUnutilizedCapacity | Real                    | Maximum unutilized capacity (Amps) during rollup interval                           |
| AverageUnutilizedCapacity | Real                    | Average unutilized capacity (Amps) during rollup interval                           |

## PDUcircuitReadingMonthlyRollups

| Field                             | Type        | Notes                      |
|-----------------------------------|-------------|----------------------------|
| PDUcircuitReadingMonthlyRollupsID | Big Integer | Unique ID for each reading |



| Field                 | Type                     | Notes   |
|-----------------------|--------------------------|---|
| PDUID                 | Integer                  | Foreign key reference to PDUs table   |
| PDUcircuitID          | Integer                  | Foreign key reference to the PDUcircuits table  |
| Time                  | timestamp with time zone | Timestamp when rollup was created   |
| Year                  | double precision         | Year when rollup was created  |
| Month                 | double precision         | Month when rollup was created   |
| Voltage               | Real                     | Average voltage reading during rollup interval  |
| MinVoltage            | Real                     | Minimum voltage reading during rollup interval  |
| MaxVoltage            | Real                     | Maximum voltage reading during rollup interval  |
| Current               | Real                     | Average current reading (Amps) during rollup interval                                 |
| MinCurrent            | Real                     | Minimum current reading (Amps) during rollup interval                                 |
| MaxCurrent            | Real                     | Maximum current reading (Amps) during rollup interval                                 |
| UnutilizedCapacity    | Real                     | Average unutilized capacity (rated amps minus current) reading during rollup interval |
| MinUnutilizedCapacity | Real                     | Minimum unutilized capacity (rated amps minus current) reading during rollup interval |
| MaxUnutilizedCapacity | Real                     | Maximum unutilized capacity (rated amps minus current) reading during rollup interval |
| PowerFactor           | Real                     | Average Power factor reading during rollup interval                                   |
| MinPowerFactor        | Real                     | Minimum power factor reading during rollup interval                                   |
| MaxPowerFactor        | Real                     | Maximum power factor reading during rollup interval                                   |
| ActivePower           | Real                     | Average active power (Watts) reading during rollup interval                           |

| Field            | Type | Notes   |
|------------------|------|---|
| MinActivePower   | Real | Minimum active power (Watts) reading during rollup interval                     |
| MaxActivePower   | Real | Maximum active power (Watts) reading during rollup interval                     |
| ApparentPower    | Real | Average apparent power (VA) reading during rollup interval                      |
| MinApparentPower | Real | Minimum apparent power (VA) reading during rollup interval                      |
| MaxApparentPower | Real | Maximum apparent power (VA) reading during rollup interval                      |
| VoltAmpHour      | Real | Maximum of the cumulative volt-amp-hour meter readings over the rollup interval |
| WattHour         | Real | Maximum of the cumulative watt-hour meter readings over the rollup interval     |

## PDUCircuitReadingHourlyRollups

| Field                            | Type                     | Notes  |
|----------------------------------|--------------------------|--|
| PDUCircuitReadingHourlyRollupsID | Big Integer              | Unique ID for each reading                     |
| PDUID                            | Integer                  | Foreign key reference to PDUs table            |
| PDUCircuitID                     | Integer                  | Foreign key reference to the PDUCircuits table |
| Time                             | timestamp with time zone | Timestamp when rollup was created              |
| Voltage                          | Real                     | Average voltage reading during rollup interval |
| MinVoltage                       | Real                     | Minimum voltage reading during rollup interval |
| MaxVoltage                       | Real                     | Maximum voltage reading during rollup interval |

| Field                 | Type | Notes   |
|-----------------------|------|---|
| Current               | Real | Average current reading (Amps) during rollup interval                                 |
| MinCurrent            | Real | Minimum current reading (Amps) during rollup interval                                 |
| MaxCurrent            | Real | Maximum current reading (Amps) during rollup interval                                 |
| UnutilizedCapacity    | Real | Average unutilized capacity (rated amps minus current) reading during rollup interval |
| MinUnutilizedCapacity | Real | Minimum unutilized capacity (rated amps minus current) reading during rollup interval |
| MaxUnutilizedCapacity | Real | Maximum unutilized capacity (rated amps minus current) reading during rollup interval |
| PowerFactor           | Real | Average Power factor reading during rollup interval                                   |
| MinPowerFactor        | Real | Minimum power factor reading during rollup interval                                   |
| MaxPowerFactor        | Real | Maximum power factor reading during rollup interval                                   |
| ActivePower           | Real | Average active power (Watts) reading during rollup interval                           |
| MinActivePower        | Real | Minimum active power (Watts) reading during rollup interval                           |
| MaxActivePower        | Real | Maximum active power (Watts) reading during rollup interval                           |
| ApparentPower         | Real | Average apparent power (VA) reading during rollup interval                            |
| MinApparentPower      | Real | Minimum apparent power (VA) reading during rollup interval                            |
| MaxApparentPower      | Real | Maximum apparent power (VA) reading during rollup interval                            |
| VoltAmpHour           | Real | Maximum of the cumulative volt-amp-hour meter readings over the rollup interval       |
| WattHour              | Real | Maximum of the cumulative watt-hour meter readings                                    |

| Field | Type | Notes                    |
|-------|------|--------------------------|
|       |      | over the rollup interval |

## PDUCircuitPoleReadingDailyRollups

| Field                               | Type                     | Notes   |
|-------------------------------------|--------------------------|---|
| PDUCircuitPoleReadingDailyRollupsID | Big Integer              | Unique ID for each reading  |
| PDUCircuitPoleID                    | Integer                  | Circuit pole number on the PDU  |
| PDUID                               | Integer                  | Foreign key reference to PDUs table   |
| Time                                | timestamp with time zone | Timestamp when rollup was created   |
| Date                                | date                     | Date when rollup was created  |
| Voltage                             | Real                     | Average voltage reading during rollup interval  |
| MinVoltage                          | Real                     | Minimum voltage reading during rollup interval  |
| MaxVoltage                          | Real                     | Maximum voltage reading during rollup interval  |
| Current                             | Real                     | Average current reading (Amps) during rollup interval                                 |
| MinCurrent                          | Real                     | Minimum current reading (Amps) during rollup interval                                 |
| MaxCurrent                          | Real                     | Maximum current reading (Amps) during rollup interval                                 |
| UnutilizedCapacity                  | Real                     | Average unutilized capacity (rated amps minus current) reading during rollup interval |
| MinUnutilizedCapacity               | Real                     | Minimum unutilized capacity (rated amps minus current) reading during rollup interval |
| MaxUnutilizedCapacity               | Real                     | Maximum unutilized capacity (rated amps minus current) reading during rollup interval |

## PDUCircuitPoleReadingMonthlyRollups

| Field                                 | Type                     | Notes   |
|---------------------------------------|--------------------------|---|
| PDUCircuitPoleReadingMonthlyRollupsID | Big Integer              | Unique ID for each reading  |
| PDUCircuitPoleID                      | Integer                  | Circuit pole number on the PDU  |
| PDUID                                 | Integer                  | Foreign key reference to PDUs table   |
| Time                                  | timestamp with time zone | Timestamp when rollup was created   |
| Year                                  | double precision         | Year when rollup was created  |
| Month                                 | double precision         | Month when rollup was created   |
| Voltage                               | Real                     | Average voltage reading during rollup interval  |
| MinVoltage                            | Real                     | Minimum voltage reading during rollup interval  |
| MaxVoltage                            | Real                     | Maximum voltage reading during rollup interval  |
| Current                               | Real                     | Average current reading (Amps) during rollup interval                                 |
| MinCurrent                            | Real                     | Minimum current reading (Amps) during rollup interval                                 |
| MaxCurrent                            | Real                     | Maximum current reading (Amps) during rollup interval                                 |
| UnutilizedCapacity                    | Real                     | Average unutilized capacity (rated amps minus current) reading during rollup interval |
| MinUnutilizedCapacity                 | Real                     | Minimum unutilized capacity (rated amps minus current) reading during rollup interval |
| MaxUnutilizedCapacity                 | Real                     | Maximum unutilized capacity (rated amps minus current) reading during rollup interval |



## PDUCircuitPoleReadingHourlyRollups

| Field                                | Type                     | Notes   |
|--------------------------------------|--------------------------|---|
| PDUCircuitPoleReadingHourlyRollupsID | Big Integer              | Unique ID for each reading  |
| PDUCircuitPoleID                     | Integer                  | Circuit pole number on the PDU  |
| PDUID                                | Integer                  | Foreign key reference to PDUs table   |
| Time                                 | timestamp with time zone | Timestamp when rollup was created   |
| Voltage                              | Real                     | Average voltage reading during rollup interval  |
| MinVoltage                           | Real                     | Minimum voltage reading during rollup interval  |
| MaxVoltage                           | Real                     | Maximum voltage reading during rollup interval  |
| Current                              | Real                     | Average current reading (Amps) during rollup interval                                 |
| MinCurrent                           | Real                     | Minimum current reading (Amps) during rollup interval                                 |
| MaxCurrent                           | Real                     | Maximum current reading (Amps) during rollup interval                                 |
| UnutilizedCapacity                   | Real                     | Average unutilized capacity (rated amps minus current) reading during rollup interval |
| MinUnutilizedCapacity                | Real                     | Minimum unutilized capacity (rated amps minus current) reading during rollup interval |
| MaxUnutilizedCapacity                | Real                     | Maximum unutilized capacity (rated amps minus current) reading during rollup interval |

## PDUCircuitReadingDailyRollups

| Field                           | Type                     | Notes   |
|---------------------------------|--------------------------|---|
| PDUCircuitReadingDailyRollupsID | Big Integer              |   |
| PDUID                           | Integer                  | Foreign key reference to PDUs table   |
| PDUCircuitID                    | Integer                  | Foreign key reference to the PDUcircuits table  |
| Time                            | timestamp with time zone | Timestamp when rollup was created   |
| Date                            | date                     | Date when rollup was created  |
| Voltage                         | Real                     | Average voltage reading during rollup interval  |
| MinVoltage                      | Real                     | Minimum voltage reading during rollup interval  |
| MaxVoltage                      | Real                     | Maximum voltage reading during rollup interval  |
| Current                         | Real                     | Average current reading (Amps) during rollup interval                                 |
| MinCurrent                      | Real                     | Minimum current reading (Amps) during rollup interval                                 |
| MaxCurrent                      | Real                     | Maximum current reading (Amps) during rollup interval                                 |
| UnutilizedCapacity              | Real                     | Average unutilized capacity (rated amps minus current) reading during rollup interval |
| MinUnutilizedCapacity           | Real                     | Minimum unutilized capacity (rated amps minus current) reading during rollup interval |
| MaxUnutilizedCapacity           | Real                     | Maximum unutilized capacity (rated amps minus current) reading during rollup interval |
| PowerFactor                     | Real                     | Average Power factor reading during rollup interval                                   |
| MinPowerFactor                  | Real                     | Minimum power factor reading during rollup interval                                   |
| MaxPowerFactor                  | Real                     | Maximum power factor reading during rollup interval                                   |
| ActivePower                     | Real                     | Average active power (Watts) reading during rollup interval                           |



| Field            | Type | Notes   |
|------------------|------|---|
| MinActivePower   | Real | Minimum active power (Watts) reading during rollup interval                     |
| MaxActivePower   | Real | Maximum active power (Watts) reading during rollup interval                     |
| ApparentPower    | Real | Average apparent power (VA) reading during rollup interval                      |
| MinApparentPower | Real | Minimum apparent power (VA) reading during rollup interval                      |
| MaxApparentPower | Real | Maximum apparent power (VA) reading during rollup interval                      |
| VoltAmpHour      | Real | Maximum of the cumulative volt-amp-hour meter readings over the rollup interval |
| WattHour         | Real | Maximum of the cumulative watt-hour meter readings over the rollup interval     |

## PDUcircuitPoleReadingMonthlyRollups

| Field                                 | Type                     | Notes                               |
|---------------------------------------|--------------------------|-------------------------------------|
| PDUcircuitPoleReadingMonthlyRollupsID | Big Integer              | Unique ID for each reading          |
| PDUcircuitPoleID                      | Integer                  | Circuit pole number on the PDU      |
| PDUID                                 | Integer                  | Foreign key reference to PDUs table |
| Time                                  | timestamp with time zone | Timestamp when rollup was created   |
| Year                                  | double precision         | Year when rollup was created        |
| Month                                 | double precision         | Month when rollup was created       |



| Field                 | Type | Notes   |
|-----------------------|------|---|
| Voltage               | Real | Average voltage reading during rollup interval  |
| MinVoltage            | Real | Minimum voltage reading during rollup interval  |
| MaxVoltage            | Real | Maximum voltage reading during rollup interval  |
| Current               | Real | Average current reading (Amps) during rollup interval                                 |
| MinCurrent            | Real | Minimum current reading (Amps) during rollup interval                                 |
| MaxCurrent            | Real | Maximum current reading (Amps) during rollup interval                                 |
| UnutilizedCapacity    | Real | Average unutilized capacity (rated amps minus current) reading during rollup interval |
| MinUnutilizedCapacity | Real | Minimum unutilized capacity (rated amps minus current) reading during rollup interval |
| MaxUnutilizedCapacity | Real | Maximum unutilized capacity (rated amps minus current) reading during rollup interval |

## PDUcircuitBreakerReadingsRollup - To Be Deprecated

*Note: This table will be deprecated soon. It is recommended to stop using it, and use the new PDUcircuitBreakerReadingsHourlyRollup, PDUcircuitBreakerReadingDailyRollups, and PDUcircuitBreakerReadingMonthlyRollups tables. If you experience any performance issues, move to the new tables.*

The PDUcircuitBreakerReadingsRollup view summarizes the circuit breaker readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDUcircuitBreakerReadingsRollup view are purged.

| Field                             | Type    | Notes                             |
|-----------------------------------|---------|-----------------------------------|
| PDUcircuitBreakerReadingsRollupID | Integer | Non-unique ID for each reading    |
| PDUID                             | Integer | Foreign key reference to PDU      |
| CircuitBreakerNumber              | Integer | Circuit breaker number on the PDU |

| Field                     | Type                    | Notes   |
|---------------------------|-------------------------|---|
| CircuitBreakerID          | Integer                 | Foreign key reference to PDUcircuitBreakers table         |
| RollupInterval            | Integer                 | 1: one hour<br>2: one day<br>3: one month                 |
| Time                      | Timestamp with Timezone | Timestamp when rollup was created                         |
| MinimumCurrent            | Real                    | Lowest current (Amps) reading during rollup interval      |
| MaximumCurrent            | Real                    | Maximum current (Amps) reading during rollup interval     |
| AverageCurrent            | Real                    | Average current (Amps) reading during rollup interval     |
| MinimumUnutilizedCapacity | Real                    | Lowest unutilized capacity (Amps) during rollup interval  |
| MaximumUnutilizedCapacity | Real                    | Maximum unutilized capacity (Amps) during rollup interval |
| AverageUnutilizedCapacity | Real                    | Average unutilized capacity (Amps) during rollup interval |

## PDUcircuitBreakerReadingHourlyRollups

The PDUcircuitBreakerReadingHourlyRollup view summarizes the circuit breaker readings power data over the hourly roll-up interval.

| Field                             | Type    | Notes                             |
|-----------------------------------|---------|-----------------------------------|
| PDUcircuitBreakerReadingsRollupID | Integer | Unique ID for each reading        |
| PDUID                             | Integer | Foreign key reference to PDU      |
| CircuitBreakerNumber              | Integer | Circuit breaker number on the PDU |

| Field                     | Type                    | Notes   |
|---------------------------|-------------------------|---|
| CircuitBreakerID          | Integer                 | Foreign key reference to PDUcircuitBreakers table         |
| Time                      | Timestamp with Timezone | Timestamp when rollup was created                         |
| MinimumCurrent            | Real                    | Lowest current (Amps) reading during rollup interval      |
| MaximumCurrent            | Real                    | Maximum current (Amps) reading during rollup interval     |
| AverageCurrent            | Real                    | Average current (Amps) reading during rollup interval     |
| MinimumUnutilizedCapacity | Real                    | Lowest unutilized capacity (Amps) during rollup interval  |
| MaximumUnutilizedCapacity | Real                    | Maximum unutilized capacity (Amps) during rollup interval |
| AverageUnutilizedCapacity | Real                    | Average unutilized capacity (Amps) during rollup interval |

## PDUcircuitBreakerReadingDailyRollups

The PDUcircuitBreakerReadingsDailyRollup view summarizes the circuit breaker readings power data over the daily roll-up interval.

| Field                             | Type           | Notes   |
|-----------------------------------|----------------|---|
| PDUcircuitBreakerReadingsRollupID | Integer        | Unique ID for each reading                        |
| PDUID                             | Integer        | Foreign key reference to PDU                      |
| CircuitBreakerNumber              | Integer        | Circuit breaker number on the PDU                 |
| CircuitBreakerID                  | Integer        | Foreign key reference to PDUcircuitBreakers table |
| Time                              | Timestamp with | Timestamp when rollup was created                 |

| Field                     | Type     | Notes   |
|---------------------------|----------|---|
|                           | Timezone |   |
| MinimumCurrent            | Real     | Lowest current (Amps) reading during rollup interval      |
| MaximumCurrent            | Real     | Maximum current (Amps) reading during rollup interval     |
| AverageCurrent            | Real     | Average current (Amps) reading during rollup interval     |
| MinimumUnutilizedCapacity | Real     | Lowest unutilized capacity (Amps) during rollup interval  |
| MaximumUnutilizedCapacity | Real     | Maximum unutilized capacity (Amps) during rollup interval |
| AverageUnutilizedCapacity | Real     | Average unutilized capacity (Amps) during rollup interval |

## PDUCircuitBreakerReadingMonthlyRollups

The PDUCircuitBreakerReadingsMonthlyRollup view summarizes the circuit breaker readings power data over the monthly roll-up interval.

| Field                             | Type                    | Notes   |
|-----------------------------------|-------------------------|---|
| PDUCircuitBreakerReadingsRollupID | Integer                 | Unique ID for each reading  |
| PDUID                             | Integer                 | Foreign key reference to PDU  |
| CircuitBreakerNumber              | Integer                 | Circuit breaker number on the PDU   |
| CircuitBreakerID                  | Integer                 | Foreign key reference to PDUCircuitBreakers table                                   |
| Time                              | Timestamp with Timezone | Local timestamp for the first day of the month over which the rollup was calculated |
| MinimumCurrent                    | Real                    | Lowest current (Amps) reading during rollup interval                                |

| Field                     | Type | Notes   |
|---------------------------|------|---|
| MaximumCurrent            | Real | Maximum current (Amps) reading during rollup interval     |
| AverageCurrent            | Real | Average current (Amps) reading during rollup interval     |
| MinimumUnutilizedCapacity | Real | Lowest unutilized capacity (Amps) during rollup interval  |
| MaximumUnutilizedCapacity | Real | Maximum unutilized capacity (Amps) during rollup interval |
| AverageUnutilizedCapacity | Real | Average unutilized capacity (Amps) during rollup interval |

## PDUSensorReadingsRollup - To Be Deprecated

*Note: This table will be deprecated soon. It is recommended to stop using it, and use the new PDUSensorReadingsHourlyRollups, PDUSensorReadingsDailyRollups, and PDUSensorReadingsMonthlyRollups tables. If you experience any performance issues, move to the new tables.*

The PDUSensorReadingsRollup view summarizes the sensor readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDUSensorReadingsRollup view are purged.

| Field                     | Type                    | Notes   |
|---------------------------|-------------------------|---|
| PDUSensorReadingsRollupID | Integer                 | Non-unique ID for each reading                  |
| SensorID                  | Integer                 | Database ID of the sensor as seen in PDUSensors |
| RollupInterval            | Integer                 | 1: one hour<br>2: one day<br>3: one month       |
| Time                      | Timestamp with Timezone | Timestamp when rollup was created               |
| MinimumValue              | Real                    | Lowest sensor reading during rollup interval    |



| Field        | Type | Notes   |
|--------------|------|---|
| MaximumValue | Real | Maximum sensor reading during rollup interval |
| AverageValue | Real | Average sensor reading during rollup interval |

## PDUSensorReadingHourlyRollup

The PDUSensorReadingsHourlyRollup view summarizes the sensor readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDUSensorReadingsRollup view are purged.

| Field                     | Type                    | Notes   |
|---------------------------|-------------------------|---|
| PDUSensorReadingsRollupID | Integer                 | Unique ID for each reading                      |
| SensorID                  | Integer                 | Database ID of the sensor as seen in PDUSensors |
| Time                      | Timestamp with Timezone | Timestamp when rollup was created               |
| MinimumValue              | Real                    | Lowest sensor reading during rollup interval    |
| MaximumValue              | Real                    | Maximum sensor reading during rollup interval   |
| AverageValue              | Real                    | Average sensor reading during rollup interval   |

## PDUSensorReadingDailyRollup

The PDUSensorReadingsDailyRollup view summarizes the sensor readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDUSensorReadingsRollup view are purged.

| Field                     | Type                    | Notes   |
|---------------------------|-------------------------|---|
| PDUSensorReadingsRollupID | Integer                 | Unique ID for each reading                      |
| SensorID                  | Integer                 | Database ID of the sensor as seen in PDUSensors |
| Time                      | Timestamp with Timezone | Timestamp when rollup was created               |
| MinimumValue              | Real                    | Lowest sensor reading during rollup interval    |

| Field        | Type | Notes   |
|--------------|------|---|
| MaximumValue | Real | Maximum sensor reading during rollup interval |
| AverageValue | Real | Average sensor reading during rollup interval |

## PDUSensorReadingMonthlyRollup

The PDUSensorReadingsMonthlyRollup view summarizes the sensor readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDUSensorReadingsRollup view are purged.

| Field                     | Type                    | Notes   |
|---------------------------|-------------------------|---|
| PDUSensorReadingsRollupID | Integer                 | Unique ID for each reading  |
| SensorID                  | Integer                 | Database ID of the sensor as seen in PDUSensors                                     |
| Time                      | Timestamp with Timezone | Local timestamp for the first day of the month over which the rollup was calculated |
| MinimumValue              | Real                    | Lowest sensor reading during rollup interval  |
| MaximumValue              | Real                    | Maximum sensor reading during rollup interval                                       |
| AverageValue              | Real                    | Average sensor reading during rollup interval                                       |

## PDUSensors

The PDUSensors view contains information about sensors attached to PDUs that Power IQ manages.

| Field        | Type    | Notes   |
|--------------|---------|---|
| SensorID     | Integer | Auto-generated ID                                     |
| PDUID        | Integer | Foreign key reference to PDUs table                   |
| PDUSensorID  | Integer | ID of the sensor on the PDU, as gathered from the pdu |
| SensorNumber | Integer | Sensor number on the PDU                              |

| Field         | Type         | Notes  |
|---------------|--------------|--|
| AttributeName | VarChar(64)  | Type of sensor   |
| Label         | VarChar(255) | Sensor's label as gathered from the PDU                                  |
| Removed       | VarChar(64)  | When the sensor was removed from the system, or null for current sensors |
| Position      | VarChar(10)  | Sensor position on the PDU: inlet, outlet or outside air                 |

## PDUTransferSwitchStates

This view represents the state of a Transfer Switch at a particular moment in time, normally recorded when the state of the switch has changed.

| Field                     | Type                    | Notes   |
|---------------------------|-------------------------|---|
| PDUTransferSwitchStatesID | BigInt                  | The primary key for this view   |
| PDUTransferSwitchesID     | Integer                 | Foreign key reference to the PDUTransferSwitches view.                |
| ActivePDUInletNumber      | VarChar(32)             | The ordinal of the active inlet.                                      |
| OperatingStatus           | VarChar(32)             | A string representing the operating status reported by the PDU's MIB. |
| Time                      | Timestamp with Timezone | Local timestamp   |

## PDUTransferSwitches

This view represents the physical transfer switch inside of a PDU of type 'Rack Transfer Switch'.

| Field                 | Type                    | Notes   |
|-----------------------|-------------------------|---|
| PDUTransferSwitchesID | Integer                 | The primary key for this view                                       |
| PDUID                 | Integer                 | Foreign key reference to the PDUs view.                             |
| CreatedAt             | Timestamp with Timezone | The date and time that the Transfer Switch was added to the system. |



| Field     | Type                    | Notes  |
|-----------|-------------------------|--|
| UpdatedAt | Timestamp with Timezone | The date and time this Transfer Switch was last updated. |



## TagEntries

This view shows all of the tags that have been applied to an entity.

| Field        | Type                    | Notes  |
|--------------|-------------------------|--|
| TagEntriesID | Integer                 | The primary key for this view                                  |
| TagsID       | Integer                 | Foreign key reference to the Tags view.                        |
| TaggableType | VarChar(255)            | The type of EDM entity that was tagged (Room, Rack, PDU, etc.) |
| TaggableID   | Integer                 | Foreign key reference to the appropriate entity view.          |
| CreatedAt    | Timestamp with Timezone | The date and time this Tag Entry was created.                  |
| UpdatedAt    | Timestamp with Timezone | The date and time this Tag Entry was last updated.             |



## TagGroups

This view lists all of the tag groups in Power IQ.

| Field       | Type                    | Notes  |
|-------------|-------------------------|--|
| TagGroupsID | Integer                 | The primary key for this view                      |
| Name        | VarChar(255)            | Name of the Tag Group                              |
| CreatedAt   | Timestamp with Timezone | The date and time this Tag Group was created.      |
| UpdatedAt   | Timestamp with Timezone | The date and time this Tag Group was last updated. |



## Tags

This view lists all of the tags in Power IQ and the shows which tag group they belong to.

| Field       | Type                       | Notes  |
|-------------|----------------------------|--|
| TagsID      | Integer                    | The primary key for this view                |
| TagGroupsID | Integer                    | Foreign key reference to the TagGroups view. |
| Name        | VarChar(255)               | Name of the Tag                              |
| CreatedAt   | Timestamp with<br>Timezone | The date and time this Tag was created.      |
| UpdatedAt   | Timestamp with<br>Timezone | The date and time this Tag was last updated. |



## DataCenters

The DataCenters view contains information about data center objects as part of the Enterprise Relationship Model. The fields in this view correspond to the item attributes in the model.

| Field          | Type         | Notes  |
|----------------|--------------|--|
| DataCenterID   | Integer      | Auto-generated ID  |
| Name           | VarChar(255) | Human-assigned name for this data center object                |
| CompanyName    | VarChar(255) | Name of the company that owns this data center                 |
| ContactName    | VarChar(255) | Name of the person to contact regarding data center            |
| ContactPhone   | VarChar(255) | Phone number for contact                                       |
| ContactEmail   | VarChar(255) | Email for contact  |
| City           | VarChar(255) | City location of data center                                   |
| State          | VarChar(255) | State location of data center                                  |
| Country        | VarChar(255) | Country location of data center                                |
| Capacity       | Real         | The Data Center capacity in kW                                 |
| PeakKWHRate    | Double       | Energy cost per Kilowatt Hour during peak hours                |
| OffPeakKWHRate | Double       | Energy cost per Kilowatt Hour during off-peak hours            |
| PeakBegin      | Double       | Time of day peak hours begin<br>For example 19.5 = 19:30 hours |
| PeakEnd        | Double       | Time of day peak hours end                                     |
| CO2Factor      | Double       | CO2 computational factor                                       |
| CoolingFactor  | Double       | Cooling factor for data center                                 |
| CustomField1   | VarChar(255) | A user-defined field   |



| Field        | Type         | Notes   |
|--------------|--------------|---|
| CustomField2 | VarChar(255) | A user-defined field  |
| ExternalKey  | VarChar(255) | The unique code used by the Enterprise Model to identify this data center |

## Floors

The Floors view contains information about Floor objects as part of the Enterprise Relationship Model. The fields in this view correspond to the item attributes in the model.

| Field       | Type         | Notes  |
|-------------|--------------|--|
| FloorID     | Integer      | Auto-generated ID  |
| Name        | VarChar(255) | Human-assigned name for this Floor object.                           |
| ExternalKey | VarChar(255) | The unique code used by the Enterprise Model to identify this Floor. |



## Rooms

The Rooms view contains information about Room objects as part of the Enterprise Relationship Model. The fields in this view correspond to the item attributes in the model.

| Field       | Type         | Notes   |
|-------------|--------------|---|
| RoomID      | Integer      | Auto-generated ID   |
| Name        | VarChar(255) | Human-assigned name for this Room object.                           |
| ExternalKey | VarChar(255) | The unique code used by the Enterprise Model to identify this Room. |



## Aisles

The Aisles view contains information about Aisle objects as part of the Enterprise Relationship Model. The fields in this view correspond to the item attributes in the model.

| Field       | Type         | Notes  |
|-------------|--------------|--|
| AisleID     | Integer      | Auto-generated ID  |
| Name        | VarChar(255) | Human-assigned name for this Aisle object.                           |
| ExternalKey | VarChar(255) | The unique code used by the Enterprise Model to identify this Aisle. |



## Rows

The Rows view contains information about Row objects as part of the Enterprise Relationship Model. The fields in this view correspond to the item attributes in the model.

| Field       | Type         | Notes  |
|-------------|--------------|--|
| RowID       | Integer      | Auto-generated ID  |
| Name        | VarChar(64)  | Human-assigned name for this Row object.                           |
| ExternalKey | VarChar(256) | The unique code used by the Enterprise Model to identify this Row. |



## Racks

The Racks view contains information about Rack objects as part of the Enterprise Relationship Model. The fields in this view correspond to the item attributes in the model.

| Field           | Type          | Notes   |
|-----------------|---------------|---|
| RackID          | Integer       | Auto-generated ID   |
| Name            | VarChar (255) | Human-assigned name for this Rack object.                           |
| SpaceIdentifier | VarChar(255)  | Optional human-assigned value to identify this rack.                |
| ExternalKey     | VarChar(255)  | The unique code used by the Enterprise Model to identify this Rack. |
| Capacity        | Integer       | Capacity of the rack in kW.   |

## Rack Readings Rollups

The rack readings rollups views contain rollups of raw readings.

### RackReadingHourlyRollups

| Field                      | Type                     | Notes   |
|----------------------------|--------------------------|---|
| RackReadingHourlyRollupsID | Bigint                   | Unique ID for each reading                                  |
| RackID                     | Integer                  | ID of the rack  |
| Time                       | Timestamp with time zone | Timestamp when rollup was created                           |
| ActivePower                | Real                     | Average active power (Watts) reading during rollup interval |
| MinActivePower             | Real                     | Minimum active power (Watts) reading during rollup interval |
| MaxActivePower             | Real                     | Maximum active power (Watts) reading during rollup          |

| Field | Type | Notes    |
|-------|------|----------|
|       |      | interval |

## RackReadingDailyRollups

| Field                     | Type    | Notes   |
|---------------------------|---------|---|
| RackReadingDailyRollupsID | bigint  | Unique ID for each reading                                  |
| RackID                    | integer | ID of the rack  |
| Date                      | date    | Date when rollup was created                                |
| ActivePower               | Real    | Average active power (Watts) reading during rollup interval |
| MinActivePower            | Real    | Minimum active power (Watts) reading during rollup interval |
| MaxActivePower            | Real    | Maximum active power (Watts) reading during rollup interval |

## RackReadingMonthlyRollups

| Field                       | Type             | Notes   |
|-----------------------------|------------------|---|
| RackReadingMonthlyRollupsID | bigint           | Unique ID for each reading                                  |
| RackID                      | integer          | ID of the rack  |
| Year                        | double precision | Year when rollup was created                                |
| Month                       | double precision | Month when rollup was created                               |
| ActivePower                 | Real             | Average active power (Watts) reading during rollup interval |
| MinActivePower              | Real             | Minimum active power (Watts) reading during rollup interval |
| MaxActivePower              | Real             | Maximum active power (Watts) reading during rollup interval |



## ITDevices

The ITDevices view contains information about IT Device objects as part of the Enterprise Relationship Model. The fields in this view correspond to the item attributes in the model.

| Field          | Type         | Notes   |
|----------------|--------------|---|
| ITDeviceID     | Integer      | Auto-generated ID   |
| Name           | VarChar(255) | Human-assigned name for this IT Device object                           |
| Customer       | VarChar(255) | Name of the customer that owns this object                              |
| DeviceType     | VarChar(255) | Type of device  |
| PowerRating    | Integer      | Power in watts that this device is rated for                            |
| Decommissioned | Boolean      | Whether this device should be considered decommissioned                 |
| CustomField1   | VarChar(255) | A user-defined field  |
| CustomField2   | VarChar(255) | A user-defined field  |
| ExternalKey    | VarChar(255) | The unique code used by the Enterprise Model to identify this IT Device |

## IT Device Readings Rollups

The IT device readings rollups views contain rollups of raw readings.

The following limitations apply:

- IT devices associated with Raritan PX1 and PX2 outlets only.
- Data buffering must be enabled on the PDU.
- Outlets from other PDUs are excluded from the rollups.

## ITDeviceReadingDailyRollups

See [IT Device Readings Rollups](#) for details on this view.

| Field                         | Type   | Notes                      |
|-------------------------------|--------|----------------------------|
| ITDeviceReadingDailyRollupsID | bigint | Unique ID for each reading |



| Field            | Type    | Notes   |
|------------------|---------|---|
| ITDeviceID       | integer | ID of the IT Device   |
| Date             | date    | Date when rollup was created                                |
| Current          | Real    | Average current reading (Amps) during rollup interval       |
| MinCurrent       | Real    | Minimum current reading (Amps) during rollup interval       |
| MaxCurrent       | Real    | Maximum current reading (Amps) during rollup interval       |
| ActivePower      | Real    | Average active power (Watts) reading during rollup interval |
| MinActivePower   | Real    | Minimum active power (Watts) reading during rollup interval |
| MaxActivePower   | Real    | Maximum active power (Watts) reading during rollup interval |
| ApparentPower    | Real    | Average apparent power (VA) reading during rollup interval  |
| MinApparentPower | Real    | Minimum apparent power (VA) reading during rollup interval  |
| MaxApparentPower | Real    | Maximum apparent power (VA) reading during rollup interval  |

## ITDeviceReadingHourlyRollups

See [IT Device Readings Rollups](#) for details on this view.

| Field                          | Type                     | Notes   |
|--------------------------------|--------------------------|---|
| ITDeviceReadingHourlyRollupsID | Bigint                   | Unique ID for each reading                            |
| ITDeviceID                     | Integer                  | ID of the IT Device                                   |
| Time                           | Timestamp with time zone | Timestamp when rollup was created                     |
| Current                        | Real                     | Average current reading (Amps) during rollup interval |
| MinCurrent                     | Real                     | Minimum current reading (Amps) during rollup interval |

| Field            | Type | Notes   |
|------------------|------|---|
| MaxCurrent       | Real | Maximum current reading (Amps) during rollup interval       |
| ActivePower      | Real | Average active power (Watts) reading during rollup interval |
| MinActivePower   | Real | Minimum active power (Watts) reading during rollup interval |
| MaxActivePower   | Real | Maximum active power (Watts) reading during rollup interval |
| ApparentPower    | Real | Average apparent power (VA) reading during rollup interval  |
| MinApparentPower | Real | Minimum apparent power (VA) reading during rollup interval  |
| MaxApparentPower | Real | Maximum apparent power (VA) reading during rollup interval  |

## ITDeviceReadingMonthlyRollups

See [IT Device Readings Rollups](#) for details on this view.

| Field                           | Type             | Notes   |
|---------------------------------|------------------|---|
| ITDeviceReadingMonthlyRollupsID | bigint           | Unique ID for each reading                            |
| ITDeviceID                      | integer          | ID of the IT Device                                   |
| Year                            | double precision | Year when rollup was created                          |
| Current                         | Real             | Average current reading (Amps) during rollup interval |
| MinCurrent                      | Real             | Minimum current reading (Amps) during rollup interval |
| MaxCurrent                      | Real             | Maximum current reading (Amps) during rollup interval |

| Field            | Type | Notes   |
|------------------|------|---|
| ActivePower      | Real | Average active power (Watts) reading during rollup interval |
| MinActivePower   | Real | Minimum active power (Watts) reading during rollup interval |
| MaxActivePower   | Real | Maximum active power (Watts) reading during rollup interval |
| ApparentPower    | Real | Average apparent power (VA) reading during rollup interval  |
| MinApparentPower | Real | Minimum apparent power (VA) reading during rollup interval  |
| MaxApparentPower | Real | Maximum apparent power (VA) reading during rollup interval  |



## EDMNodes

The EDMNodes view contains the relationship between EDM entities arranged as nested sets. EDM entities are part of a data hierarchy. Hierarchical data can be efficiently searched when arranged as a Nested set tree structure.

| Field           | Type        | Notes   |
|-----------------|-------------|---|
| ID              | Integer     | Auto-generated EDMNodes ID  |
| Lft             | Integer     | Auto-generated EDMNode Left ID  |
| Rgt             | Integer     | Auto-generated EDMNode Right ID   |
| edm_entity_type | VarChar(40) | Entity Type. For example, DataCenter, Floor, Rack, Device, ComputerSystem, Sensors. Entity Type ComputerSystem represents a PDU system. |
| edm_entity_id   | Integer     | Entity ID of the entity.  |
| create_at       | Timestamp   | Create time stamp.  |
| Updated_at      | Timestamp   | Update time stamp.  |
| ParentID        | Integer     | Entity ID of the parent entity  |



## AssetStrips

The AssetStrips view contains information about asset management strips attached to PDUs that Power IQ manages.

| Field                    | Type                     | Notes   |
|--------------------------|--------------------------|---|
| AssetStripID             | Integer                  | Database id of the asset strip                    |
| PDUID                    | Integer                  | Database id of the attached PDU                   |
| Name                     | VarChar (255)            | Name of the asset strip                           |
| State                    | VarChar (64)             | ok, upgrading, unavailable, unsupported           |
| AssetStripCreationTime   | Timestamp with time zone | Time asset strip was created in the database      |
| AssetStripLastUpdateTime | Timestamp with time zone | Time the asset strip last changed in the database |
| AssetStripOrdinal        | Integer                  | The id of the asset strip on the PDU: 1 to n      |



## RackUnits

The RackUnits view contains information about the rack units on asset strips connected to PDUs that Power IQ manages.

| Field                  | Type                     | Notes  |
|------------------------|--------------------------|--|
| RackUnitID             | Integer                  | Database id of rack unit   |
| AssetStripID           | Integer                  | Database id of asset strip.<br>See <a href="#">AssetStrips</a> .   |
| AssetTagIDString       | VarChar (255)            | Asset tag id string of any attached asset tag that plugs into the asset strip.<br>Unique from the factory. |
| RackUnitOrdinal        | Smallint                 | 1-n the number of the rack unit within the asset strip   |
| RackUnitLEDState       | VarChar (64)             | LED state: on, off, blinking   |
| RackUnitLEDMode        | VarChar (64)             | LED mode: automatic or manual  |
| RackUnitLEDColor       | VarChar (6)              | LED color: hexadecimal code for the color  |
| RackUnitCreationTime   | Timestamp with time zone | When the rack unit was created in the database   |
| RackUnitLastUpdateTime | Timestamp with time zone | When the rack unit was last changed in the database  |

## PUECalculations

| Field             | Type    | Notes                                      |
|-------------------|---------|--|
| PUECalculationsID | bigint  | Unique ID for each reading                 |
| DataCenterID      | integer | Foreign key reference to DataCenters table |
| TotalEnergy       | integer | PUE facility energy                        |
| TotalAdjustment   | integer | Facility Energy manual adjustment value    |
| ITEnergy          | integer | PUE IT energy                              |
| ITAdjustment      | integer | IT Energy manual adjustment value          |
| MeasuredOn        | date    | The date when rollup was created           |
| Granularity       | text    | whether daily or monthly rollup            |

## PDUBatteries

| Field            | Type    | Notes   |
|------------------|---------|---|
| PDUBatteriesID   | integer | Unique battery number   |
| PDUID            | integer | Foreign key reference to PDUs table   |
| SecondsOnBattery | integer | If the unit is on battery power, the elapsed time since the UPS last switched to battery power, or the time since the network management subsystem was last restarted, whichever is less. Zero shall be returned if the unit is not on battery power. |

## PDUBatteryReadings

| Field                | Type        | Notes  |
|----------------------|-------------|--|
| PDUBatteryReadingsID | Integer     | Unique battery reading number                        |
| PDUBatteriesID       | Integer     | Foreign key reference to the PDUBatteries table      |
| Time                 | VarChar(64) | Local timestamp                                      |
| CapacityPercentage   | VarChar(64) | Capacity percentage from the battery                 |
| RuntimeRemaining     | Integer     | Estimated remaining runtime minutes from the battery |
| Voltage              | Integer     | Voltage from the battery                             |
| Current              | Integer     | Current from the battery                             |

## PDUBatteryReadingHourlyRollups

| Field                           | Type      | Notes  |
|---------------------------------|-----------|--|
| PDUBatteryReadingHourlyRollupID | Integer   | Unique battery reading hourly number                               |
| PDUBatteriesID                  | Integer   | Foreign key reference to the PDUBatteries table                    |
| Time                            | Timestamp | Local timestamp  |
| MinCapacityPercentage           | Real      | Minimum capacity reading (Percentage) during rollup interval       |
| MaxCapacityPercentage           | Real      | Maximum capacity reading (Percentage) during rollup interval       |
| CapacityPercentage              | Real      | Average capacity reading (Percentage) during rollup interval       |
| MinRuntimeRemaining             | Integer   | Minimum runtime remaining reading (minutes) during rollup interval |
| MaxRuntimeRemaining             | Integer   | Maximum runtime remaining reading (minutes) during rollup interval |



| Field            | Type    | Notes  |
|------------------|---------|--|
|                  |         | interval   |
| RuntimeRemaining | Integer | Average runtime remaining reading (minutes) during rollup interval |
| MinCurrent       | Real    | Minimum current reading (Amps) during rollup interval              |
| MaxCurrent       | Real    | Maximum current reading (Amps) during rollup interval              |
| Current          | Real    | Average current reading (Amps) during rollup interval              |
| MinVoltage       | Real    | Minimum voltage reading (Volts) during rollup interval             |
| MaxVoltage       | Real    | Maximum voltage reading (Volts) during rollup interval             |
| Voltage          | Real    | Average voltage reading (Volts) during rollup interval             |

## PDUBatteryReadingDailyRollups

| Field                          | Type      | Notes  |
|--------------------------------|-----------|--|
| PDUBatteryReadingDailyRollupID | Integer   | Unique battery reading daily rollup number                   |
| PDUBatteriesID                 | Integer   | Foreign key reference to the PDUBatteries table              |
| Time                           | Timestamp | Local timestamp  |
| MinCapacityPercentage          | Real      | Minimum capacity reading (Percentage) during rollup interval |
| MaxCapacityPercentage          | Real      | Maximum capacity reading (Percentage) during rollup interval |
| CapacityPercentage             | Real      | Average capacity reading (Percentage) during rollup interval |
| MinRuntimeRemaining            | Integer   | Minimum runtime remaining reading (minutes) during rollup    |



| Field               | Type    | Notes  |
|---------------------|---------|--|
|                     |         | interval   |
| MaxRuntimeRemaining | Integer | Maximum runtime remaining reading (minutes) during rollup interval |
| RuntimeRemaining    | Integer | Average runtime remaining reading (minutes) during rollup interval |
| MinCurrent          | Real    | Minimum current reading (Amps) during rollup interval              |
| MaxCurrent          | Real    | Maximum current reading (Amps) during rollup interval              |
| Current             | Real    | Average current reading (Amps) during rollup interval              |
| MinVoltage          | Real    | Minimum voltage reading (Volts) during rollup interval             |
| MaxVoltage          | Real    | Maximum voltage reading (Volts) during rollup interval             |
| Voltage             | Real    | Average voltage reading (Volts) during rollup interval             |

## PDUBatteryReadingMonthlyRollups

| Field                            | Type      | Notes  |
|----------------------------------|-----------|--|
| PDUBatteryReadingMonthlyRollupID | Integer   | Unique battery reading monthly rollup number                 |
| PDUBatteriesID                   | Integer   | Foreign key reference to the PDUBatteries table              |
| Time                             | Timestamp | Local timestamp  |
| MinCapacityPercentage            | Real      | Minimum capacity reading (Percentage) during rollup interval |
| MaxCapacityPercentage            | Real      | Maximum capacity reading (Percentage) during rollup interval |
| CapacityPercentage               | Real      | Average capacity reading (Percentage) during rollup interval |



| Field               | Type    | Notes  |
|---------------------|---------|--|
| MinRuntimeRemaining | Integer | Minimum runtime remaining reading (minutes) during rollup interval |
| MaxRuntimeRemaining | Integer | Maximum runtime remaining reading (minutes) during rollup interval |
| RuntimeRemaining    | Integer | Average runtime remaining reading (minutes) during rollup interval |
| MinCurrent          | Real    | Minimum current reading (Amps) during rollup interval              |
| MaxCurrent          | Real    | Maximum current reading (Amps) during rollup interval              |
| Current             | Real    | Average current reading (Amps) during rollup interval              |
| MinVoltage          | Real    | Minimum voltage reading (Volts) during rollup interval             |
| MaxVoltage          | Real    | Maximum voltage reading (Volts) during rollup interval             |
| Voltage             | Real    | Average voltage reading (Volts) during rollup interval             |

## PDUBatteryReplacementStatusRecords

| Field                               | Type      | Notes   |
|-------------------------------------|-----------|---|
| PDUBatteryReplacementStatusRecordID | Integer   | Unique battery replacement status record number                   |
| PDUBatteriesID                      | Integer   | Foreign key reference to the PDUBatteries table                   |
| StartTime                           | Timestamp | Time the status record was created                                |
| EndTime                             | Timestamp | Time the status ended   |
| Status                              | Boolean   | One or more batteries have been determined to require replacement |

## Sample ODBC Queries

This section contains sample ODBC queries that can be used to generate custom reports.

### Obtain Active Power and Apparent Power Data for a PDU With IP Address 66.214.208.92

```
Select "PDUs"."IPAddress", "PDUs"."PDUName", "PDUReadings"."ActivePower", "PDUReadings"."ApparentPower",
"PDUReadings"."Time" from "PDUs", "PDUReadings" where "PDUs"."IPAddress"='66.214.208.91' AND "PDUs"."ID"-
"="PDUReadings"."PDUID";
```

The table shows a sample custom report.

| IP Address    | PDU Name       | Active Power | Apparent Power | Time                       |
|---------------|----------------|--------------|----------------|----------------------------|
| 66.214.208.91 | Sentry3_511c15 | 8            | 8              | 2009-12-08 12:46:21.753-05 |
| 66.214.208.91 | Sentry3_511c15 | 8            | 8              | 2009-12-08 12:58:23.871-05 |
| 66.214.208.91 | Sentry3_511c15 | 8            | 8              | 2009-12-08 16:29:26.032-05 |
| 66.214.208.91 | Sentry3_511c15 | 8            | 8              | 2009-12-08 16:32:36.868-05 |

### Obtain Active Power and Apparent Power for an IT Device With Name “DBServer”

raritan

```
Select "ITDevices"."Name", "PDUOutletReadings"."Time", "PDUOutletReadings"."ActivePower", "PDUOut-
letReadings"."ApparentPower", "PDUOutletReadings"."CurrentAmps" from "ITDevices", "PDUOutlets", "PDUOut-
letReadings" where "ITDevices"."Name"='DBServer' AND "PDUOutletReadings"."OutletID" =
"PDUOutlets"."PDUOutletsID" AND "PDUOutlets"."ITDeviceID" = "ITDevices"."ITDeviceID";
```

The table shows a sample custom report.

| Name     | Time                       | Active Power | Apparent Power | Current Amps |
|----------|----------------------------|--------------|----------------|--------------|
| DBServer | 2009-12-08 14:16:31.759-05 | 0            | 0              | 0            |
| DBServer | 2009-12-08 16:11:27.017-05 | 0            | 0              | 0            |



## Report Maximum Power Reading for Each IT Device Since Added to Power IQ

To obtain the maximum power reading for an IT device since it was added to Power IQ, three queries are needed. These sample queries group data by device name. This assumes that device names are unique. If your device names are not unique, use IT Device ID for grouping.

- Query for all devices with all readings for all outlets.
- Group, per device, per hour, all outlets of a device and sum up the outlet usage
- Find the maximum power per device of the total power consumption.

List all outlet readings for all devices:

```
SELECT odbc_ITDevices.Name, odbc_PDUOutletReadingsRollup.Time, odbc_PDUOutlets.PDUOutletsID, odbc_PDUOutletReadingsRollup.MaximumActivePower
FROM odbc_ITDevices, odbc_PDUOutlets, odbc_PDUOutletReadingsRollup
WHERE (((odbc_PDUOutletReadingsRollup.RollupInterval)=1) AND ((odbc_PDUOutletReadingsRollup.OutletID)=[odbc_PDUOutlets].[PDUOutletsID]) AND ((odbc_PDUOutlets.ITDeviceID)=[odbc_ITDevices].[ITDeviceID]))
ORDER BY odbc_ITDevices.Name, odbc_PDUOutletReadingsRollup.Time, odbc_PDUOutlets.PDUOutletsID;
```

Group hourly outlet readings per IT device:

```
SELECT [List of all Devices with all readings for all outlets].Name, [List of all Devices with all readings for all outlets].Time, Sum([List of all Devices with all readings for all outlets].MaximumActivePower) AS SumOfMaximumActivePower
FROM [List of all Devices with all readings for all outlets]
GROUP BY [List of all Devices with all readings for all outlets].Name, [List of all Devices with all readings for all outlets].Time
ORDER BY [List of all Devices with all readings for all outlets].Name;
```

Find the maximum power reading per IT device:

```
SELECT [Summation per Device of hourly readings].Name, Max([Summation per Device of hourly readings].SumOfMaximumActivePower) AS MaxOfSumOfMaximumActivePower
FROM [Summation per Device of hourly readings]
GROUP BY [Summation per Device of hourly readings].Name;
```



## Creating Database Connection in Excel

1. On your Mac, launch Excel.
2. Choose Excel > About Excel. If you are running Mac Lion or higher, make sure you have Excel version 14.1.2 or higher.
3. Create a new Workbook and save it. For example, "Power Consumption by Rack.xlsx"
4. In the Excel toolbar, choose Data > Get External Data > New Database Query.
5. The "iODBC Data Source Chooser" dialog appears. In the User DSN tab, select the Power IQ data source that you created previously. Click OK.
6. If this is the first time you are using the data source in Excel, enter the username and password according to the ODBC user credentials specified in Power IQ, and click Store password in Keychain then click OK.

For information on Power IQ's ODBC user credentials, see [Configuring ODBC User Credentials](#).



## Finding All Entities in a Rack

The following query shows all the entities, such as IT Devices and PDUs, contained in a specific rack. The example uses "Rack 4."

Retrieve the EDMNodes id for a rack with RackId=4.

```
oculan=> select id from "EDMNodes" where edm_entity_type='Rack' and edm_entity_id=4;
```

```
id
```

```
----
```

```
14
```

```
(1 row)
```

Use the EDMNodes id =14 to retrieve entities contained under this rack.

```
oculan=> select "EDMNodes".* FROM "EDMNodes", "EDMNodes" AS parent where (("EDMNodes".id != parent.id) AND ("EDMNodes".lft >parent.lft AND "EDMNodes".rgt <=parent.rgt AND parent.id=14)) ORDER BY "EDMNodes".lft;
```

The table shows a sample custom report.

| ID | Lft | Rgt | EDM_Entity_Type | EDM_Entity_ID | Created_at                      | Updated_at                       |
|----|-----|-----|-----------------|---------------|---------------------------------|----------------------------------|
| 1  | 4   | 5   | Device          | 3             | 2009-06-19<br>11:16:48.257348-0 | 2009-06-19<br>11:16:48.257348-04 |
| 2  | 6   | 7   | Device          | 4             | 2009-06-19<br>11:16:48.274988-0 | 2009-06-19<br>11:16:48.274988-04 |
| 3  | 8   | 9   | Device          | 5             | 2009-06-19<br>11:16:48.276324-0 | 2009-06-19<br>11:16:48.276324-04 |



## ODBC Configuration and Sample Query for Apple Users

This section contains instructions for configuring ODBC and creating custom reports for Apple users.

These instructions apply to the following Apple products:

- Mac OS 10.7.x or higher. These instructions were tested in Lion.
- Microsoft Excel 2011

The sample report provides the Max/Min/Avg power consumption of every rack in the data center.





## Download and Install ODBC Client Driver for Mac

1. Go to [http://www.actualtech.com/product\\_opensourcedatabases.php](http://www.actualtech.com/product_opensourcedatabases.php) (see [http://www.actualtech.com/product\\_opensourcedatabases.php](http://www.actualtech.com/product_opensourcedatabases.php) - [http://www.actualtech.com/product\\_opensourcedatabases.php](http://www.actualtech.com/product_opensourcedatabases.php)), to download the ODBC Pack for Mac OSX.

---

*Note: The driver is free to try. You can confirm that it works for you first, by following the steps in this guide.*

---

2. Follow the usual Mac steps to install the "Actual ODBC Pack.pkg"



## Download and Install Microsoft Query for Mac (included in Office 2011 v14.1.2)

Make sure you have the latest updates for your version of Microsoft Excel.

If you are using Mac OS XLion or higher, you must use Microsoft Office 2011 v14.1.2 or higher.



## Allow Your Mac to Access Power IQ via ODBC

1. Login to Power IQ.
2. In the Settings tab, click ODBC Access in the Data Management section. The Configure ODBC Database Access page opens.
3. Click Add. Double-click the 0.0.0.0/0 Network Address, then enter the IP Address information of your Mac. Or, leave the default 0.0.0.0/0 to allow access from all IP addresses.
4. Click Save.



## Adding Power IQ as an ODBC Information Source to your Mac

1. On your Mac, launch /Applications/Utilities/ODBC Manager.app.

---

*Note: ODBC Manager may need to be installed. It is not included with the operating system. You can download it from [www.odbcmanager.net](http://www.odbcmanager.net).*

---

1. Select the tab "User DSN", and click Add.
2. Select Actual Open Source Databases and click OK. The Actual Open Source Databases DSN Configuration wizard opens.
3. Click Continue.
4. Name the Power IQ that you are connecting to, and select PostgreSQL as the database type. Click Continue.
5. Enter the IP address of your Power IQ server, and copy the rest of the settings exactly as pictured here. Click Continue.
  - Server: IP address of Power IQ
  - Port: 5432
6. Do NOT select "Connect to server to obtain default settings for the additional configuration options".
7. Enter "raritan" as the database name. Make sure to select the checkbox labeled "Always include views in table lists". Click Continue.
8. Click Test.
9. At the next prompt, enter the username and password based on the ODBC user credentials specified in Power IQ, and click OK. See [Configuring ODBC User Credentials](#).
10. The test results should be successful. Click OK.
11. Click Done.

---

*Note: If the test was successful, the ODBC driver works, and you can purchase it.*

---

12. Launch /Applications/Utilities/ODBC Manager.app again. Select User DSN and highlight the Power IQ entry you just created.
13. Click Configure.
14. Click Licenses and follow instructions to buy and enter a license key.

---

*Remember, the license you want to buy is the "Actual ODBC Driver for Open Source Databases."*

---

Your Mac now can access all the data on the Power IQ server, and you can create reports using Microsoft Excel, FileMaker Pro, or any ODBC-compliant reporting tool.

See [Create Database Connection in Excel](#) for instructions on using Microsoft Excel.



## Creating Database Connection in Excel

1. On your Mac, launch Excel.
2. Choose Excel > About Excel. If you are running Mac Lion or higher, make sure you have Excel version 14.1.2 or higher.
3. Create a new Workbook and save it. For example, "Power Consumption by Rack.xlsx"
4. In the Excel toolbar, choose Data > Get External Data > New Database Query.
5. The "iODBC Data Source Chooser" dialog appears. In the User DSN tab, select the Power IQ data source that you created previously. Click OK.
6. If this is the first time you are using the data source in Excel, enter the username and password according to the ODBC user credentials specified in Power IQ, and click Store password in Keychain then click OK.

For information on Power IQ's ODBC user credentials, see [Configuring ODBC User Credentials](#).



## Formulate a Database Query

After creating the database connection, Microsoft Excel ("Microsoft Query") shows a list of all data tables that Power IQ makes available. See [Power IQ ODBC Schema](#).

These instructions will create a report providing the max/min/average power utilization of every PDU in Power IQ.

1. Click SQL View.
2. Copy and paste this EXACT string, including every quotation mark, every capitalization, and so on. The string must be used Exactly as shown.

```
SELECT "PDURollups"."PDUID", "PDUs"."ID", "PDUs"."PDUName", "PDURollups"."AverageActivePower", "PDURollups"."AverageApparentPower", "PDURollups"."MaximumActivePower", "PDURollups"."MaximumApparentPower", "PDURollups"."MinimumActivePower", "PDURollups"."MinimumApparentPower", "PDURollups"."Time" FROM "PDURollups", "PDUs" WHERE "PDURollups"."PDUID" = "PDUs"."ID" AND "PDURollups"."Time" = '2012-09-10 00:00:00'
```

3. Click Return Data. A new window opens. Select "New Sheet", then click Properties.
4. Deselect the checkboxes for "Enable background refresh" and Use Table.
5. Click OK, then click OK again on the previous "New Sheet" dialog.

The report is generated. The query shows rollups from September 10, 2012. Change the query date in the string you copied and pasted for data from other days.



# Appendix B: Floor Map Drawing Files

To create floor map drawing files for Power IQ, you may find the dcTrack drawing file templates useful. This appendix contains information about downloading and using those templates.

Because a dcTrack floor map may require more information in the drawing file than a Power IQ floor map, you'll notice extra details in the template.

## Chapter B Power IQ Floor Map Drawing Files Must:

- Be in .DWG file format and created using either AutoCAD® 2012 (and earlier) or Microsoft Visio®. Only .DWG files can be uploaded to the application.

---

*Note: Drawings created in AutoCAD 2013 and 2014 are not supported by dcTrack.*

---

- Represent a data center, floor or room in your EDM.
- Contain all racks that you want to display in the floor map.
- Include unique rack names that are exactly the same as the rack names in the EDM in Power IQ. Duplicate rack names will not work.
- Follow all drawing file requirements in either Microsoft Visio or AutoCAD. See [Microsoft Visio Drawing File Requirements](#) and [AutoCAD Drawing File Requirements](#).

## Terminology - Objects vs. Shapes

When discussing drawing files, 'objects' refers to graphical representations of cabinets, floor PDUs, UPS units and CRAC units in an AutoCAD drawing file and when explaining uploads to the application.

'Shapes' is used when referring to these same items in a Microsoft Visio drawing file.

## Create Drawing Files or Download Templates

For the floor map widget, you can:

- [Use Your Existing Drawing Files](#)

Use your existing .DWG drawing files as long as they are created using a supported version of Microsoft Visio® or AutoCAD®.

- [Download Drawing File Templates](#)

Sunbird provides generic Microsoft Visio and AutoCAD drawing file templates.

The templates include -

Layers for buildings, row labels, cabinet (rack) shapes, floor PDU shapes, UPS shapes and CRAC shapes.

---

*Note: You are not required to create a layer for each of these elements and shapes in a drawing a file.*

---

The Visio drawing file template provides predefined layers with various drawing shapes and elements.



Use the templates to create your drawing file or use them as examples to follow.

Whether you use your own file or a Sunbird template, review the information in this section to help ensure your file is formatted correctly.

See [Microsoft Visio Drawing File Requirements](#) or [AutoCAD Drawing File Requirements](#).

- **Visio Stencil**

A Visio stencil with Sunbird designed shapes and connectors is available as a download from the [Sunbird support portal](#).

This stencil is designed for both Power IQ and dcTrack use. Use the stencil with the Sunbird Visio templates, or with your own Visio files.

To download the templates and/or stencils:

1. Go to: <http://support.sunbirdcim.com/support/solutions/6000129540>.
2. Click on Tools under your product and version and download the template zip file.

---

*Note: The stencil can be used for dcTrack or Power IQ drawings.*

---

## Microsoft Visio Drawing File Requirements

The following Microsoft Visio drawing file requirements must be met to successfully save the file in AutoCAD file format (.DWG), and visualize the floor map properly in the Power IQ Web Client and Classic View once the drawing file is uploaded.

- The file must be converted to a .DWG file to upload it to Power IQ.
- Shapes in Visio represent objects on a floor map in Power IQ.
- Shape Outline Requirements - Visio Files
- A shape's border must be closed
- Unless a shape is on a layer, the border outline can be black or any other color of your choosing.

For more information on border color when working with layers, see [Shape Border Layer Requirements - Visio Files](#).

## Shape Fill Requirements - Visio Files

- Each shape created in a Microsoft Visio file must use a solid fill color.
- The fill color *cannot* be 01:White.

Aside from the colors used by the objects on the floor map generated from the drawing file, the shape's fill color does not impact Power IQ.

## Add a Fill Color to a Visio Shape

1. In the Microsoft Visio file, right-click the shape and select Format > Fill.

---

*Tip: Select multiple shapes at once and apply a fill at the same time.*

---





2. Select a color from the Color drop-down, or apply a custom color.
3. Select 01:Solid from the Pattern drop-down. Even if it is selected by default, you must click on it to apply it.
4. Click OK to apply the fill and close the dialog.

## Shape Name Requirements for Power IQ - Visio Files

- The rack shapes in your drawing file must include unique rack names that are exactly the same as the rack names in the EDM in Power IQ. Duplicate rack names will not work.
- Facility item shapes in your drawing file must also include unique names that are the same as the facility items in the EDM. Power IQ supports the following facility items:
  - CRAC
  - Floor PDU
  - Floor UPS
  - Power panel
  - Standalone meter
- All racks and facility items in the drawing file will be synced to the EDM.
- Give each shape a unique name that matches the name in the EDM using the Text tool, or entering it directly into the shape.
- Shape names cannot contain the characters ' \ ? &

## Add Text to a Visio Shape

1. Double-click on the object to put it in edit mode.
2. Type the text ID, or use the Text Tool to add a text box and type the ID.
3. Make sure the text box is inside the floor plan shape.

## Shape Border Layer Naming Requirements - Visio Files

- Do not begin Microsoft Visio® layer names with the word "dcTrack" unless you are directed to do so.
- Microsoft Visio layer names cannot contain spaces. Use underscores or dashes to separate words if needed. For example, Layer1, Layer-1, or Layer\_1
- Shape Border Layer Requirements - Visio Files
- When using layers in a Microsoft Visio drawing file, a shape on a layer cannot have a black border.
- If it does, when the file is converted from a .VSD file to a .DWG AutoCAD file and then uploaded to Power IQ, the shape's fill is changed to black even if another fill color is applied to it.

For example, you create a rectangle with a black border and blue fill on a layer in a Visio file to represent a CRAC unit object on the floor map.

- When the file is converted to a .DWG and then uploaded to Power IQ, when the CRAC unit object appears on the floor map in Power IQ its fill is black, not blue.
- Avoid this by setting the shape's fill, border and layer to the same color - see [Set a Shape's Border, Fill and Visio Layer to the Same Color.](#)



## Set a Shape's Border, Fill and Visio Layer to the Same Color

1. In Microsoft Visio, select View > Layer Properties. The Layer Properties dialog appears.
2. Create a new layer for the objects by selecting the New... button, naming the layer in the New Layer dialog and clicking OK.

Visio layer names cannot contain spaces. Use underscores or dashes if spaces are required.

---

*Important: Do not begin Visio layer names with the word "dcTrack" unless you are directed to do so.*

---

3. In the Layer Properties dialog, locate the row containing the layer you just created, then click on the layer's field under the Color column. A checkmark appears in the field.
4. Select a color for the layer from the "Layer color:" drop-down, then click Apply.

The color is applied to the layer, and the Color field changes to the selected color.

5. Alternatively, create a custom color.
6. Click OK.

Next, assign the shape to the layer.

7. Right-click on the shape, then click Format > Layer to open the Layers dialog.
8. Select the layer, then click OK.

The shape is assigned to the layer, and its border and fill are the same color as the layer.

Since the shape and layer colors are the same, in order to see the shape, a negative (or inverse) image may be displayed.

If this is the case, the shape may appear as if it has no fill even though it does.

9. Finally, verify only the shape(s) you want are assigned to the layer.
10. Click View > Toolbars then check the Format Shape option to enable that Format Shape toolbar.
11. Click on an object that is on the layer you just created. The layer is displayed in the Layer drop-down on the Format Shape toolbar.

---

*Note: If you want shapes to have a black border even though their border and fill color are the same as their layer, there is a workaround. See [Create a Border for Visio Shapes on a Layer \(Workaround\)](#) (on page 463)*

---

## Create a Border for Visio Shapes on a Layer (Workaround)

Once a shape's border and fill are changed to the same color as the layer, the shapes do not have a black border to define them from each other in the Microsoft Visio file.

If you want the Visio shapes to use a border that is a different color than the fill, do the following as a workaround.

- Draw an additional rectangle that has no fill (Pattern = None) around each object that is not assigned to a layer (Layer = { No Layer} ).



---

*Note: This is similar to the way it would be done in AutoCAD, where the rectangle and the hatch are two separate objects.*

---

- To easily distinguish classes of objects, create separate layers and colors for each type of floor-standing object in the data center such as a cabinet, floor PDU, CRAC or UPS.
- Text labels should be modified if the text wraps to multiple lines. Text wrapping causes AutoCAD to insert a dash at the end of each line.

The workaround to this issue is to size the text box of the label to be wide enough so that the text does not wrap. Reducing the font size also helps prevent wrapping.

## AutoCAD Drawing File Requirements

Following are Power IQ's minimum, AutoCAD drawing file requirements.

### Object Outlines - AutoCAD Files

- An object's outline must be closed

### Object Name Requirements for Power IQ - AutoCAD Files

- The rack shapes in your drawing file must include unique rack names that are exactly the same as the rack names in the EDM in Power IQ. Duplicate rack names will not work.
- Facility item shapes in your drawing file must also include unique names that are the same as the facility items in the EDM. Power IQ supports the following facility items:
  - CRAC
  - Floor PDU
  - Floor UPS
  - Power panel
  - Standalone meter
- All racks and facility items in the drawing file will be synced to the EDM.
- Give each object a unique name that matches the name in the EDM
- Object names cannot contain the characters ' \ ? &

### Drawing File Layer Requirements - AutoCAD Files

- Do not begin AutoCAD® layer names with the word "dcTrack" unless you are directed to do so.

### AutoCAD Drawing Object File Recommendations

- When using AutoCAD to create your floor map drawings, follow these recommendations.
- Rack Object Recommendations - AutoCAD Drawing Files
- Rack Object - Commands
- Use the Pline command or the Rectangle command to draw a rack outline



- Make the Pline width of a rack outline equal to 0.75" or 1"
- When creating a rack with a curved front, use a single Pline and draw the rack starting at the center rear.
- Then, to create the curved front, draw several shorter straight lines while varying the angle each time to achieve the curved look.

## Rack Object - Layers

- Draw rack outlines on separate layers in the drawing file to make future modifications and global changes easier.
  - Object Outline Recommendations - AutoCAD Drawing Files
  - Object Outline - Command: Create objects using a polyline
  - Object Outline - Layer: Create the object outline on a different layer than the hatch
  - Object Outline - Color: Set the color of the object outline by layer
  - Object Outline - Command
  - Create objects using a polyline
  - Object Outline - Layers
- Create the object outline on a different layer than the hatch
  - Object Outline - Color
- Set the color of the object outline by layer
  - Object Hatch Recommendations - AutoCAD Drawing Files
  - Object Hatch - Layer: Draw solid hatches on separate layers in the drawing file so it is easier to make future modifications and global changes.
- Create the hatch on a different layer than the object outline
  - Object Hatch - Pattern: Use a solid pattern for the hatch within an outline.
  - Object Hatch - Color: Set the color of the hatch by layer
- Sunbird recommends using the following colors for hatch layers:
  - Color 81 for a cabinet Solid Hatch
  - Color 254 for PDU and CRAC Solid Hatches
  - Color 151 for PT Solid Hatches
  - Object Hatch - Layers
- Draw solid hatches on separate layers in the drawing file so it is easier to make future modifications and global changes.
- Create the hatch on a different layer than the object outline

## Object Hatch - Pattern

- Use a solid pattern for the hatch within an outline

## Object Hatch - Color

- Set the color of the hatch by layer
- Sunbird recommends using the following colors for hatch layers:
  - Color 81 for a cabinet Solid Hatch
  - Color 254 for PDU and CRAC Solid Hatches
  - Color 151 for PT Solid Hatches



## Object Label and Text Recommendations - AutoCAD Drawing Files

- Names must be unique within each drawing file for each location. For more information, see [Object Name Requirements - AutoCAD Files](#).
  - Object Labels - Layers: Draw object labels on separate layers in the drawing file so it is easier to make future modifications and global changes.
  - Object Labels - Text Formatting: Object labels should use Arial Bold set to 9 inch height. The text height assumes the AutoCAD drawing is drawn on a 1:1 scale.
- Use Multiline Text for object labels, and make sure they are contained within the object outline.
- Create either a Standard Text label or Multiline Text label to identify each data center row represented in the drawing file.
  - Cabinet Labels - Position in Row: Since Power IQ does not pull cabinet row position information from drawing files during the sync AutoCAD drawing file process, the cabinet label can contain any number.  
  
This means numbers that appear in cabinet labels can be part of the cabinet name, or used to represent the cabinet's position in the data center row.
- Once cabinets are added by syncing a drawing file, their row position can be assigned manually. Row positions are assigned on a cabinet's item page in the Web Client.

### Example

A cabinet labeled "CAB1" in a drawing is can be assigned to position 4 of a row on its item page by selecting from the Position in Row drop-down.

- Row Labels - Row Label Drop-Down: The row label in the drawing file should match a selection available in the Row Label drop-down on the Create New Item page in the Power IQ Web Client.

Select the row when creating a new cabinet for the data center location represented by the drawing file.

## Object Labels - Text Formatting

Object labels should use Arial Bold set to 9 inch height. The text height assumes the AutoCAD® drawing is drawn on a 1:1 scale

- Use Multiline Text for object labels, and make sure they are contained within the object outline
- Create either a Standard Text label or Multiline Text label to identify each data center row represented in the drawing file

See [Object Name Requirements for Power IQ - AutoCAD Files](#)



# Appendix C: Frequently Asked

## Questions

### Security Questions

| Question                                      | Answer  |
|---|---|
| Are failed login attempts recorded?           | The audit log records all login attempts. You can also configure Power IQ to send syslog notifications for entries in the audit log.  |
| Does Power IQ support LDAP lock-out settings? | Power IQ respects the lock-out settings of an LDAP server. If a user attempts multiple invalid logins, and the LDAP server set the account to be blocked, Power IQ no longer allows access. |
| Do session timeouts work in an LDAP setting?  | Session timeouts are applicable to LDAP users and local users.  |

### PDU Questions

| Question  | Answer   |
|---|--|
| The status of my PDU says "Degraded."   | <p>Check to see if the SNMP agent is enabled on the PDU.</p> <p>If enabled, check to see if the matching SNMP read strings are configured for the PDU and Power IQ.</p> <p>Check to see if you are running the latest PX firmware. For Raritan PX PDUs.</p> <p>If you have enabled Buffered Data Collection, make sure the PX has been configured with an SNMP write string. For Raritan PX PDUs.</p> <p>Reduce the poll rate or increase the number of CPUs (VMware).</p> |
| How do I configure my MRV PDU so that it will work with Power IQ's power control feature? | Make sure that the SNMP community string you use to configure the MRV PDU in Power IQ supports both SNMP v1 and v2c Gets and Sets. The community string must be configured for v1 and v2c access in both the Get Clients section and the Set Clients section on the MRV PDU.   |



## Unable to Collect IPv4 Routing Table

The error "Unable to collect IPv4 routing table" may display when you attempt to launch a Power IQ virtual machine with multiple NIC cards, using ESXi 5.1.

Renaming two files may be a workaround to this VMware Tools issue.

```
mv /usr/lib/vmware-tools/plugins32/vmsvc/libtimeSync.so /usr/lib/vmware-tools/plugins32/vmsvc/libtimeSync.so.renamed  
mv /usr/lib/vmware-tools/plugins64/vmsvc/libtimeSync.so /usr/lib/vmware-tools/plugins64/vmsvc/libtimeSync.so.renamed
```



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