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19 March 2010



# Brocade FastIron Compact Switch

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## Hardware Installation Guide

Supporting Release 07.0.01b

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# About This Document

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## Audience

This document is designed for system administrators with a working knowledge of Layer 2 and Layer 3 switching and routing.

If you are using a Brocade Layer 3 Switch, you should be familiar with the following protocols if applicable to your network – IP, RIP, OSPF, BGP, IGMP, PIM, DVMRP, and VRRP.

## Supported hardware and software

The following hardware platforms are supported by this release of this guide:

- FastIron Edge Switch® (FES) Layer 2 or Layer 3 Switch
- FastIron Edge Switch X Series® (FESX) Layer 2 or Layer 3 Switch

This document includes the information from IronWare software release R 07.0.01b.

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### **NOTE**

This document describes software release 07.0.01b only. Refer to earlier releases of this guide for information about software releases prior to 07.0.01b.

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# Document conventions

This section describes text formatting conventions and important notice formats used in this document.

## Text formatting

The narrative-text formatting conventions that are used are as follows:

<b>bold text</b>	Identifies command names
	Identifies the names of user-manipulated GUI elements
	Identifies keywords
	Identifies text to enter at the GUI or CLI
<i>italic text</i>	Provides emphasis
	Identifies variables
	Identifies document titles
code text	Identifies CLI output

For readability, command names in the narrative portions of this guide are presented in bold: for example, **show version**.

## Command syntax conventions

Command syntax in this manual follows these conventions:

<b>command and parameters</b>	Commands and parameters are printed in bold.
[ ]	Optional parameter.
<i>variable</i>	Variables are printed in italics enclosed in angled brackets < >.
...	Repeat the previous element, for example “member[;member...]”
	Choose from one of the parameters.

## Notes, cautions, and danger notices

The following notices and statements are used in this manual. They are listed below in order of increasing severity of potential hazards.

---

### NOTE

A note provides a tip, guidance or advice, emphasizes important information, or provides a reference to related information.

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#### **CAUTION**

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A Caution statement alerts you to situations that can be potentially hazardous to you or cause damage to hardware, firmware, software, or data.

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#### **DANGER**

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A Danger statement indicates conditions or situations that can be potentially lethal or extremely hazardous to you. Safety labels are also attached directly to products to warn of these conditions or situations.

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Phillips Screw Company Inc.	Phillips

## Related publications

The following Brocade documents supplement the information in this guide:

- *FastIron Configuration Guide*
- *Brocade FastIron X Series Chassis Hardware Installation Guide*
- *Switch and Router Installation and Basic Configuration Guide.*
- *Enterprise Configuration and Management Guide*
- *Switch and Router Security Guide*
- *Switch and Router Command Line Interface Reference*
- *Diagnostic Guide*
- *IronWare MIB Reference Manual*

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#### **NOTE**

For the latest edition of these documents, which contain the most up-to-date information, refer to Product Manuals at [kp.foundrynet.com](http://kp.foundrynet.com).

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Areas unable to access 800 numbers: +1-408-333-6061

# Product Overview

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## Product overview

The FastIron compact switches deliver a full complement of standards-based, feature-rich switching and Layer 3 multiprotocol routing capabilities. The extensive feature set supports network requirements ranging from basic connectivity to multicast-enabled full streaming audio and video applications for converged services such as Voice over IP (VoIP).

The FastIron compact switches come in a variety of models, providing an integral range of network connectivity within the entire enterprise network. These switches provide high 10/100 port density and Gigabit Ethernet uplinks in a compact form factor. The FastIron X Series compact switches optionally provide up to two 10-Gigabit Ethernet uplinks.

The FastIron compact switch models are described below:

- **Standard** - Provides enterprise network connectivity and server farm support at the wiring closet and edge of the network. When first shipped from the factory, standard models support full Layer 2 and base Layer 3 Switching.
- **Premium (PREM)** – Premium devices support full Layer 2 Switching and full Layer 3 multiprotocol routing. All FES and FESX devices can be upgraded to full Layer 3 multiprotocol routing, at which time they are considered to be premium devices. Note that all PREM6 models are premium devices that support full Layer 2 switching and full Layer 3 multiprotocol routing when shipped from the factory.
- **12GCF** - Provides distribution and backbone connectivity at the Distribution and Core Layers of the enterprise network. When first shipped from the factory, 12GCF models support full Layer 2 and base Layer 3 Switching.
- **POE** - Provides enterprise network connectivity and server farm support at the wiring closet and edge of the network. Also provides electrical power over existing Ethernet cables, supporting the need for integrated data, voice, and video applications. When first shipped from the factory, POE models support full Layer 2 and base Layer 3 Switching.
- **X Series** - Provides enterprise network connectivity, delivering Gigabit over Copper (GoC) to the desktop, within the enterprise Distribution Layer, and the service provider data center for high-end servers, cluster computing, and network-attached storage devices. Also provides the option of a one- or two-port 10-Gigabit Ethernet module, enabling connectivity within a Metropolitan Area Network (MAN).
- **IPv6** – Designed for service provider edge and aggregation deployment, IPv6 models support the 128-bit addressing format and full Layer 2 and base Layer 3 switching. Premium models provide additional support for full Layer 3 IPv4 routing protocols or full Layer 3 IPv4 and IPv6 routing protocols, depending on the DIP key (Layer 3 upgrade PROM) installed in the device.

Refer to [Table 1](#) for a list of supported configurations.

## Supported configurations

[Table 1](#) lists the FastIron compact products and their supported configurations.

# 1 Software features

**TABLE 1** FastIron product family supported configurations

Device	Standard	PREM (Premium)	P (POE)
<b>IPv6 Devices<sup>1</sup></b>			
FESX624E-PREM6		X	
FESX624HFE-PREM6		X	
FESX648E-PREM6		X	
FESX624	X	X	
FESX624HF	X	X	
FESX648	X	X	
<b>IPv4 Devices</b>			
FES2402	X	X	X
FES4802	X	X	X
FES9604	X	X	
FES12GCF	X	X	
FESX424	X	X	X
FESX424HF	X	X	
FESX448	X	X	

1. For details about these IPv6 devices, refer to ["IPv6 support"](#) on page 4

## Software features

Software features differ depending on the software version that is loaded on the device. When first shipped, Standard and POE devices support full Layer 2 and base Layer 3 Switching. Premium (PREM) devices support full Layer 2 Switching and full Layer 3 multiprotocol routing. All FES and FESX devices can be upgraded to premium models, meaning all models can support full Layer 3 multiprotocol routing. All **PREM6** models are premium devices that support full Layer 2 switching and full Layer 3 IPv4 and IPv6 multiprotocol routing when shipped from the factory.

For a complete list of software features supported on the FESX, refer to the *FastIron Configuration Guide*. For a complete list of software features supported on FES, refer to the FES release notes.

## POE applications

The FES2402-POE, FES4802-POE, and FESX424-POE provide Power over Ethernet, compliant with the standards described in the IEEE 802.3af specification for delivering in-line power. The 802.3af specification defines the standard for delivering power over existing network cabling infrastructure, enabling multicast-enabled full streaming audio and video applications for converged services, such as, Voice over IP (VoIP), WLAN access points, IP surveillance cameras, and other IP technology devices.

POE technology eliminates the need for an electrical outlet and dedicated UPS near IP powered devices. With power sourcing devices, such as the FES2402-POE and FES4802-POE, power is consolidated and centralized in the wiring closets, improving the reliability and resiliency of the network. Because POE can provide power over Ethernet cable, power is continuous, even in the event of a power failure.

For more information about POE and how to configure it on FES devices, refer to the *Switch and Router Installation and Basic Configuration Guide*. For information about POE and how to configure it on FESX devices, refer to the *FastIron Configuration Guide*.

## Wireless applications

You can convert (upgrade) your FastIron Edge Switch to an IronPoint-FES device. Converting your FES to an IronPoint-FES allows you to run a software image that contains wireless feature support.

To convert your FES to an IronPoint-FES, you need an EEPROM kit, part number FESWLAN. The kit includes a Dual Inline Package (DIP) key, IronPoint-FES software, upgrade instructions, and other items. Alternatively, you can order an IronPoint-FES with the EEPROM and wireless software already installed.

You can convert the following FES devices to an IronPoint-FES:

- FastIron Edge Switch 2402
- FastIron Edge Switch 4802
- FastIron Edge Switch 9604
- FastIron Edge Switch 2402-DC
- FastIron Edge Switch 4802-DC
- FastIron Edge Switch 9402-DC
- FastIron Edge Switch 2402-POE
- FastIron Edge Switch 4802-POE

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### NOTE

You cannot convert the FES12GCF or FastIron Edge Switch X Series switch to an IronPoint-FES device.

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The following IronPoint FES devices ship with the firmware required for the wireless features:

- FastIron Edge Switch 2402-WLAN
- FastIron Edge Switch 4802-WLAN
- FastIron Edge Switch 9604-WLAN
- FastIron Edge Switch 2402-WLAN-DC
- FastIron Edge Switch 4802-WLAN-DC
- FastIron Edge Switch 9604-WLAN-DC
- FastIron Edge Switch 2402-POE-WLAN
- FastIron Edge Switch 4802-POE-WLAN

## IPv6 support

FESX IPv6 (FESX6) compact models support the 128-bit addressing format and full Layer 2 and base Layer 3 switching.

The following IPv6 premium models provide support for full Layer 3 IPv6 and IPv4 routing protocols, as well as IPv6 host and management features:

- FESX624E-PREM6
- FESX624HFE-PREM6
- FESX648E-PREM6

The following IPv6 models can be upgraded to support either IPv4 routing only or IPv6 and IPv4 routing, depending on the Layer 3 upgrade PROM installed in the device. For more information, refer to [Appendix A, “Layer 3 Upgrade Procedures”](#).

- FESX624
- FESX624HF
- FESX648

For hardware details about the IPv6 compact models, refer to the following sections in this chapter:

- [“FESX424, FESX624, and FESX624E-PREM6”](#) on page 6
- [“FESX424HF, FESX624HF, and FESX624HFE-PREM6”](#) on page 7
- [“FESX448, FESX648, and FESX648E-PREM6”](#) on page 9

## Hardware features

This section describes the physical characteristics of the Brocade FES and FESX. For details about physical dimensions, power supply specifications, and pinouts, refer to [Chapter 6, “Hardware Specifications”](#).

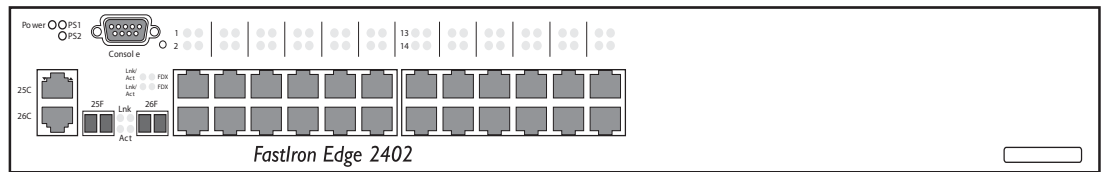
### FES2402, FES4802, FES9604

The FastIron Edge Switch (FES) family provides high 10/100 port density and 10/100/1000 Gigabit Ethernet uplinks in a compact form factor:

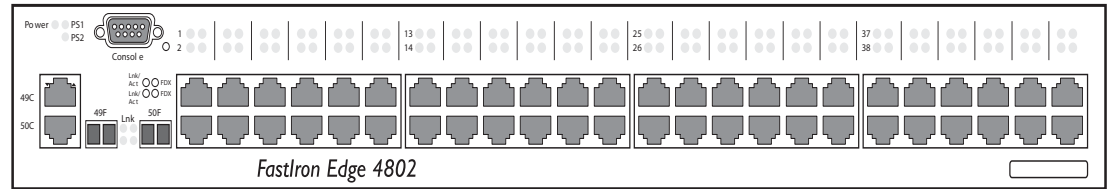
- The FES2402 has 24 10/100 ports and two Gigabit uplink ports.
- The FES4802 has 48 10/100 ports and two Gigabit uplink ports.
- The FES9604 has 96 10/100 ports and four Gigabit uplink ports.

The following figures show the front panels of these FastIron Edge Switches.

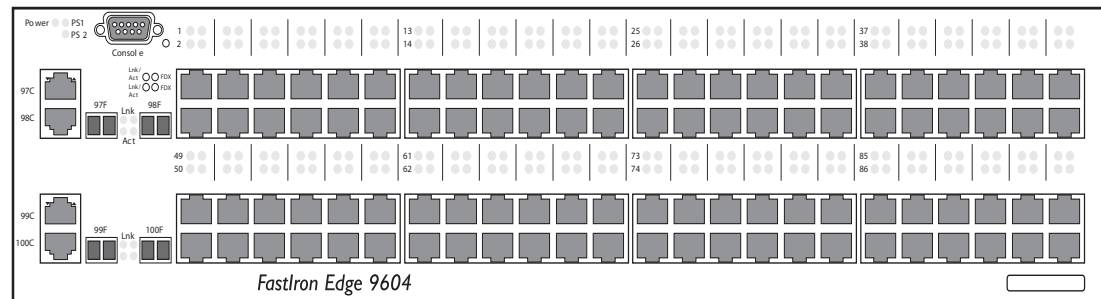
**FIGURE 1** FastIron Edge Switch 2402



**FIGURE 2** FastIron Edge Switch 4802



**FIGURE 3** FastIron Edge Switch 9604

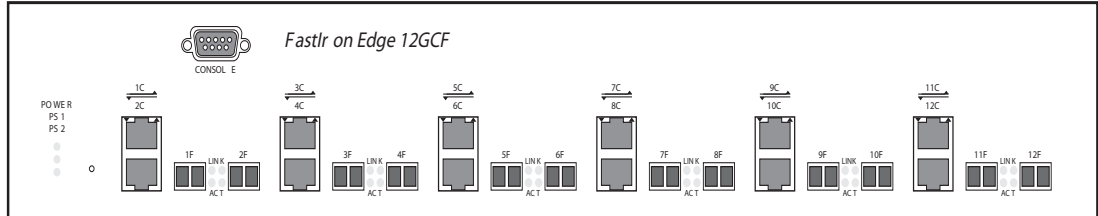


## FES12GCF

The FES12GCF provides 12 combination 10/100/1000 Gigabit Ethernet Copper and Fiber ports in a compact form factor.

Figure 4 shows the front panel of the FES12GCF.

**FIGURE 4** FastIron Edge Switch 12GCF

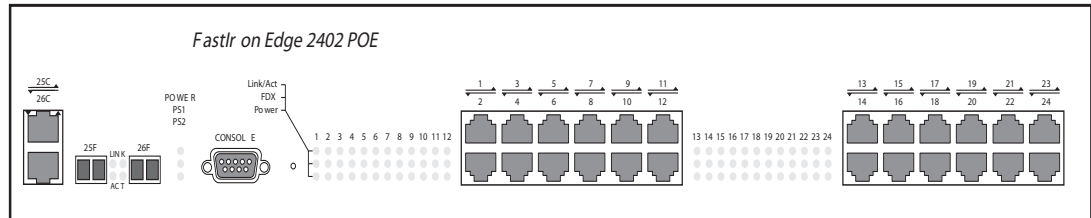


## FES2402-POE and FES4802-POE

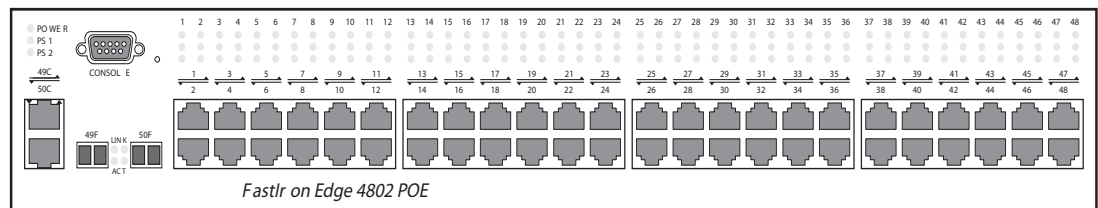
- The FES2402-POE has 24 10/100 ports and two Gigabit uplink ports.
- The FES4802-POE has 48 10/100 ports and two Gigabit uplink ports.

The following figures show the front panels of these FastIron Edge Switches.

**FIGURE 5** FastIron Edge Switch 2402-POE



**FIGURE 6** FastIron Edge Switch 4802-POE



## FESX424, FESX624, and FESX624E-PREM6

The FESX424, FESX624, and FESX624E-PREM6 have the following ports:

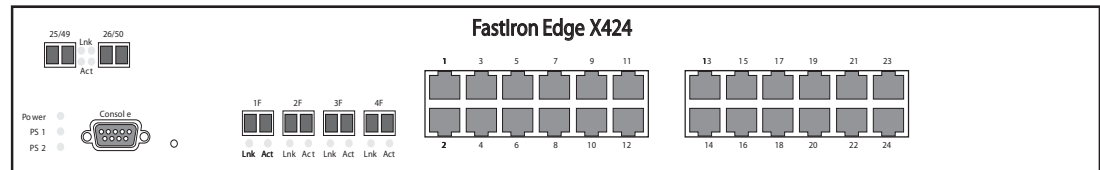
- 24 Copper ports that support 10/100/1000Base-T RJ-45 connectors
- Four Gigabit Fiber ports for mini-GBIC optical transceivers (also called Small Form Factor Pluggable (SFP) MultiSource Agreement (MSA)-compliant optical transceivers)
- IPv4 FESX4 devices optionally support one or two 10-Gigabit Ethernet uplink ports for 10-Gigabit Small Form Factor Pluggable (XFP) MSA-compliant optical transceivers

- IPv6 (FESX6) devices optionally support two 10-Gigabit Ethernet uplink ports for 10-Gigabit Small Form Factor Pluggable (XFP) MSA-compliant optical transceivers

Note that one port out of each pair of copper and fiber ports can be active at a time (refer to “[FES 10/100/1000 Mbps ports](#)” on page 11).

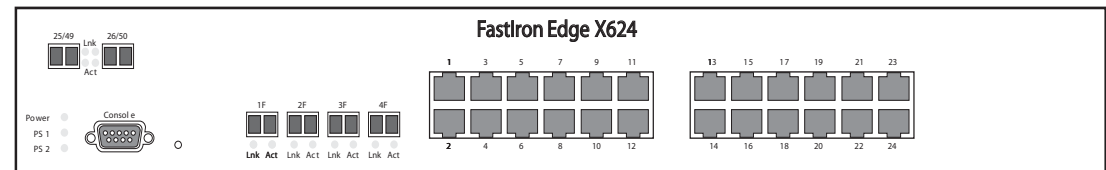
The following figure shows the front panel of the FESX424.

**FIGURE 7 FESX424**



The following figure shows the front panel of the FESX624. The FESX624E-PREM6 looks similar to the FESX624, except for the model number on the front of the device.

**FIGURE 8 FESX624**



## FESX424HF, FESX624HF, and FESX624HFE-PREM6

The FESX424HF, FESX624HF, and FESX624HFE-PREM6 have the following ports:

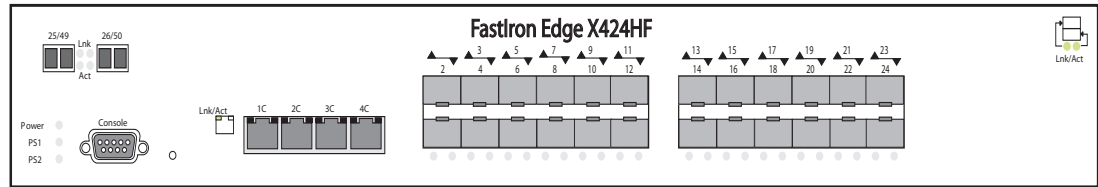
- 20 100/1000 Gigabit Ethernet fiber ports for mini-GBIC optical transceivers (also called Small Form Factor Pluggable (SFP) Multisource Agreement (MSA)-compliant optical transceivers).
- Four combination Gigabit Copper or Fiber uplink ports:
  - The copper ports support 10/100/1000Base-T RJ-45 connectors.
  - The fiber ports support 100/1000 SFPs.
- IPv4 (FESX4) devices optionally support one or two 10-Gigabit Ethernet uplink ports for 10-Gigabit Small Form Factor Pluggable (XFP) MSA-compliant optical transceivers
- IPv6 (FESX6) devices optionally support two 10-Gigabit Ethernet uplink ports for 10-Gigabit Small Form Factor Pluggable (XFP) MSA-compliant optical transceivers

Note that one port out of each pair of copper and fiber ports can be active at a time. For example, you can use either copper port 2 or fiber port 2, but not both at the same time. You can use a combination of fiber and copper ports or all copper or all fiber ports, as needed. For more information, refer to “[Combination ports](#)” on page 13.

# 1 Hardware features

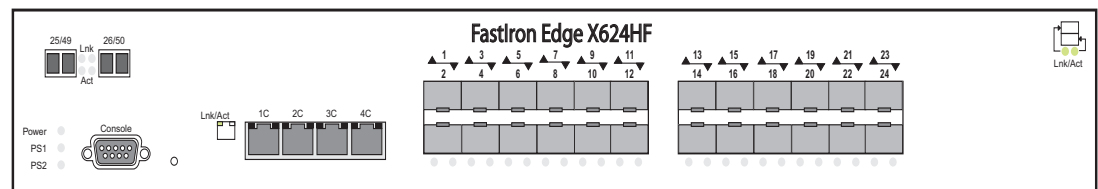
The following figure shows the front panel of the FESX424HF.

**FIGURE 9 FESX424HF front panel**



The following figure shows the front panel of the FESX624HF. The FESX624HFE-PREM6 front panel looks similar to the FESX624HF, except for the model number on the front panel.

**FIGURE 10 FESX624HF front panel**



## FESX424-POE

The Brocade FESX424-POE has 10/100/1000 ports that provide Power over Ethernet (PoE), compliant with the IEEE 802.3af specification for delivering power over the LAN. The 802.3af specification provides the standard for delivering power over existing network cabling infrastructure, enabling multicast-enabled full streaming audio and video applications for converged services, such as, Voice over IP (VoIP), WLAN access points, IP surveillance cameras, and other IP powered devices.

For more information about POE and the CLI commands used to configure it, refer to the *FastIron Configuration Guide*.

The FESX424-POE has the following ports:

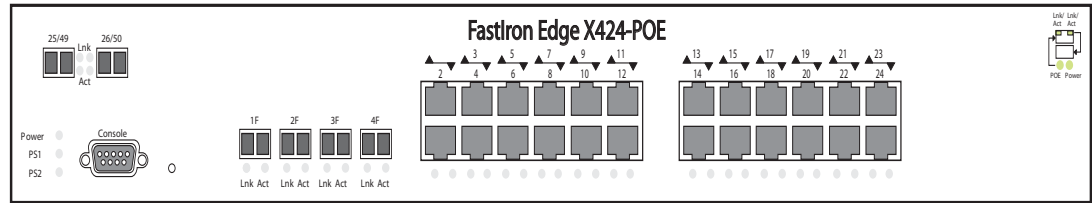
- 20 10/100/1000 ports with RJ-45 copper connectors
- Four combination Gigabit Copper or Fiber uplink ports:
  - The copper ports support 10/100/1000BaseT RJ-45 connectors.
  - The fiber ports support 10/100/1000 SFPs.
- Optionally, one or two 10-Gigabit Ethernet uplink ports for 10-Gigabit Small Form Factor Pluggable (XFP) MSA-compliant optical transceivers

The ports numbered from 1 – 24 support POE.

Note that one port out of each pair of copper and fiber ports can be active at a time. For example, you can use either copper port 2 or fiber port 2, but not both at the same time. You can use a combination of fiber and copper ports or all copper or all fiber ports, as needed. For more information, refer to [“Combination ports”](#) on page 13.

The following figure shows the front panel of the FESX424-POE.

**FIGURE 11 FESX424-POE front panel**



## FESX448, FESX648, and FESX648E-PREM6

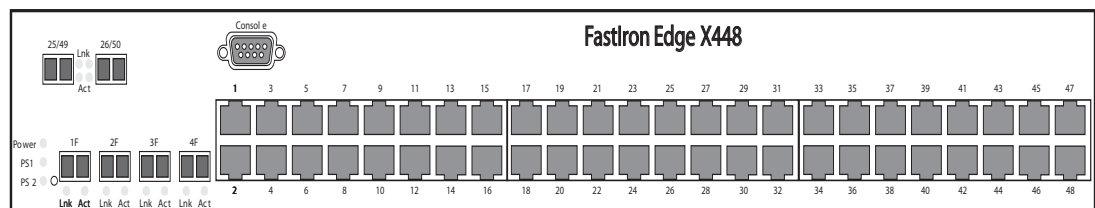
The FESX448, FESX648, and FESX648E-PREM6 have the following ports:

- 48 Copper ports that support 10/100/1000Base-T RJ-45 connectors
- Four Gigabit Fiber uplink ports (1F – 4F) for mini-GBIC optical transceivers (also called Small Form Factor Pluggable (SFP) Multisource Agreement (MSA)-compliant optical transceivers)
- IPv4 (FESX4) devices optionally support one or two 10-Gigabit Ethernet uplink ports for 10-Gigabit Small Form Factor Pluggable (XFP) MSA-compliant optical transceivers
- IPv6 (FESX6) devices optionally support two 10-Gigabit Ethernet uplink ports for 10-Gigabit Small Form Factor Pluggable (XFP) MSA-compliant optical transceivers

Note that one port out of each pair of copper and fiber ports can be active at a time. For example, you can use either copper port 2 or fiber port 2, but not both at the same time. You can use a combination of fiber and copper ports or all copper or all fiber ports, as needed (refer to [“Combination ports”](#) on page 13).

The following figure shows the front panel of the FESX448.

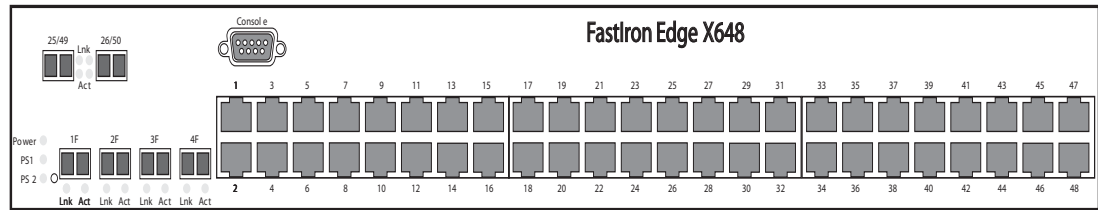
**FIGURE 12 FESX448 front panel**



The following figure shows the front panel of the FESX648. The FESX648E-PREM6 front panel looks similar to the FESX648, except for the model number on the front panel.

# 1 Hardware features

**FIGURE 13 FESX648 front panel**



## Control features

Each device's front panel has the following control features:

- Serial management interface (the port labeled **Console**)
- Reset button
- 10/100 ports with RJ-45 copper connectors (FES only)
- 10/100/1000 ports with RJ-45 copper connectors
- 10/100/1000 ports with mini-GBIC slots for SFP MSA-compliant fiber transceivers
- 100/1000 ports with mini-GBIC slots for SFP MSA-compliant fiber transceivers (FESX424HF)
- IPv4 (FESX4) devices optionally support one or two 10-Gigabit Ethernet uplink ports for 10-Gigabit Small Form Factor Pluggable (XFP) MSA-compliant optical transceivers
- IPv6 (FESX6) devices optionally support two 10-Gigabit Ethernet uplink ports for 10-Gigabit Small Form Factor Pluggable (XFP) MSA-compliant optical transceivers

### *Serial Management Interface (Console port)*

The serial management interface enables you to configure and manage the device using a third-party terminal emulation application on a directly connected PC. A straight-through EIA/TIA DB-9 serial cable (M/F) ships with the device. The serial management interface (the port labeled **Console**) is located in the left corner of the front panel.

### *Reset button*

The reset button allows you to restart the system without switching the power supplies off and on or using the CLI or Web Management Interface. The button is located to the right of the serial management interface and is recessed to prevent it from being pushed accidentally.

### *FES network interfaces*

The FES2402, 4802, and 9604 provide the following interfaces:

- 10Base-T/100Base-T (10/100) copper ports
- 10/100/1000Base-T copper or Fiber Gigabit uplink ports

The FES12GCF provides the following interfaces:

- 10/100/1000Base-T copper or Fiber Gigabit uplink ports

For information about the type of fiber optic modules supported on FES devices, refer to [“Network interfaces”](#) on page 16.

### FES 10/100 Mbps Ports

The 10/100 copper ports support automatic MDI or MDIX detection, and use auto-sensing and auto-negotiating to determine the speed (10 Mbps or 100 Mbps) and mode (full-duplex or half-duplex) of the port at the other end of the link and adjust port speed accordingly. In addition, the 10/100 ports on the FES POE models can detect 802.3af compatible IP devices and provide power accordingly.

For more information about automatic MDI or MDIX detection, refer to the *Switch and Router Installation and Basic Configuration Guide*.

The 10/100 ports use RJ-45 connectors. For pinout information, refer to [Chapter 6, “Hardware Specifications”](#).

The 10/100 Mbps ports on FES devices provide status information using the LEDs listed in [Table 2](#).

### FES 10/100/1000 Mbps ports

The 10/100/1000 ports use auto-sensing and auto-negotiating to determine the speed (10 Mbps, 100 Mbps, or 1000 Mbps) and mode (full-duplex or half-duplex) of the port at the other end of the link and adjust port speed accordingly. 10/100/1000 ports on the devices have the following interfaces:

- RJ-45 copper interface for 10/100/1000Base-T – Cat5 copper cabling
- Mini-GBIC slot for CWDM, 1000Base-BX, LH, LX, or SX – fiber cabling

The copper ports support automatic Media Dependent Interface (MDI) and Media Dependent Interface Crossover (MDIX) detection. Refer to the *Switch and Router Installation and Basic Configuration Guide* for more information.

One port out of each pair of copper and fiber ports can be active at a time. For example, on the FES12GCF, you can use either Copper port 10 or Fiber port 10, but not both at the same time. You can use a combination of fiber and copper ports or all copper or all fiber ports, as needed. On the FES, if you attach both the copper and fiber connectors for a port to the network, the fiber connector takes precedence over the copper connector and will be the active connector for the port. Insertion of a fiber mini-GBIC disables the copper connector. To enable a port’s copper connector, you must remove the port’s fiber mini-GBIC.

The 10/100/1000 Mbps ports on the FES provide status information using the LEDs listed in [Table 2](#). The fiber connectors on the FES devices use the Lnk and Act LEDs located between the mini-GBIC slots for the fiber ports. The copper connectors use triangular LEDs located in the upper right and left corners of the upper Gigabit copper connector. The LED on the left side is for the upper copper connector. The LED on the right side is for the lower copper connector.

### LEDs for FES ports



The 10/100 Mbps and 10/100/1000 Mbps ports on FES devices provide status information using the LEDs listed in [Table 2](#).

**TABLE 2** LEDs for FES ports

LED	Position	State	Meaning
10/100 Port LEDs			
Lnk or Act	Left LED above port	On	Link is up.
	OR	Off	Link is down.
	Top LED above port	Blinking	Port is transmitting or receiving.

# 1 Hardware features

**TABLE 2** LEDs for FES ports (Continued)

LED	Position	State	Meaning
FDX	Right LED above port OR Middle LED above port	On	Full-duplex connection found or configured.
		Off	Half-duplex connection or no port connection exists.
		Blinking	Collisions are being detected.
Power (POE devices only)	Bottom LED above port (POE devices only)	On	The port is providing in-line power to the power consuming device, such as a VoIP phone or other device, that is connected to the port.
		Off	The port is not providing in-line power.
10/100/1000 Port LEDs			
Lnk or Act	Top	On	Link is up.
		Off	Link is down.
		Blinking	Port is transmitting or receiving traffic
FDX	Bottom	On	Full-duplex connection found or configured. <b>NOTE:</b> This LED also is lit if you configure the port to 10 Mbps full-duplex or 100 Mbps full-duplex. This is true even when no link is present.
		Off	Half-duplex connection or no port connection exists.
		Blinking	Collisions are being detected.
	Upper left corner of upper copper connector for upper copper connector	Off	No copper port connection exists on upper copper connector.
		Green	Copper port is connected on upper copper connector.
		Amber	Traffic is being transmitted and received on upper copper connector.
	Upper right corner of upper copper connector for lower copper connector	Off	No copper port connection exists on lower copper connector.
		Green	Copper port is connected on lower copper connector.
		Amber	Traffic is being transmitted and received on lower copper connector.

## *FastIron X Series network interfaces*

The FastIron X Series compact switches support the network interfaces listed in [Table 4](#) on page 17.

This section describes the port types in the FastIron X Series compact switches.

### 10/100/1000 Mbps ports

The 10/100/1000 ports on the FastIron X Series compact switches use auto-sensing and auto-negotiating to determine the speed (10 Mbps, 100 Mbps, or 1000 Mbps) and duplex mode (full-duplex or half-duplex) of the port at the other end of the link and adjust port speed accordingly. 10/100/1000 ports on the devices support the interfaces listed in the section “[Network interfaces](#)” on page 16.

The 10/100 and Gigabit Copper ports support auto MDI or MDIX detection. For more information about this feature, refer to "Configuring MDI or MDIX" in the *FastIron Configuration Guide*.

### 100/1000 Mbps ports on Hybrid Fiber (HF) models

The 100/1000 ports on the hybrid fiber models (FESX424HF, FESX624HF, and FESX624HFE-PREM6) are configurable to support the interfaces listed in the section “[Network interfaces](#)” on page 16.

### Support for 100BaseFX

The hybrid fiber models support the following types of SFPs for 100BaseFX:

- Multimode – maximum distance is 2 kilometers
- Bidirectional singlemode – maximum distance is 10 kilometers
- Long Reach (LR) – maximum distance is 40 kilometers
- Intermediate Reach (IR) – maximum distance is 15 kilometers

To enable support for 100BaseFX, you must enter the CLI command **link-config gig fiber 100-base-fx ethernet <portnum>**. For CLI command details, refer to the section “Enabling and Disabling Support for 100BaseFX” in the *FastIron Configuration Guide*.

### Combination ports

One port out of each pair of copper and fiber ports can be active at a time. For example, you can use either copper port 2 or fiber port 2, but not both at the same time. You can use a combination of fiber and copper ports or all copper or all fiber ports, as needed.

If you attach both the copper and fiber connectors for a port to the network, the fiber connectors take precedence over the copper connectors. These ports support true media automatic detection, meaning the device selects the fiber or copper connector based on link availability. If a fiber link cannot be established, the device selects the copper media.

### 10-Gbps ports

The 10-Gigabit Ethernet module on a FastIron X Series compact switch is optional. If one is installed on your device, it has either a one- or two-port optical interface for XFP MSA-compliant 10GBase-LR, 10GBase-SR, or 10GBase-ER – fiber cabling. If your device does not include a 10-GbE module, you can optionally install one. Refer to “[Installing or replacing a 10-Gigabit Ethernet module](#)” on page 68. For more details, follow these pointers:

- IPv4 (FESX4) devices optionally support one or two 10-Gigabit Ethernet uplink ports for 10-Gigabit Small Form Factor Pluggable (XFP) MSA-compliant optical transceivers
- IPv6 (FESX6) devices optionally support two 10-Gigabit Ethernet uplink ports for 10-Gigabit Small Form Factor Pluggable (XFP) MSA-compliant optical transceivers

The 10-Gigabit Ethernet ports use 10-Gigabit Small Form Factor Pluggable (XFP) MSA-compliant transceivers.

---

**NOTE**

The IPv6 10-GbE modules are supported in IPv6 compact switches only. Likewise, the IPv4 10-GbE modules are supported in IPv4 compact switches only.

---

**LEDs for FastIron X Series ports**

The 10/100/1000 Mbps copper and fiber ports, and the 10-Gbps fiber ports on the FastIron X Series compact switches provide status information using the LEDs listed in [Table 3](#):


- The copper ports use square LEDs located in the upper right and left corners of the upper Gigabit copper connector. The LEDs are combined Lnk or Act LEDs. The LED on the left side is for the upper copper connector. The LED on the right side is for the lower copper connector.
- The Gigabit fiber connectors use the Lnk and Act LEDs located beneath the mini-GBIC slots for the fiber ports.
- The 10-Gbps fiber connectors use the LEDs located next to the fiber ports.

**LEDs for POE ports**

The fiber and copper ports on the FESX424-POE provide status information using the LEDs listed in [Table 3](#):

- The 10/100/1000 copper ports (1 – 24) use the LEDs located on the top left and top right of the copper connectors. The LEDs are combined Link or Activity (Lnk or Act) LEDs. The LED on the left side is for the upper fiber connector. The LED on the right side is for the lower fiber connector.
- The 10/100/1000 fiber ports (1F – 4F) use the LEDs located beneath the fiber connectors. The LED on the left side is the Lnk LED, and the LED on the right side is the Act LED.
- The POE ports (1 – 24) use the round LEDs located beneath the copper ports. The first (left-most) LED is for port 1, the second LED is for port 2, the third LED is for port 3, etc.

**TABLE 3** LEDs for FastIron X Series ports

LED	Position	State	Meaning
<b>10/100/1000 Copper Port LEDs</b>			
	Left for upper copper connector	On	The link is up.
	Right for lower copper connector	Off	The link is down.
		Blinking	The port is transmitting or receiving traffic
<b>10/100/1000 Fiber Port LEDs</b>			
Lnk	Bottom left	On	The fiber port is connected.
		Off	No fiber port connection exists.
Act	Bottom right	On or blinking	Traffic is being transmitted and received on the fiber port.
		Off	No traffic is being transmitted on the fiber port.
<b>100/1000 Fiber Port LEDs on the FESX424HF, FESX624HF, and FESX624HFE-PREM6</b>			
	Left for upper copper	On	The link is up.
	Right for lower copper connector	Off	The link is down.
		Blinking	The port is transmitting or receiving traffic

**TABLE 3** LEDs for FastIron X Series ports (Continued)

LED	Position	State	Meaning
10-Gbps Port LEDs			
Lnk	Top right for left-most connector	On	The port is connected.
	Top left for right-most connector	Off	No fiber port connection exists.
Act	Bottom right for left-most connector	On or Blinking	Traffic is being transmitted and received on the fiber port.
	Bottom left for right-most connector	Off	No traffic is being transmitted on the fiber port.
POE Port LEDs			
POE	Left for upper port	On (Green)	The port is enabled, a power-consuming device has been detected, and the module is supplying power to the device.
	Right for lower port	Off	The port is not providing in-line power.

### *Port regions*

Except for the FES12GCF, ports on the FastIron compact switches are grouped into regions. For a few features, such as port monitoring and unknown unicast configurations, you will need to know the region to which a port belongs. However, for most features, a port's region does not affect configuration or operation of the feature. If a port's region does affect configuration or operation of a feature, it is noted and described in the appropriate feature section of this guide.

FastIron Edge Switch 2402 port regions:

- Ports 1 – 8
- Ports 9 – 16
- Ports 17 – 24
- Port 25
- Port 26

FastIron Edge Switch 4802 port regions:

- Ports 1 – 8
- Ports 9 – 16
- Ports 17 – 24
- Ports 25 – 32
- Ports 33 – 40
- Ports 41 – 48
- Port 49
- Port 50

FastIron Edge Switch 9604 port regions:

- Ports 1 – 8

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- Ports 9 – 16
- Ports 17 – 24
- Ports 25 – 32
- Ports 33 – 40
- Ports 41 – 48
- Ports 49 – 56
- Ports 57 – 64
- Ports 65 – 72
- Ports 73 – 80
- Ports 81 – 88
- Ports 89 – 96
- Port 97
- Port 98
- Port 99
- Port 100

FastIron Edge Switch 12GCF:

- There are no port ranges on the FES12GCF

FastIron X Series compact switches with 24 ports:

- Ports 1 – 12
- Ports 13 – 24
- Port 25 (optional 10-GbE uplink port)
- Port 26 (optional 10-GbE uplink port)

FastIron X Series compact switches with 48 ports:

- Ports 1 – 12
- Ports 13 – 24
- Port 25 – 36
- Port 37 – 48
- Port 49 (optional 10-GbE uplink port)
- Port 50 (optional 10-GbE uplink port)

## Network interfaces

[Table 4](#) lists the network interfaces supported on the FastIron compact devices. For network interface and cabling specifications, refer to [Table 19](#) on page 79.

The output of the **show media** command displays the type of media installed in the ports.

---

### NOTE

The **show media** output on FES devices display fiber media only. These devices do not display the copper media installed in the ports.

---

**TABLE 4** Network interfaces

Interface	Show Media Description
1000Base-BX-D	M-GBXD
1000Base-BX-U	M-GBXU
1000Base-CWDM	Cxxxx <sup>1</sup>
1000Base-LHA	M-LHA
1000Base-LHB	M-LHB
1000Base-LX	M-LX
1000Base-SX	M-SX
1000Base-SX2	M-XR or M-SX2
1000Base-T	M-C
100Base-BX	M-FBXD or M-FBXU
100Base-FX	M-FX, M-FXB1, or M-FXB2
100Base-FX-IR	M-FX-IR
100Base-FX-LR	M-FX-LR
100Base-FX-SR	M-FX-SR
100Base-TX <sup>2</sup>	M-TX
10GBase-1310-MMF	1310-MMF
10GBase-CX4	XG-CX4
10GBase-ER	XG-ER
10GBase-LR	XG-LR
10GBase-SR	XG-SR
10GBase-ZR	XG-ZR
10GBase-ZRD	XG-ZRD

1. xxxx denotes the wavelength. For example, C1550.
2. Supported on copper ports only.

## Power supplies

Each FastIron compact switch comes with one alternating-current (AC) or direct-current (DC) power supply, depending on how it was ordered from the factory. All models have two power supply slots, enabling you to install a second power supply for redundancy. Direct-current (DC) supplies are available for some devices, in which you can use any combination of AC and DC supplies in the same device. The following table lists the power supplies that may be installed in a FastIron compact switch.

[Table 5](#) and [Table 6](#) show which Brocade power supply can be installed on each Brocade FastIron compact product.

### NOTE

You can interchange power supplies, but you must adhere to the compatibility matrix shown in the tables below.

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## NOTE

Changes or modifications made to this device that are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**TABLE 5** FastIron AC power supply compatibility matrix

Device	RPS5 <sup>1</sup> 220 watts	RPS8 <sup>2</sup> 600 watts	RPS-X424 220 watts	RPS-X424- POE 600 watts	RPS-X448 600 watts	RPS-FGS 600 watts
FastIron Edge Switch	Yes	No	Yes	No	No	No
FastIron Edge Switch - Power Over Ethernet	No	Yes	No	No	Yes	Yes
FESX424-POE	No	Yes	No	No	Yes	Yes
FastIron X Series with 24 ports (except FESX424-POE)	Yes	No	Yes	No	No	No
FastIron X Series with 48 ports	No	Yes	No	Yes	Yes	Yes

1. RPS5 = RPS-X424 = 220 watts
2. RPS8 = RPS-X424-POE = RPS-X448 = RPS-FGS = 600 watts

**TABLE 6** FastIron DC power supply compatibility matrix

Device	RPS5DC <sup>1</sup> 220 watts	RPS8DC <sup>2</sup> 600 watts	RPSDC-X42 4 220 watts	RPSDC-X4 24-POE 600 watts	RPSDC-X 448 600 watts	RPSDC-FGS 600 watts
FastIron Edge Switch	Yes	No	No	No	No	No
FastIron Edge Switch - Power Over Ethernet	No	Yes	No	No	Yes	Yes
FESX424-POE	No	Yes	No	Yes	Yes	Yes
FastIron X Series with 24 ports (except FESX424-POE)	No	No	Yes	No	No	No
FastIron X Series with 48 ports	No	Yes	No	Yes	Yes	Yes

1. RPS5DC = RPSDC-X424 = 220 watts
2. RPS8DC = RPSDC-X424-POE = RPSDC-X448 = RPSDC-FGS = 600 watts

The power supplies can be swapped in or out of the device while the device is running. You can remove and insert a power supply without opening the device. If the device contains non-POE redundant power supplies, you can remove one of the supplies without interrupting operation. The remaining supply provides enough power for all the ports.

The following sections provide further details about the power supplies for the FastIron family of switches:

- Power status LEDs are listed in [Table 8](#) on page 34.
- Hardware specifications for the power supplies are listed in [Chapter 6, “Hardware Specifications”](#).
- [“About redundant power supplies and power supply failure”](#) on page 20

## *POE power supply precautions*

The following precautions apply to FastIron POE compact switches:

- A device with dual power supplies may not provide redundancy, depending on how much power the POE ports are consuming. For more information, refer to [“What happens when a FastIron POE power supply fails”](#) on page 20.
- If your device has 48 ports and two power supplies, and the POE ports are consuming more than 480 watts of power, a single power supply failure will cause both power supplies to shut down.
- If your device has 48 ports and only one power supply, and each POE-enabled port needs 15.4 watts, then a maximum of 31 ports can supply power to connected devices.
- If your device has 48 ports and only one power supply, and the power consuming devices connected to POE-enabled ports consume a total of more than 480 watts of power, the power supply may shut down.

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### **NOTE**

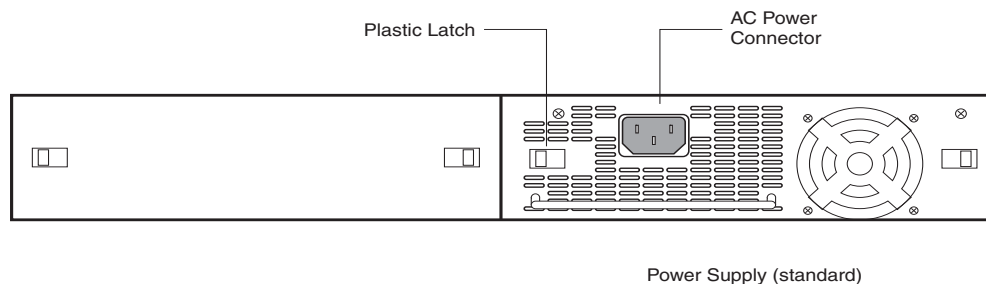
The system powers on as many POE ports as the power supplies can handle. The system calculates the maximum number of POE ports it can support based on the number of power supplies installed. POE ports are enabled based on their priority settings. Keep in mind that the system will reserve the maximum configured power per POE-enabled port, even if the POE power-consuming device is drawing less power.

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## *AC power supplies*

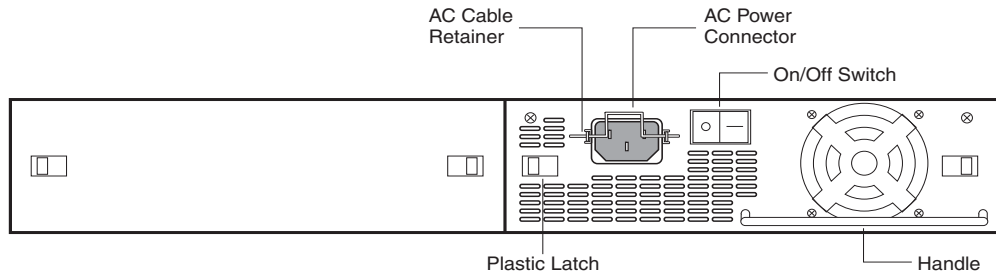
[Figure 14](#) shows a rear view of a FastIron Compact device containing one AC power supply. The power supply installed in your system may vary from the one shown here, which does not have an ON or OFF switch.

**FIGURE 14** AC power supply without ON or OFF switch



[Figure 15](#) shows a rear view of a FastIron Compact device containing one AC power supply. The power supply installed in your system may vary from the one shown here, which has an ON or OFF switch.

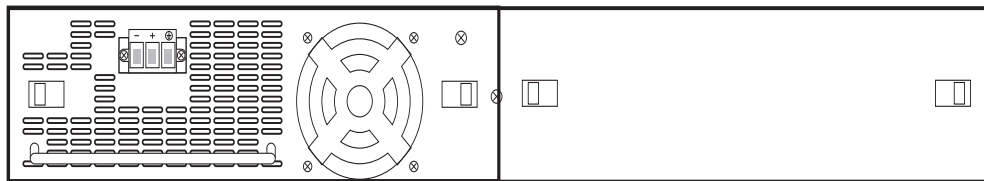
**FIGURE 15 AC power supply with ON or OFF switch**



### *DC power supplies*

Figure 16 shows a rear view of a FastIron Compact device containing one DC power supply.

**FIGURE 16 RPS5DC power supply**



### *About redundant power supplies and power supply failure*

A FastIron compact switch with redundant power supplies can maintain full operation when one power supply fails. Power supply failure can be a failure of the supply itself or the office power grid connected to the power supply.

#### **What happens when a FastIron (non-POE) power supply fails**

In a FastIron compact switch (non-POE) with redundant power supplies, power consumption is equally distributed between both power supplies, within a certain percentage depending on power load or power supply type. However, when one power supply fails, the power load is carried by the remaining power supply.

#### **What happens when a FastIron POE power supply fails**

A FastIron POE compact switch with dual power supplies may not provide redundancy, depending on how much power the POE ports are consuming. In a POE device with redundant power supplies, power consumption is equally distributed (within a certain percentage depending on power load or power supply type) between both power supplies. The power supplies provide power to both the system and POE components. Therefore, a power supply failure can affect the operation of the entire device and not just POE ports.

---

#### **NOTE**

If a switch has 48 ports and two power supplies, and the POE ports are consuming more than 480 watts of power, a single power supply failure will cause both power supplies to shut down.

---

If a power supply fails and the system is left with less than the minimum required power, the remaining power supply will go into overload. Several things can happen with a power supply failure in a FastIron POE switch. The output voltage of the remaining good power supply will likely drop as it tries unsuccessfully to generate more power than it is capable of. The system will react to a drop in voltage by increasing the current draw. POE ports will start to shut down due to over-current protection or under-voltage protection, whichever occurs first. There is no particular order in which the POE ports will shut down, as this will occur in hardware and not in software.

After a power loss, if the system is left with less than the minimum number of power supplies required for normal operation, the system will be left in an unknown state. At this point, manual recovery is required (i.e. restore power and power cycle the switch).

## Cooling system and fans

This section describes the fans in the FastIron compact switches.

### *FES fans*

The FES cooling fans cool the CPU, main memory, and voltage regulators. The fans use either a push or pull configuration to move the air from the left side of the device to the right side of the device.

The fans in the FES operate at a steady speed, and do not support multiple fan speeds.

### *FastIron X Series fans*

The FastIron X Series cooling fans cool the CPU, main memory, and voltage regulators. The fans use either a push or pull configuration to move the air from the left side of the device to the right side of the device.

The fans in the 24-port FastIron X Series switches operate at a single speed and do not support multiple fan speeds.

The fans in the 48-port FastIron X Series switches include two three-speed fans that operate at low speed, then adjust based on the ambient temperature and configured or default temperature thresholds. Both fans operate simultaneously at the same speed. If one fan fails, it does not affect the operation of the other fan.

The fans can operate at speeds of low, medium, and high. The system uses a **fan speed switch** and a default or configured temperature threshold associated with it to determine at which speed the fan should operate. If desired, you can change the settings of the temperature thresholds associated with fan speed switches. For more information, refer to [“Managing temperature settings and fan speed on FastIron X Series compact switches”](#) on page 56.

# 1 Hardware features

# Installing a FastIron Compact Switch

---

## Unpacking a system



### **DANGER**

*The procedures in this guide are for qualified service personnel.*

The Brocade systems ship with all of the following items. Please review the list below and verify the contents. If any items are missing, please contact the place of purchase.

### Package contents

- Brocade FastIron compact switch
- 115V AC power cable (for AC sourced devices)
- Rack mount brackets and mounting screws
- Warranty card

### General requirements

To manage the system, you need the following items for serial connection to the switch or router:

- A management station, such as a PC running a terminal emulation application.
- A straight-through EIA or TIA DB-9 serial cable (F/F). The serial cable can be ordered separately from Brocade. If you prefer to build your own cable, refer to the pinout information in [“Attaching a PC or terminal”](#) on page 35.

You use the serial connection to perform basic configuration tasks including assigning an IP address and network mask to the system. This information is required for managing the system using the Web Management Interface or IronView Network Manager or using the CLI through Telnet.



### **DANGER**

*Do not use the handles on the power supply units to lift or carry a Brocade device.*

## Summary of installation tasks

Follow the steps listed below to install your FastIron compact switch. Details for each of the steps highlighted below are provided in this chapter and in the following chapter.

## 2 Summary of installation tasks

**TABLE 7** Summary of installation tasks

Task Number	Task	Where to Find More Information
1	Ensure that the physical environment that will host the device has the proper cabling and ventilation.	<a href="#">“Preparing the installation site”</a> on page 28
2	Optionally insert a second or redundant power supply. If you need to install a power supply, it may be easier to install it before mounting the device, although the power supplies are “hot swappable”, and can be installed or removed after the device is mounted and powered-on.  <b>NOTE: CAUTION:</b> Remove the power cord from a power supply before you install it in or remove it from the device. Otherwise, the power supply or the device could be damaged as a result. (The device can be running while a power supply is being installed or removed, but the power supply itself should not be connected to a power source.)	<a href="#">“Installing a redundant power supply”</a> on page 28
4	Install the Brocade device on a desktop, in an equipment rack, or on the wall.	<a href="#">“Installing the device”</a> on page 31
5	Once the device is physically installed, plug the device into a nearby power source that adheres to the regulatory requirements outlined in this guide.	<a href="#">“Powering on the system”</a> on page 33
6	Verify that the system LEDs are registering the proper LED state after power-on of the system.	<a href="#">“Verifying proper operation”</a> on page 34
7	Attach a terminal or PC to the Brocade device. This will enable you to configure the device through the Command Line Interface (CLI).	<a href="#">“Attaching a PC or terminal”</a> on page 35
8	No default password is assigned to the CLI. For additional access security, assign a password.	<a href="#">“Assigning permanent passwords”</a> on page 39
9	Before attaching equipment to the device, you need to configure an interface IP address to the subnet on which it will be located. Initial IP address configuration is performed using the CLI with a direct serial connection. Subsequent IP address configuration can be performed using the Web Management Interface.	<a href="#">“Configuring IP addresses”</a> on page 41
10	Once you power on the device and assign IP addresses, the system is ready to accept network equipment.	<a href="#">“Connecting network devices”</a> on page 45
11	Test IP connectivity to other devices by pinging them and tracing routes.	<a href="#">“Testing connectivity”</a> on page 49
12	Continue configuring the device using the CLI or the Web Management Interface. You also can use IronView Network Manager to manage the device. Refer to the <i>IronView Network Management User’s Guide</i> for information.	<i>FastIron Configuration Guide</i> (for FastIron X Series compact devices) or <i>Switch and Router Installation and Basic Configuration Guide</i> and <i>Enterprise Configuration and Management Guide</i> (for FES devices).
13	Secure access to the device.	<i>FastIron Configuration Guide</i> (for FastIron X Series compact devices) or <i>Security Guide</i> (for FES devices).

# Installation precautions

Follow these precautions when installing a Brocade device.

## General precautions



### **DANGER**

*All fiber-optic interfaces use Class 1 lasers.*



### **CAUTION**

*Do not install the device in an environment where the operating ambient temperature might exceed 40o C (104o F).*



### **CAUTION**

*Make sure the air flow around the front, sides, and back of the device is not restricted.*



### **CAUTION**

*Never leave tools inside the chassis.*

## Lifting precautions



### **DANGER**

*Make sure the rack or cabinet housing the device is adequately secured to prevent it from becoming unstable or falling over.*



### **DANGER**

*Do not use the handles on the power supply units to lift or carry a Brocade device.*



### **DANGER**

*Mount the devices you install in a rack or cabinet as low as possible. Place the heaviest device at the bottom and progressively place lighter devices above.*

## Power precautions



### CAUTION

---

Use a separate branch circuit for each AC power cord, which provides redundancy in case one of the circuits fails.

---



### CAUTION

---

Ensure that the device does not overload the power circuits, wiring, and over-current protection. To determine the possibility of overloading the supply circuits, add the ampere (amp) ratings of all devices installed on the same circuit as the device. Compare this total with the rating limit for the circuit. The maximum ampere ratings are usually printed on the devices near the input power connectors.

---



### CAUTION

---

All devices with DC power supplies are intended for installation in restricted access areas only. A restricted access area is where access can be gained only by service personnel through the use of a special tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.

---



### CAUTION

---

For the DC input circuit to a FES, FESX, or FWSX (DC power supply part number RPS5DC and RPS-X424-DC), make sure there is a 10-amp listed circuit breaker, minimum -48VDC, double pole, on the input to the terminal block. The input wiring for connection to the product should be Listed copper wire, 14 AWG, marked VW-1, and rated 90 degrees Celsius.

---



### CAUTION

---

For the DC input circuit to the system (DC power supply part number RPSDC-X424-POE), make sure there is a Listed 30 amp circuit breaker, minimum -48Vdc, double pole, on the input to the terminal block. The input wiring for connection to the product should be Listed copper wire, 10 AWG, marked VW-1, and rated minimum 90 degrees Celsius.

---



### CAUTION

---

Make sure you insert the power supply right-side up. It is possible to insert the supply upside down, although the supply will not engage with the power backplane when upside down. The power supply is right-side up when the power connector is on the left and the fan vent is on the right.

---

**CAUTION**

Remove the power cord from a power supply before you install it in or remove it from the device. Otherwise, the power supply or the device could be damaged as a result. (The device can be running while a power supply is being installed or removed, but the power supply itself should not be connected to a power source.)

**CAUTION**

The RPS8-AC power supply is designed exclusively for use with the FES2402-POE and FES4802-POE devices. The power supply produces extensive power to support 802.3af applications. Installing the power supply in a device other than the FES2402-POE or FES4802-POE will cause extensive damage to your equipment.

**DANGER**

*Disconnect the power cord from all power sources to completely remove power from the device.*

**DANGER**

*Make sure to choose the appropriate circuit device depending on the number of AC power supplies installed in the chassis. The minimum current draw for the system is one AC power supply.*

**DANGER**

*Power supplies are hot swappable. However, Brocade recommends that you disconnect the power supply from AC power before installing or removing the supply. The device can be running while a power supply is being installed or removed, but the power supply itself should not be connected to a power source. Otherwise, you could be injured or the power supply or other parts of the device could be damaged.*

**DANGER**

*Make sure that the power source circuits are properly grounded, then use the power cord supplied with the device to connect it to the power source.*

**DANGER**

*If the installation requires a different power cord than the one supplied with the device, make sure you use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.*

## Preparing the installation site

### Cabling infrastructure

Ensure that the proper cabling is installed in the site. Refer to [Chapter 6, “Hardware Specifications”](#) or [www.brocade.com](http://www.brocade.com) for a summary of supported cabling types and their specifications.

### Installation location

Before installing the device, plan its location and orientation relative to other devices and equipment. Allow at least 3 inches of space at the front of the device for the twisted-pair, fiber-optic, and power cabling. Also, allow a minimum of 3 inches of space between the sides and the back of the device and walls or other obstructions.

## Installing a redundant power supply

The FastIron Compact device ships with one AC or DC power supply. If desired, you can install a second supply for redundancy. For more information about power supply redundancy, refer to [“About redundant power supplies and power supply failure”](#) on page 20.

If you need to install a redundant power supply, it may be easier to install it before mounting the device, although the power supplies are “hot swappable” and can be installed or removed after the device is mounted and powered on.

This section provides the following procedures:

- Installing a redundant AC power supply – [“Installing an AC power supply”](#) on page 28
- Installing a redundant DC power supply – [“Installing a DC power supply”](#) on page 29

### Installing an AC power supply



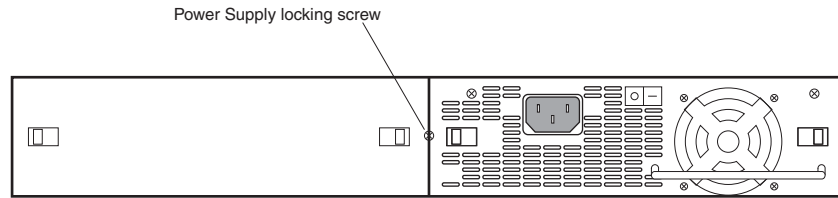
#### **DANGER**

*Before beginning the installation, refer to the precautions in [“Power precautions”](#) on page 26.*

Use the following procedures for AC power supplies in FastIron compact devices. Refer to [“Power supplies”](#) on page 17 for a list of which power supplies are supported in each device, and for illustrations showing power supply placement in the Brocade devices.

To install an AC power supply, complete the following steps.

1. If necessary, remove the power supply locking screw located in the center rear of the device (illustrated below).



2. If the empty power supply bay has a cover plate, press inward on the two latches near the edges of the cover plate to unlock the plate, then remove the plate.
3. Remove the power supply from its packaging.
4. With one hand, hold the bar on the front panel of the power supply. With the other hand, support the underside of the power supply, and insert the power supply into the empty power supply slot. Press until the supply is completely in the slot, so that the connectors on the back of the supply are fully engaged with the pins on the power backplane.



#### **CAUTION**

**Make sure you insert the power supply right-side up. It is possible to insert the supply upside down, although the supply will not engage with the power backplane when upside down. The power supply is right-side up when the power connector is on the left and the fan vent is on the right.**

5. Press the two latches near the edges of the supply outward to lock the supply in place.
6. Connect the power cord to the power supply.
7. Connect the plug end of the power cord into an outlet.

## Installing a DC power supply

Use the following procedures for DC power supplies in FastIron compact devices. Refer to [“Power supplies”](#) on page 17 for a list of which power supplies are supported in which devices, and for illustrations of power supply placement in the Brocade devices.



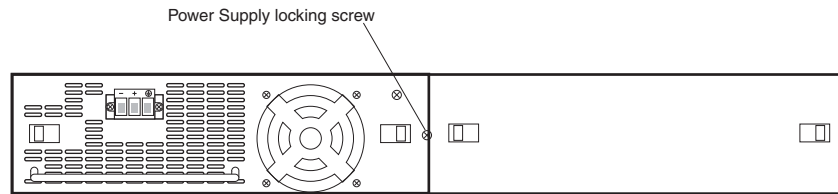
#### **DANGER**

***Before beginning the installation, refer to the precautions in [“Power precautions”](#) on page 26.***

Complete the following steps to install a DC power supply.

## 2 Installing a redundant power supply

1. If necessary, before installing a power supply, remove the power supply locking screw located in the center rear of the device (illustrated below).



2. If the empty power supply bay has a cover plate, press inward on the two latches near the edges of the cover plate to unlock the plate, then remove the plate.
3. Remove the power supply from its packaging.
4. Prepare the positive, negative, and ground wires by stripping about 1/4 inch of insulation off the end of each one. (Use 14 AWG wire.)
5. Loosen the three screws used to hold the wires in the connector. These are the wires under the following markings  
- + ⊕
6. Slip the ground wire into the opening under the marking shown below until the wire is fully in place, then tighten the screw to hold the wire in place.  
⊕
7. Repeat for the negative (–) and positive (+) wires.
8. Pull gently on each wire to make sure they are securely fastened in the connector.
9. With one hand, hold the bar on the front panel of the power supply. With the other hand, support the underside of the power supply, and insert the power supply into the empty power supply slot. Press until the supply is completely in the slot, so that the connectors on the back of the supply are fully engaged with the pins on the power backplane.



### CAUTION

**Make sure you insert the power supply right-side up. It is possible to insert the supply upside down, although the supply will not engage with the power backplane when upside down. The power supply is right-side up when the power connector is on the left and the fan vent is on the right.**

10. Press the two latches near the edges of the supply outward to lock the supply in place.
11. If necessary, replace the power supply locking screw.
12. After the power supply is properly inserted, connect the power source to the wires to activate the circuit.

# Installing the device

You can install Brocade systems on a desktop, in an equipment rack, or on the wall.

## Desktop installation

To install the device on a desktop, complete the following steps.

1. Set the device on a flat desktop, table, or shelf. Make sure that adequate ventilation is provided for the system – a 3 in. clearance is recommended on each side.
2. Go to [“Powering on the system”](#) on page 33.

## Rack mount installation

For rack mount installation, Brocade recommends that you use a Telco equipment rack.

The Brocade FastIron compact device supports two different rack mount kits; a kit with short mounting brackets which ships with the device, and a kit with long mounting brackets (19 in.), which you can order separately from Brocade (part number 70166-000). Use the long mounting brackets to prevent the Brocade device from sagging when installed in a non-compliant (non-Telco) equipment rack.

In addition to the rack mount kit, you will need the following tools for installation:

- #2 Phillips-head screwdriver
- Four each 12-24 screws to mount the Brocade device to the rack.



### **DANGER**

***Make sure the rack or cabinet housing the device is adequately secured to prevent it from becoming unstable or falling over.***



### **DANGER**

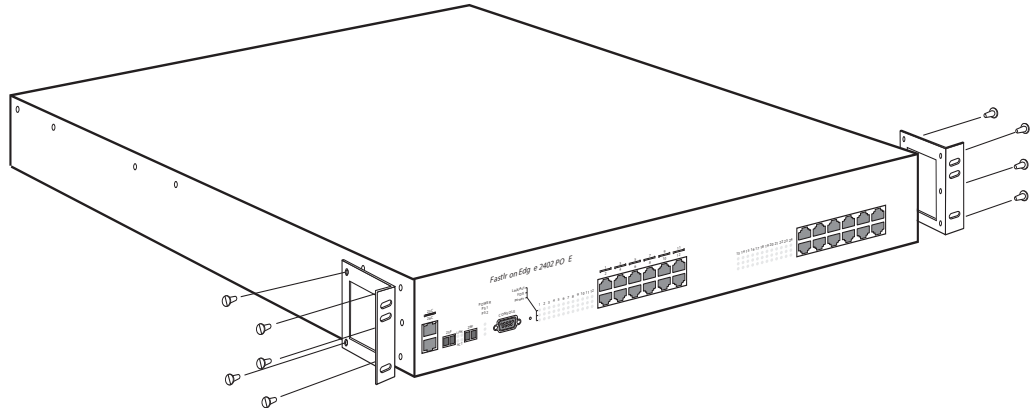
***Mount the devices you install in a rack or cabinet as low as possible. Place the heaviest device at the bottom and progressively place lighter devices above.***

Complete the following steps to install the rack mount brackets and mount the device in a rack.

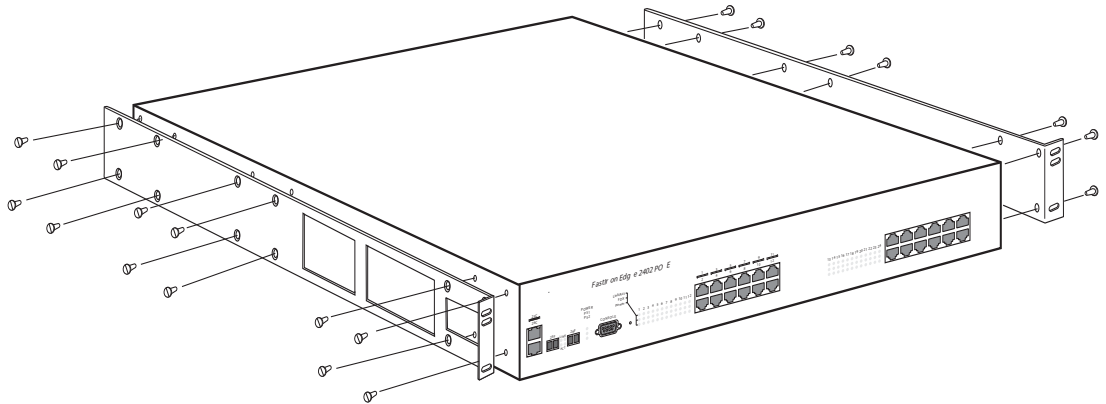
1. Remove the rack mount kit from the shipping carton. The kit contains two mounting brackets and several mounting screws.
2. Align the brackets with the screw holes on the sides of the device, then use the screws to attach the mounting brackets. Refer to the appropriate illustration, depending on which brackets you are installing:
  - [Figure 17](#) shows how to attach the short mounting brackets.
  - [Figure 18](#) shows how to attach the long mounting brackets.

## 2 Installing the device

**FIGURE 17** Attaching the short mounting brackets



**FIGURE 18** Attaching the long mounting brackets



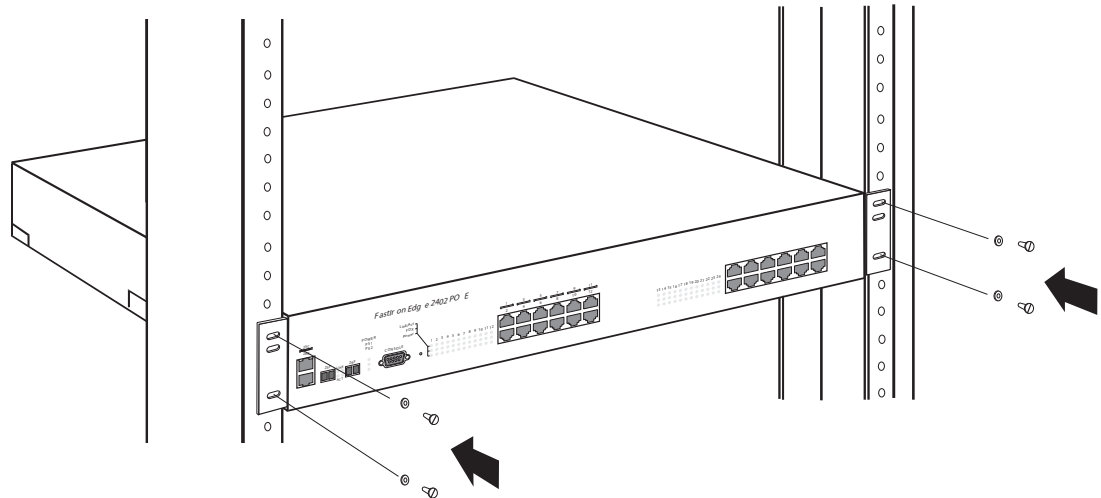
3. Mount the device in the rack as illustrated in [Figure 19](#).

---

**NOTE**

Although [Figure 19](#) shows a device with short mounting brackets, the procedure for securing a device with long mounting brackets is the same.

---

**FIGURE 19** Installing the device in a rack

4. Proceed to [“Powering on the system”](#) on page 33.

## Powering on the system

After you complete the physical installation of the system, you can power on the system.

1. Ensure that all power supplies are fully and properly inserted and no power supply slots are uncovered.



### CAUTION

**Never leave tools inside the device.**

2. Remove the power cord from the shipping package.
3. Attach the AC power cable to the AC connector on the rear panel.
4. Insert the power cable plug into a 115V or 120V outlet.

---

### NOTE

To turn the system off, simply unplug the power cords.

---

### NOTE

The socket should be installed near the equipment and should be easily accessible.

---

### NOTE

If the outlet is not rated 115 or 120V, stop and get the appropriate cable for the outlet.

---

## Verifying proper operation

After you have installed any redundant power supplies, verify that the device is working properly by plugging it into a power source and verifying that it passes its self test.

If your device has more than one power supply installed, repeat this procedure for each power supply.

1. Connect the power cord supplied with the device to the power connector on the power supply on the rear of the device.
2. Insert the other end into a properly grounded electrical outlet.
3. For the FES2402-POE and FES4802-POE with power supply model RPS8, turn the power switch to the ON position.
4. The non-POE devices use power supply model RPS5, which do not have power switches. They power on when you connect a power cord to the device and to a power source.

If your installation requires a different power cord than that supplied with the device, make sure you obtain a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.

5. Verify that the LED for each power supply is a solid green.
6. Verify proper operation by observing the LEDs.

All the port LEDs should flash momentarily, usually in sequence, while the device performs diagnostics. After the diagnostics are complete, the LEDs will be dark except for the ones that are attached by cables to other devices. If the links on these cables are good and the connected device is powered on, the link LEDs will light.

For more details on specific LED conditions after system start-up, refer to the section below, [“Observing the power status LEDs”](#) on page 34 and [Chapter 6, “Hardware Specifications”](#).

## Observing the power status LEDs

[Table 8](#) lists the LEDs that show power status. The power supplies themselves do not have LEDs.

**TABLE 8** LEDs for power

LED	Position	State	Meaning
Power	Left side of front panel	On	The device is powered on and has enough power to operate.
		Off	The device is not powered on, or has been powered on but does not have sufficient power to operate.
PS1	Left side of front panel	On	Power supply 1 is installed and is functioning normally. Power supply 1 is located in the right-hand bay (when you are facing the rear of the device).
		Off	Power supply 1 is not installed or is not providing power.

**TABLE 8** LEDs for power (Continued)

LED	Position	State	Meaning
PS2	Left side of front panel	On	Power supply 2 is installed and is functioning normally. Power supply 2 is located in the left-hand bay (when you are facing the rear of the device).
		Off	Power supply 2 is not installed or is not providing power.

The software regularly polls the hardware for power status information. You can display the status information from any management session. In addition, the software automatically generates a Syslog message and SNMP trap if a status change occurs.

## Attaching a PC or terminal

To assign an IP address, you must have access to the **Command Line Interface (CLI)**. The CLI is a text-based interface that can be accessed through a direct serial connection to the device and through Telnet connections. The CLI is described in detail in the *Brocade Switch and Router Command Line Interface Reference*.

You need to assign an IP address using the CLI. You can access the CLI by attaching a serial cable to the Console port. After you assign an IP address, you can access the system through Telnet, the Web Management Interface, or IronView Network Manager.

Perform the following tasks to attach a management station using the serial port.

1. Connect a PC or terminal to the serial port of the system using a straight-through cable. The serial port has a male DB-9 connector.

---

### NOTE

You need to run a terminal emulation program on the PC.

---

2. Open the terminal emulation program and set the session parameters as follows:

- Baud: 9600 bps
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

When you establish the serial connection to the system, press Enter to display the CLI prompt in the terminal emulation window. For example:

- FastIron>
- FastIron-PRM>

If you see one of these prompts, you are now connected to the system and can proceed to [“Assigning permanent passwords”](#) on page 39.

You can customize the prompt by changing the system name. Refer to the *FastIron Configuration Guide* (for FastIron X Series compact devices) or the *Switch and Router Installation and Basic Configuration Guide* (for FES devices).

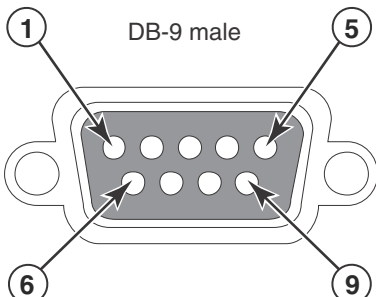
## Troubleshooting the serial connection

When you establish the serial connection to the system and the CLI prompt does not appear, perform the following tasks.

1. Make sure the cable is securely connected to your PC and to the Brocade system.
2. Check the settings in your terminal emulation program. In addition to the session settings listed above, make sure the terminal emulation session is running on the same serial port you attached to the Brocade system.

The EIA or TIA 232 serial communication port serves as a connection point for management by a PC or SNMP workstation. Brocade switches come with a standard male DB-9 connector, shown in [Figure 20](#).

**FIGURE 20** Serial port pin and signalling details

Pin Assignment	Pin Number	Switch Signal
 DB-9 male	1	Reserved
	2	TXD (output)
	3	RXD (input)
	4	Reserved
	5	GND
	6	Reserved
	7	CTS (input)
	8	RTS (output)
	9	Reserved

Most PC serial ports also require a cable with a female DB-9 connector.

Terminal connections will vary, requiring either a DB-9 or DB-25 connector, male or female.

Serial cable options between a Brocade switch or router and a PC or terminal are shown in [Figure 21](#).

**NOTE**

As indicated in [Figure 20](#) and [Figure 21](#), some of the wires should not be connected. If you do connect the wires that are labeled “Reserved”, you might get unexpected results with some terminals.

**FIGURE 21** Serial port pin assignments showing cable connection options to a terminal or PC

DB-9 to DB-9 Female Switch		Terminal or PC	DB-9 to DB-25 Female Switch		Terminal or PC
1	Reserved	1	1	Reserved	8
2	→	2	2	→	3
3	←	3	3	←	2
4	Reserved	4	4	Reserved	20
5	→	5	5	→	7
6	Reserved	6	6	Reserved	6
7	←	7	7	←	4
8	→	8	8	→	5
9	Reserved	9	9	Reserved	22

## 2 Attaching a PC or terminal

# Connecting Network Devices and Checking Connectivity

## Overview



### DANGER

*The procedures in this guide are for qualified service personnel.*

Table 9 lists the tasks you must perform to connect your Brocade device, and shows where to get troubleshooting information for any problems that can arise.

**TABLE 9** Network connectivity tasks

Step	Task	Page
1	Secure access to the CLI by assigning passwords.	<a href="#">page 39</a>
2	Configure IP addresses for the management, Ethernet, virtual, and loopback interfaces.	<a href="#">page 41</a>
3	Connect your device to another networking device.	<a href="#">page 45</a>
4	Observe certain LEDs to determine if the network connections are functioning properly. Also test a port for connectivity to other networking devices using the <b>ping</b> and <b>traceroute</b> commands.	<a href="#">page 49</a>
5	Troubleshoot any problems that can arise.	<a href="#">page 50</a>

## Assigning permanent passwords

By default, the CLI is not protected by passwords. To secure CLI access, Brocade strongly recommends assigning passwords.

### NOTE

You cannot assign a password using the Web Management Interface. You can assign passwords using IronView Network Manager if an enable password for a Super User has been configured on the device.

The CLI contains the following access levels:

- User EXEC – The level you enter when you first start a CLI session. At this level, you can view some system information but you cannot configure system or port parameters.
- Privileged EXEC – This level is also called the **Enable** level and can be secured by a password. You can perform tasks such as manage files on the flash module, save the system configuration to flash, and clear caches at this level.

## 3 Assigning permanent passwords

- CONFIG – The configuration level. This level lets you configure the system IP address and configure switching and routing features. To access the CONFIG mode, you must already be logged into the Privileged level of the EXEC mode.

You can set the following levels of Enable passwords:

- Super User – Allows complete read-and-write access to the system. This is generally for system administrators and is the only password level that allows you to configure passwords.

---

**NOTE**

You must set a super user password before you can set other types of passwords.

---

- Port Configuration – Allows read-and-write access for specific ports but not for global (system-wide) parameters.
- Read Only – Allows access to the Privileged EXEC mode and CONFIG mode but only with read access.

Complete the following steps to set passwords.

1. At the opening CLI prompt, enter the following command to change to the Privileged level of the EXEC mode.

```
FastIron> enable
```

2. Access the CONFIG level of the CLI by entering the following command.

```
FastIron# configure terminal
FastIron(config)#
```

3. Enter the following command to set the super-user password.

```
FastIron(config)# enable super-user-password <text>
```

---

**NOTE**

You must set the super-user password before you can set other types of passwords.

---

4. Enter the following commands to set the port configuration and read-only passwords.

```
FastIron(config)# enable port-config-password <text>
FastIron(config)# enable read-only-password <text>
```

---

**NOTE**

If you forget your super-user password, refer to [“Recovering from a lost password”](#) on page 40.

---

**Syntax:** `enable super-user-password | read-only-password | port-config-password <text>`

Passwords can be up to 32 characters long.

## Recovering from a lost password

By default, the CLI does not require passwords. However, if someone has configured a password for the device but the password has been lost, you can regain super-user access to the device using the following procedure.

---

**NOTE**

Recovery from a lost password requires direct access to the serial port and a system reset.

---

Complete the following steps to recover a lost password.

1. Start a CLI session over the serial interface to the Brocade device.
2. Reboot the device.
3. While the system is booting, before the initial system prompt appears, enter **b** to enter the boot monitor mode.
4. Enter **no password** at the prompt. (You cannot abbreviate this command.)
5. Enter **boot system flash primary** at the prompt. This command causes the device to bypass the system password check.
6. After the console prompt reappears, assign a new password.

## Configuring IP addresses

You must configure at least one IP address using the serial connection to the CLI before you can manage the system using the other management interfaces. In addition, Brocade routers require an IP subnet address for the subnet in which you plan to place them in your network.

### IPv4 devices

Brocade IPv4 devices support both classical IP network masks (Class A, B, and C subnet masks, and so on) and Classless Interdomain Routing (CIDR) network prefix masks:

- To enter a classical network mask, enter the mask in IP address format. For example, enter “209.157.22.99 255.255.255.0” for an IP address with a Class-C subnet mask.
- To enter a prefix number for a network mask, enter a forward slash ( / ) and the number of bits in the mask immediately after the IP address. For example, enter “209.157.22.99/24” for an IP address that has a network mask with 24 significant (“mask”) bits.

By default, the CLI displays network masks in classical IP address format (for example, 255.255.255.0). You can change the display to the prefix format. Refer to the *FastIron Configuration Guide* for more information.

### *IPv4 devices running layer 3 software*

Before attaching equipment to a Brocade router, you must assign an interface IP address to the subnet on which the router will be located. You must use the serial connection to assign the first IP address. For subsequent addresses, you also can use the CLI through Telnet or the Web Management Interface.

By default, you can configure up to 24 IP interfaces on each port, virtual interface, and loopback interface. You can increase this amount to up to 64 IP subnet addresses per port by increasing the size of the subnet-per-interface table. Refer to the *FastIron Configuration Guide* for more information.

The following procedure shows how to add an IPv4 address and mask to a router port.

1. At the opening CLI prompt, enter **enable**.

```
FastIron> enable
```

2. Enter the following command at the CLI Privileged EXEC level prompt, then press **Enter**. This command erases the factory test configuration if still present.

```
FastIron# erase startup-config
```



#### CAUTION

Use the `erase startup-config` command only for new systems. If you enter this command on a system you have already configured, the command erases the configuration. If you accidentally do erase the configuration on a configured system, enter the write memory command to save the running configuration to the startup-config file.

3. Access the configuration level of the CLI by entering the following command.

Privileged EXEC Level.

```
FastIron# configure terminal
```

Global CONFIG Level

```
FastIron(config)#
```

4. Configure the IPv4 address and mask address for the interface.

```
FastIron(config)# int e 5
```

```
FastIron(config-if-e1000-5)# ip address 192.22.3.44 255.255.255.0
```

---

#### NOTE

You can use the syntax **ip address** <ip-addr>/<mask-bits> if you know the subnet mask length. In the above example, you could enter **ip address 192.22.3.44/24**.

---

**Syntax:** `enable` [<password>]

**Syntax:** `configure terminal`

**Syntax:** [`no`] `ip address` <ip-addr> <ip-mask> [`secondary`]

or

**Syntax:** [`no`] `ip address` <ip-addr>/<mask-bits> [`secondary`]

Use the **secondary** parameter if you have already configured an IP address within the same subnet on the interface.

### *IPv4 devices running Layer 2 software*

Complete the following tasks to configure an IPv4 address to a device running Layer 2 software.

1. At the opening CLI prompt, enter **enable**.

```
FastIron> enable
```

2. Enter the following command at the Privileged EXEC level prompt, then press **Enter**. This command erases the factory test configuration if still present.

```
FastIron# erase startup-config
```



#### CAUTION

Use the `erase startup-config` command only for new systems. If you enter this command on a system you have already configured, the command erases the configuration. If you accidentally do erase the configuration on a configured system, enter the write memory command to save the running configuration to the startup-config file.

3. Access the configuration level of the CLI by entering the following command.

Privileged EXEC Level.

```
FastIron# configure terminal
```

Global CONFIG Level.

```
FastIron(config)#
```

4. Configure the IPv4 address and mask for the switch.

```
FastIron(config)# ip address 192.22.3.44 255.255.255.0
```

5. Set a default gateway address for the switch.

```
FastIron(config)# ip default-gateway 192.22.3.1
```

---

#### NOTE

You do not need to assign a default gateway address for single subnet networks.

---

**Syntax:** `enable` [`<password>`]

**Syntax:** `configure terminal`

**Syntax:** [`no`] `ip address` `<ip-addr>` `<ip-mask>`

or

**Syntax:** [`no`] `ip address` `<ip-addr>/<mask-bits>`

**Syntax:** `ip default-gateway` `<ip-addr>`

## IPv6 devices

Brocade IPv6 devices support the 128-bit addressing format, composed of 8 fields of 16-bit hexadecimal values separated by colons (:). For example, 2001:0000:0000:0200:002D:D0FF:FE48:4672 is an IPv6 address, which can also be expressed as 2001:0:0:200:2D:D0FF:FE48:4672 after omitting the leading zeros.

### *IPv6 devices running layer 3 software*

Before attaching equipment to a Brocade router, you must assign an interface IP address to the subnet on which the router will be located. You must use the serial connection to assign the first IP address. For subsequent addresses, you also can use the CLI through Telnet or the Web Management Interface.

By default, you can configure up to 24 IP interfaces on each port, virtual interface, and loopback interface. You can increase this amount to up to 64 IP subnet addresses per port by increasing the size of the subnet-per-interface table. Refer to the *FastIron Configuration Guide* for more information.

The following procedure shows how to add an IPv6 address and mask to a router port.

1. At the opening CLI prompt, enter **enable**.

```
FastIron> enable
```

2. Enter the following command at the CLI Privileged EXEC level prompt, then press **Enter**. This command erases the factory test configuration if still present.

```
FastIron# erase startup-config
```



#### CAUTION

Use the `erase startup-config` command only for new systems. If you enter this command on a system you have already configured, the command erases the configuration. If you accidentally do erase the configuration on a configured system, enter the `write memory` command to save the running configuration to the startup-config file.

3. Access the configuration level of the CLI by entering the following command.

Privileged EXEC Level.

```
FastIron# configure terminal
```

Global CONFIG Level.

```
FastIron(config)#
```

4. Configure the IPv6 address and mask address for the interface.

```
FastIron(config)# int e 5
FastIron(config-if-e1000-5)# ipv6 address
2001:200:12D:1300:240:D0FF:FE48:4672:/64
```

These commands configure the global prefix `2001:200:12d:1300::/64` and the interface ID `::240:D0FF:FE48:4672`, and enable IPv6 on interface `e 1/5`.

---

#### NOTE

The above procedure shows how to configure an IPv6 address with a manually configured Interface ID as the address for the interface. You could also configure an IPv6 address with an automatically computed EUI-64 Interface ID as the address for the interface. Link-local IPv6 addresses are also supported. For details, refer to the *FastIron Configuration Guide*.

---

**Syntax:** `enable [<password>]`

**Syntax:** `configure terminal`

**Syntax:** `[no] ipv6 address <ipv6-prefix>/<prefix-length>`

You must specify the `<ipv6-prefix>` parameter in hexadecimal using 16-bit values between colons as documented in RFC 2373.

You must specify the `<prefix-length>` parameter in decimal value. A slash mark (/) must follow the `<ipv6-prefix>` parameter and precede the `<prefix-length>` parameter.

#### *IPv6 devices running Layer 2 software*

To configure an IPv6 address to a device running Layer 2 software, perform the following steps.

1. At the opening CLI prompt, enter **enable**.

```
FastIron> enable
```

2. Enter the following command at the Privileged EXEC level prompt, then press **Enter**. This command erases the factory test configuration if still present.

```
FastIron# erase startup-config
```

**CAUTION**

Use the `erase startup-config` command only for new systems. If you enter this command on a system you have already configured, the command erases the configuration. If you accidentally do erase the configuration on a configured system, enter the `write memory` command to save the running configuration to the startup-config file.

3. Access the configuration level of the CLI by entering the following command.

Privileged EXEC Level.

```
FastIron# configure terminal
```

Global CONFIG Level.

```
FastIron(config)#
```

4. Configure the IPv6 address and mask for the switch.

```
FastIron(config)# ipv6 address 2001:200:12D:1300:240:D0FF:FE48:4000:1/64
```

**NOTE**

The above procedure shows how to configure an IPv6 address with a manually configured interface ID as the system-wide address for the switch. You could also configure an IPv6 address with an automatically computed EUI-64 interface ID as the system-wide address for the switch. A link-local IPv6 address is also supported. For details, refer to the *FastIron Configuration Guide*.

**Syntax:** `enable` [`<password>`]

**Syntax:** `configure terminal`

**Syntax:** `[no] ipv6 address <ipv6-prefix>/<prefix-length>`

You must specify the `<ipv6-prefix>` parameter in hexadecimal using 16-bit values between colons as documented in RFC 2373.

You must specify the `<prefix-length>` parameter in decimal value. A slash mark (/) must follow the `<ipv6-prefix>` parameter and precede the `<prefix-length>` parameter. `192.22.3.44 255.255.255.0`

## Connecting network devices

Brocade devices support connections to other vendors routers, switches, and hubs, as well other Brocade devices.

### Connectors and cable specifications

Refer to [“Cable specifications”](#) on page 78 for connector types and cable lengths and types.

For port pinouts, refer to the section [“10/100 and Gigabit port pinouts”](#) on page 78.

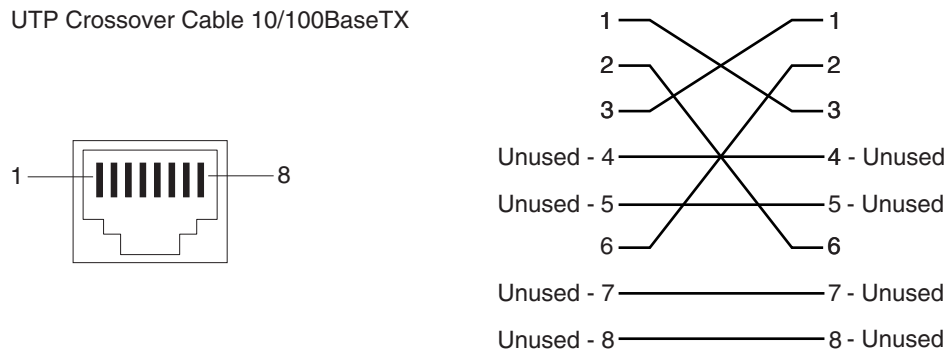
## Connecting to ethernet or fast ethernet hubs

For copper connections to Ethernet hubs, a 10/100BaseTX or 1000BaseT switch, or another Brocade device, a crossover cable is required (Figure 22 and Figure 23). If the hub is equipped with an uplink port, it will require a straight-through cable instead of a crossover cable.

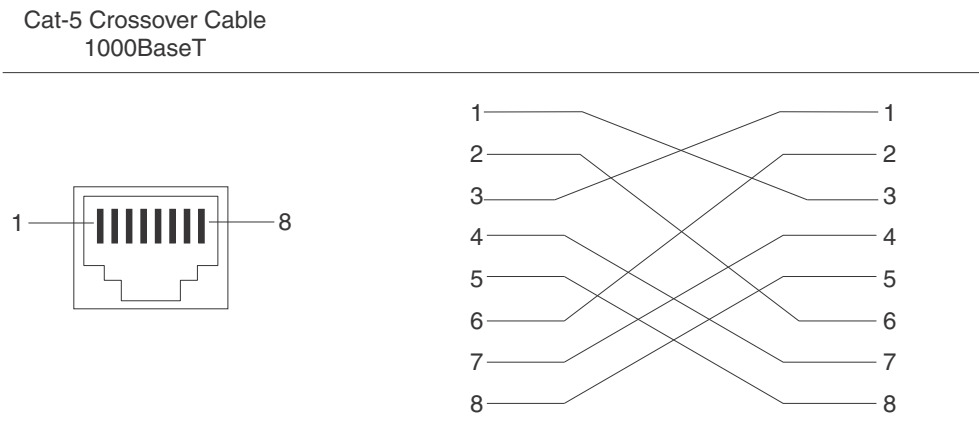
**NOTE**

The 802.3ab standard (automatic MDI or MDIX detection) calls for automatic negotiation of the connection between two 1000Base-T ports. Therefore, a crossover cable may not be required; a straight-through cable may work as well. For more information about this feature, refer to the *FastIron Configuration Guide* (FastIron X Series Devices) or the *Switch and Router Installation and Basic Configuration Guide* (FES devices).

**FIGURE 22** UTP crossover cable



**FIGURE 23** Cat-5 crossover cable for 1000BaseT



**NOTE**

The 802.3ab standard calls for automatic negotiation of the connection between two 1000BaseT ports. Consequently, a crossover cable may not be required; a straight-through cable may work as well.

### ***100Base-TX support on 1000Base-TX SFP modules***

You can configure a 1000Base-TX SFP (part number E1MG-TX) to operate at a speed of 100 Mbps. To enable support, you must enter the CLI command **100-tx** at the Interface level of the CLI. For CLI command details, refer to the section “Enabling and Disabling Support for 100Base-TX” in the *FastIron Configuration Guide*.

---

**NOTE**

This module requires a Cat5 cable and uses an RJ45 connector. Hotswap is supported for this module when it is configured in 100M mode.

---

## **Connecting to workstations, servers, or routers**

Straight-through UTP cabling is required for direct UTP attachment to workstations, servers, or routers using network interface cards (NICs).

Fiber cabling is required for direct attachment to Gigabit NICs or switches and routers through fiber ports. Refer to “[Connecting a network device to a fiber port](#)” on page 47.

### ***Automatic MDI or MDIX detection***

All 10/100 and Gigabit Ethernet Copper ports on the Brocade FastIron devices support automatic Media Dependent Interface (MDI) and Media Dependent Interface Crossover (MDIX) detection. This feature is enabled on all 10/100 and Gigabit copper ports by default. For each port, you can disable auto MDI or MDIX, designate the port as an MDI port, or designate the port as an MDIX port.

For more information about this feature and how to configure it, refer to the *FastIron Configuration Guide* or the *Switch and Router Installation and Basic Configuration Guide*.

## **Connecting a network device to a fiber port**

For direct attachment from the Brocade device to a Gigabit NIC, switch, or router, fiber cabling with an LC connector is required.

---

**NOTE**

All physical IP interfaces on FastIron X Series Layer 3 devices share the same MAC address. For this reason, if more than one connection is made between two devices, one of which is a FastIron X Series Layer 3 device, Brocade recommends the use of virtual interfaces. It is not recommended to connect two or more physical IP interfaces between two routers.

---

To connect the Brocade device to another network device using a fiber port, you must do the following:

- Install a fiber optic module (SFP transceiver or mini-GBIC for Gigabit Ethernet ports, or XFP-MSA transceiver for 10-Gigabit Ethernet ports)
- Cable the fiber optic module

The following sections provide information about performing these tasks.

### *Installing a fiber optic module*

You must install a fiber optic module (SFP or XFP transceiver) in each Gigabit Ethernet and 10-Gigabit Ethernet fiber port you want to use.

You can install a new fiber optic module in a port while the FastIron Compact device is powered on and running.

Before installing one of these modules into the port, have the following on hand:

- An ESD wrist strap with a plug for connection to a metal surface.



#### **DANGER**

***For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.***

Complete the following tasks to install a fiber optic module.

1. Put on the ESD wrist strap and ground yourself by attaching the clip end to a metal surface (such as an equipment rack) to act as ground.
2. Remove the new module from its protective packaging.
3. Gently insert the fiber optic module into the port until the module clicks into place. The module is keyed to prevent incorrect insertion.

### *Cabling a fiber optic module*

Complete the following tasks to cable a fiber optic module.

1. Remove the protective covering from the fiber-optic port connectors and store the covering for future use.
2. Before cabling a fiber optic module, Brocade strongly recommends cleaning the cable connectors and the port connectors. For more information, refer to “[Cleaning the fiber-optic connectors](#)” on page 48.
3. Gently insert the cable connectors (a tab on each connector should face upward) into the port connectors until the tabs lock into place.
4. Observe the link and active LEDs to determine if the network connections are functioning properly. For more information about the LED indicators, refer to [Table 10](#) on page 50.

### *Cleaning the fiber-optic connectors*

To avoid problems with the connection between the fiber optic module (SFP (mini-GBIC) or XFP) and the fiber cable connectors, Brocade strongly recommends cleaning both connectors each time you disconnect and reconnect them. In particular, dust can accumulate in the connectors and cause problems such as reducing the optic launch power.

To clean the fiber cable connectors, Brocade recommends using the fiber-optic reel-type cleaner that shipped with your FastIron chassis. You can also purchase this type of cleaner from the following Website.

[http://www.fisfiber.com/Home\\_Page.asp](http://www.fisfiber.com/Home_Page.asp)

When not using an SFP or XFP connector, make sure to keep the protective covering on.

## Using a CX4 transceiver

You can install a twin-axial 10G copper CX4 XFP transceiver in any 10G port. For a link to operate properly, both sides must use identical CX4 transceivers.

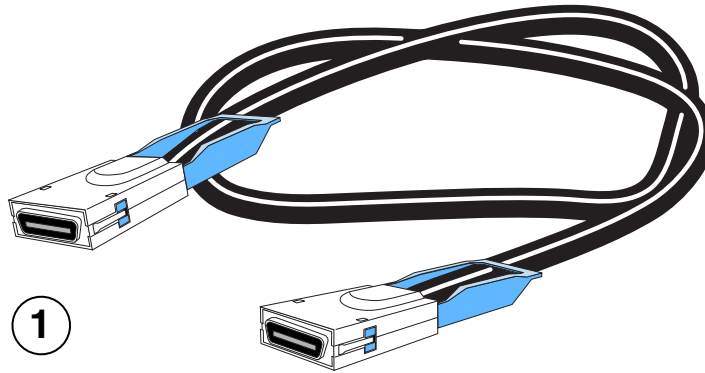
The CX4 transceiver requires a 15 meter CX4-grade cable with 24 or 26 American Wire Gauge (AWG). This cable can be purchased from Brocade. Refer to part number CAB-CX4-0050 when ordering.

---

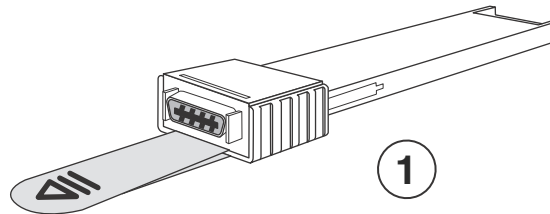
**NOTE**

The CX4 transceiver is not hot-swappable.

---



1 CX4 Transceiver Infiniteband cable



1 CX4 Transceiver

## Testing connectivity

After you install the network cables, you can test network connectivity to other devices by pinging those devices. You also can observe the LEDs related to network connection and perform trace routes.

For more information about **ping** and **traceroute** commands, refer to the *FastIron Configuration Guide*

## Observing LEDs

### 3 Troubleshooting network connections

After you install the network cables, you can observe certain LEDs to determine if the network connections are functioning properly. [Table 10](#) outlines the LEDs related to the network connections, the desired state of each LED, possible abnormal states of each LED, and what to do if an LED indicates an abnormal state

**TABLE 10** Network connection-related LED states

LED	Desired State	Meaning	Abnormal State	Meaning or Action
Link (Lnk)	On (Green)	A link is established with the remote port.	Off	A link is not established with the remote port. You can do the following: <ul style="list-style-type: none"><li>• Verify that the connection to the other network device has been properly made. Also, make certain that the other network device is powered on and operating correctly.</li><li>• Verify that the transmit port on the Brocade device is connected to the receive port on the other network device, and that the receive port on the Brocade device is connected to the transmit port on the other network device. If you are not certain, remove the two cable connectors from the port connector and reinsert them in the port connector, reversing their order.</li><li>• Dust may have accumulated in the cable connector or port connector. For information about cleaning the connectors, refer to <a href="#">“Cleaning the fiber-optic connectors”</a> on page 48.</li><li>• If the other actions do not resolve the problem, try using a different port or a different cable.</li></ul>
Active (Act)	On or blinking (Yellow)	The port is transmitting and receiving user packets.	Off for an extended period.	The port is not transmitting or receiving user packets. You can do the following: <ul style="list-style-type: none"><li>• Check the Link LED to make sure the link is still established with the remote port. If not, take the actions described in the Meaning or Action column for the Link LED.</li><li>• Verify that the port has not been disabled through a configuration change. You can use the CLI. If you have configured an IP address on the device, you also can use the Web Management Interface or IronView Network Manager.</li></ul>

If a problem persists after taking these actions, contact Brocade technical support.

## Troubleshooting network connections

Follow these procedures to troubleshoot a network connection:

- For the indicated port, verify that both ends of the cabling (at the Brocade device and the connected device) are snug.

- Verify that the Brocade device and the connected device are both powered on and operating correctly.
- Verify that the port has not been disabled through a configuration change. You can use the CLI. If you have configured an IP address on the device, you also can use the Web Management Interface or IronView Network Manager.
- Verify that you have used the correct cable type for the connection:
  - For twisted-pair connections to an end node, use straight-through cabling.
  - For fiber-optic connections, verify that the transmit port on the device is connected to the receive port on the connected device, and that the receive port on the device is connected to the transmit port on the connected device.
- For copper ports, you can test the cable using Virtual Cable Testing. For more information, refer to the chapter “Monitoring Hardware Components” in the *FastIron Configuration Guide*.
- If the other procedures do not resolve the problem, try using a different port or a different cable.

## Support for digital optical monitoring

You can configure the Foundry device to monitor optical transceivers in the system, either globally or by specified port. When this feature is enabled, the system will monitor the temperature and signal power levels for the optical transceivers in the specified ports. Console messages and syslog messages are sent when optical operating conditions fall below or rise above the XFP or SFP manufacturer recommended thresholds. For details about this feature and how to configure it, refer to the section “Digital Optical Monitoring” in the *FastIron Configuration Guide*.

### 3 Troubleshooting network connections

# Managing the FastIron Compact Switch

---

## Overview

This chapter contains information about refining the configuration of, monitoring, and managing the following components:

- Temperature settings for the FES
- Temperature and fan settings for the FESX
- Management module CPU usage
- MAC address entries (removing)

## Viewing the device type

For the FESX and FESXE, the output of the **show chassis** command displays the device type.

```
SW-FESX424F Switch#show chassis

Chassis Type: FESX424HF-PREM

Power supply 1 (NA - NA - Regular) present, status ok
Power supply 2 not present

Fan 1 ok
Fan 2 ok

Exhaust Side Temperature Readings:
  Current temperature : 15.0 deg-C
  Warning level.....: 85.0 deg-C
  Shutdown level.....: 90.0 deg-C
Intake Side Temperature Readings:
  Current temperature : 14.0 deg-C
Boot Prom MAC: 000c.dbda.79a0
```

## Managing FES temperature settings

This section describes how to display temperature settings on the FES and how to change the temperature warning level, shutdown level, and polling interval.

### About the temperature sensor on a FES

The FES compact switch comes with a built-in temperature sensor. The temperature sensor causes the device to generate a Syslog message and SNMP trap if the temperature exceeds a specified warning level or shutdown level.

## 4 Managing FES temperature settings

The software reads the temperature sensor according to the device poll time, which is 60 seconds by default. If the temperature equals or exceeds the shutdown temperature for five consecutive polls of the temperature by the software, the software will shut down the device to prevent damage.

You can use the CLI or Web Management Interface to do the following:

- Display the temperature of the device
- Change the warning and shutdown temperature levels
- Change the device poll time

### Default temperature warning and shutdown thresholds

The FES compact switch has default settings for temperature warning and shutdown levels. Therefore, no initial configuration is necessary. If desired, you can change the settings.

The default temperature warning and shutdown thresholds are shown in [Table 11](#).

**TABLE 11** Default temperature thresholds for FES switches

Default Warning Threshold	Default Shutdown Threshold
65°C	75°C

If desired, you can re-configure the temperature warning and shutdown settings once the new software is loaded. To change the warning threshold, refer to [“Changing the temperature warning level on a FES”](#) on page 55. To change the shutdown threshold, refer to [“Changing the temperature shutdown level on a FES”](#) on page 55.

### Displaying the temperature on a FES

By default, the software polls the temperature sensor every 60 seconds to obtain the current temperature of the device. This poll rate is controlled by the device poll time, which also controls how often the software polls other system components.

To display the temperature of the device, enter the following command at any level of the CLI.

```
FastIron>show chassis
power supply 1 ok
power supply 2 not present
power supply 1 to 2 from left to right
fan ok
Current temperature : 41.0 C degrees
Warning level : 64 C degrees, shutdown level : 80 C degrees
```

**Syntax:** show chassis

### Displaying temperature messages on the FES

The software sends a Syslog message and an SNMP trap if the temperature crosses the warning or shutdown thresholds. The following methods describe how to view the system log on the device. If you have configured the device to use a Syslog server or SNMP trap receiver, refer the documentation for the server or receiver.

To display the system log, enter the following command at any CLI level.

```
FastIron>show log
Syslog logging: enabled (0 messages dropped, 0 flushes, 0 overruns)
Buffer logging: level ACDMEINW, 8 messages logged
level code: A=alert C=critical D=debugging M=emergency E=error
I=informational N=notification W=warning

Static Log Buffer:

Dynamic Log Buffer (50 entries):

at 0 days 0 hours 2 minutes 0 seconds, level alert
Temperature 48.0 C degrees, warning level 45.0 C degrees, shutdown level 55.0 C
degrees

at 0 days 0 hours 1 minutes 0 seconds, level alert
Temperature 50.0 C degrees, warning level 45.0 C degrees, shutdown level 55.0 C
degrees
```

The default warning temperature is 45° Celsius. The default shutdown temperature is 55° Celsius. These default temperatures refer to the exhaust side of the device.

## Changing the temperature warning level on a FES

The FES sends a warning message whenever the device's internal temperature reaches the default or administratively-configured warning temperature. To change the temperature at which the device will send a warning, enter the following commands at the Global CONFIG level of the CLI.

```
FastIron(config)#temperature warning 67
FastIron(config)#write memory
FastIron(config)#exit
FastIron#reload
```

---

### NOTE

You must save the configuration and reload the software to place the change into effect.

---

**Syntax:** `temperature warning <warning-temperature>`

The `<warning-temperature>` can be 0 – 125°C. The default value is 65°C.

## Changing the temperature shutdown level on a FES

If the temperature equals or exceeds the shutdown temperature for five consecutive polls of the temperature by the software, the software will shut down the device to prevent damage. To change the temperature at which the device will shut down, enter the following commands at the Global CONFIG level of the CLI.

```
FastIron(config)#temperature shutdown 67
FastIron(config)#write memory
FastIron(config)#exit
FastIron#reload
```

---

### NOTE

You must save the configuration and reload the software to place the change into effect.

---

**Syntax:** `temperature shutdown <shutdown-temperature>`

## 4 Managing temperature settings and fan speed on FastIron X Series compact switches

The <shutdown-temperature> can be 0 – 125°C. The default value is 75°C.

### Changing the temperature polling interval

The software reads the temperature sensor and polls other hardware sensors according to the value set for the device poll time, which is 60 seconds by default. You can change the device poll time using the CLI.

To change the device poll time, enter a command such as the following at the global CONFIG level of the CLI.

```
FastIron(config)#chassis poll-time 200
```

**Syntax:** chassis poll-time <value>

The <value> can be 0 – 65535.

## Managing temperature settings and fan speed on FastIron X Series compact switches

This section describes how to manage the temperature and fan speed settings on FastIron X Series compact switches (FESX and FESX-E).

### Temperature sensors

The FastIron X Series compact switches have two temperature sensors; one at the air intake, and the other at the exhaust. The software reads the temperature sensors according to the device poll time, which is 60 seconds by default.

If the temperature equals or exceeds the shutdown temperature for five minutes or for five consecutive polls of the temperature by the software (depending on the software version running on your device), the software will either reset and reload the software or shut down the device to prevent damage.

Compact switches with 48 ports use the exhaust-side temperature sensor against the configured or default temperature threshold to determine at which speed the fans should operate. Depending on the temperature readings, the system can do the following:

- Leave the fan speed as is
- Increase the fan speed
- Decrease the fan speed
- Shut down a module to prevent damage
- The switch will automatically reset and reload the software when the internal temperature reaches or exceeds the shutdown level for five minutes.

### Fan speed

The fans in the 24-port FastIron X Series compact switches operate at a steady speed and do not support multiple fan speeds.

Compact switches with 48 ports have two three-speed fans that operate at low speed, then adjust based on the ambient temperature and configured or default temperature thresholds. Both fans operate simultaneously at the same speed. If one fan fails, it does not affect the operation of the other fan.

The fans in the 48-port switches can operate at speeds of low, medium, and high. The system uses a **fan speed switch** and a default or configured temperature threshold associated with it to determine at which speed a fan should operate. Fan speed switches are as follows:

- slow-to-medium
- medium-to-slow
- medium-to-fast
- fast-to-medium

If desired, you can change the settings of the temperature thresholds associated with fan speeds. Refer to [“Changing the temperature threshold for a fan speed switch”](#) on page 57.

## Temperature thresholds

FastIron X Series compact switches with 48 ports have default settings for temperature thresholds associated with fan speed switches. Therefore, no initial configuration is necessary. If desired, you can change the settings.

---

### NOTE

This section applies to FastIron X Series compact switches with 48 ports. It does not apply to switches with 24 ports, since the fans in the 24-port switches operate at single speed.

---

By default, the system uses the temperature thresholds shown in [Table 12](#).

**TABLE 12** Default temperature thresholds for fan speed switching

Fan Speed Switch	Default Temperature Threshold
Fast-to-Medium	35
Medium-to-Fast	40
Medium-to-Slow	25
Slow-to-Medium	30

### *Changing the temperature threshold for a fan speed switch*

To change the temperature threshold for a fan speed switch, enter a command such as the following.

```
FastIron#temp fan-speed slow-to-medium 30
```

This command causes the system to switch the fan speed from slow to medium if the system temperature reading exceeds 30° C.

**Syntax:** `temp fan-speed <speed-switch> <threshold-value>`

where:

<speed-switch> can be one of the following:

- fast-to-medium

## 4 Managing temperature settings and fan speed on FastIron X Series compact switches

- medium-to-fast
- medium-to-slow
- slow-to-medium

<threshold-value> is a temperature in Centigrade. [Table 12](#) shows the default and recommended temperature thresholds. When changing the temperature threshold for a fan speed switch, remember that the temperature threshold of a higher fan switching speed must be higher than the temperature threshold of a lower fan switching speed.

### Changing the temperature warning level

[Table 13](#) shows the default warning and shutdown temperatures for FastIron X Series compact switches. These temperatures reflect readings on the exhaust side of the device.

**TABLE 13** FastIron X Series default warning and shutdown temperatures

Device	Default Warning Temperature	Default Shutdown Temperature
FESX424	64°C	80°C
FESX448	80°C	90°C
FESX424HF	85°C	90°C
FESX424-POE	85°C	90°C
FESX624	64°C	80°C
FESX624E-PREM6	64°C	80°C
FESX624HF	85°C	90°C
FESX624HFE-PREM6	85°C	90°C
FESX648	80°C	90°C
FESX648E-PREM6	80°C	90°C

To change the warning temperature on a FastIron X Series compact switch, enter a command such as the following.

```
FastIron(config)#temperature warning 47
```

**Syntax:** `temperature warning <value>`

The <value> can be 0 – 125°C. Default values are listed in [Table 13](#).

### Changing the shutdown temperature

You can change the shutdown temperature on a FESX or FESX-E switch by changing the temperature for the highest fan speed.

#### *Changing the shutdown temperature on a 24-port switch*

To change the shutdown temperature on a FastIron X Series 24-port switch, enter a command such as the following.

```
FastIron(config)#fan-threshold mp speed-1 75
```

**Syntax:** `[no] fan-threshold mp speed-1 <shutdown-temperature>`

Enter 0 – 125°C for <shutdown-temperature>, which is the high mark on the last (highest) speed supported on the device.

### ***Changing the shutdown temperature on a 48-port switch***

To change the shutdown temperature on a FastIron X Series 48-port switch, enter a command such as the following.

```
FastIron(config)#fan-threshold mp speed-3 35 85
```

**Syntax:** [no] fan-threshold mp <highest-speed> <low-temperature-mark>  
<high-temperature-mark>

Enter “speed-3” for <highest-speed>, which is the highest fan speed available on a 48-port switch. If the switch has a fan speed higher than 3, enter that fan speed.

For the <low-temperature-mark> and <high-temperature-mark> parameters, you can specify any temperature in Centigrade. However, when changing low and high temperature thresholds for a fan speed, remember that the low temperature threshold of a higher fan speed must be lower than the high temperature threshold of the lower fan speed. Brocade establishes this guideline to ensure the fan speed stability.

For example, if you are changing the temperature thresholds for the management module’s high and medium-high fan speeds, the software will accept the following values because the low temperature threshold for the high speed (67° C) is lower than the high temperature threshold (72° C) for the medium-high speed.

Fan Speed	Low Temperature Threshold	High Temperature Threshold
High	67° C	82° C
Medium-high	57° C	72° C

However, the software will not accept the following values because the low temperature threshold for the high speed (73° C) is higher than the high temperature threshold (72° C) for the medium-high speed.

Fan Speed	Low Temperature Threshold	High Temperature Threshold
High	73° C	82° C
Medium-high	57° C	72° C

### **Changing the device polling interval**

The software reads the temperature sensor and polls other hardware sensors according to the value set for the device poll time, which is 60 seconds by default. You can change the device poll time using the CLI.

To change the device poll time, enter a command such as the following at the global CONFIG level of the CLI.

```
FastIron(config)#chassis poll-time 200
```

**Syntax:** chassis poll-time <value>

The <value> can be 0 – 65535 (seconds). The default value is 60 seconds.

### Displaying the temperature on a FastIron X Series 24-port switch

To view the current temperature readings and warning and shutdown temperature levels, use the **show chassis** command. The following shows an example output.

```
FastIron>show chassis
Power supply 1 not present
Power supply 2 present, status ok
Fan 1 ok
Fan 2 ok
Exhaust Side Temperature Readings:
    Current temperature : 29.5 deg-C
    Warning level.....: 85.0 deg-C
    Shutdown level.....: 125.0 deg-C
Intake Side Temperature Readings:
    Current temperature : 19.0 deg-C
Boot Prom MAC: 0000.789a.654c
```

### Displaying the temperature and temperature thresholds on a FastIron X Series 48-port switch

To view the current temperature readings and the configured temperature thresholds for fan speed switching, use the **show chassis** command, as shown in the following example.

```
FastIron>show chassis
power supply 1 present, status ok
power supply 2 not present
fan 1 ok
Fan 1 speed: slow<->[[medium]]<->fast
fan 2 ok
Fan 2 speed: slow<->[[medium]]<->fast
fan speed switching temperature thresholds:
    slow -> medium @ 30 degrees Celsius
    slow <- medium @ 25 degrees Celsius
    medium -> fast @ 40 degrees Celsius
    medium <- fast @ 35 degrees Celsius
Exhaust Side Temperature Readings:
    Current temperature : 35.5 degrees Celsius
    Warning level.....: 64.0 degrees Celsius
    Shutdown level.....: 80.0 degrees Celsius
Intake Side Temperature Readings:
    Current temperature : 29.0 degrees Celsius
Boot Prom MAC: 00e0.5200.0100
```

### Displaying the fan speed on a FastIron X Series 48-port switch

To view the speed at which the fans are currently operating, use the **show chassis** command, as shown in the following example. The brackets [ ] delineate the current fan speeds.

```
FastIron>show chassis
power supply 1 present, status ok
power supply 2 not present
fan 1 ok
Fan 1 speed: slow<->[[medium]]<->fast
fan 2 ok
Fan 2 speed: slow<->[[medium]]<->fast
fan speed switching temperature thresholds:
    slow -> medium @ 30 degrees Celsius
    slow <- medium @ 25 degrees Celsius
    medium -> fast @ 40 degrees Celsius
    medium <- fast @ 35 degrees Celsius
Exhaust Side Temperature Readings:
    Current temperature : 35.5 degrees Celsius
    Warning level.....: 64.0 degrees Celsius
    Shutdown level.....: 80.0 degrees Celsius
Intake Side Temperature Readings:
    Current temperature : 29.0 degrees Celsius
Boot Prom MAC: 00e0.5200.0100
```

## Displaying management module CPU usage

You can display the amount of the management module's CPU in use. To do so, enter the following command at any level of the CLI.

```
FastIron#show cpu
31 percent busy, from 3248 sec ago
1   sec avg: 31 percent busy
5   sec avg: 31 percent busy
60  sec avg: 31 percent busy
300 sec avg: 31 percent busy
```

**Syntax:** `show cpu`

## Removing MAC address entries

You can remove learned MAC address entries from the Brocade system's MAC address table. You can remove the following:

- All MAC address entries.
- All MAC address entries for a specified interface module.
- All MAC address entries for a specified Ethernet port.
- All MAC address entries for a specified VLAN.
- A specified MAC address entry in all VLANs.

For example, to remove entries for the MAC address 000d.cb80.00d in all VLANs, enter the following command at the Privileged EXEC level of the CLI.

```
FastIron# clear mac-address 000d.cb80.00d0
```

**Syntax:** `clear mac-address <mac-address> | ethernet <port-num> | vlan <number>`

## 4 Removing MAC address entries

If you enter the **clear mac-address** command without any parameters, the software removes all MAC entries.

Use the **<mac-address>** parameter to remove a specified MAC address from all VLANs. Specify the MAC address in the following format: HHHH.HHHH.HHHH.

Use the **ethernet <port-num>** parameter to remove all MAC addresses for a specified Ethernet port.

Use the **vlan <number>** parameter to remove all MAC addresses for a specified VLAN.

# Replacing and Maintaining the Hardware

---

## Hardware maintenance



### **DANGER**

*The procedures in this guide are for qualified service personnel.*

The FastIron compact switch requires minimal maintenance for its hardware components. Brocade recommends cleaning the fiber-optic connectors on a fiber-optic port and the connected fiber cable each time you disconnect the cable.

Otherwise, you can install or replace the following hardware components as needed:

- Copper and fiber optic modules (SFPs (mini-GBICs) and XFP transceivers)
- Power supplies
- CPU Dual Inline Memory Module (DIMM)
- 10-Gigabit Ethernet module
- Dual Inline Package (DIP) key (Layer 3 upgrade)

## Replacing a power supply

You can replace a power supply while the FastIron switch is powered on and running. The power supplies are located in slots at the rear of the FastIron switch.

This section provides information about the following topics:

- Installation precautions and warnings
- Determining which power supply has failed, if necessary.
- Replacing a power supply.



### **DANGER**

*Power supplies are hot swappable. However, Brocade recommends that you disconnect the power supply from AC power before installing or removing the supply. The device can be running while a power supply is being installed or removed, but the power supply itself should not be connected to a power source. Otherwise, you could be injured or the power supply or other parts of the device could be damaged.*

## Installation precautions and warnings

Follow these precautions when installing a power supply in the FastIron switch.



### **DANGER**

*Before beginning the installation, refer the precautions in [“Power precautions”](#) on page 26.*



### **CAUTION**

Do not install the device in an environment where the operating ambient temperature might exceed 40° C (104° F).



### **CAUTION**

Never leave tools inside the chassis.

## Determining which power supply failed

If you are replacing a power supply that has failed and you are not sure which supply has failed, enter the following command at any CLI command prompt:

```
FastIron>show chassis
power supply 1 ok
power supply 2 not present
power supply 1 to 2 from left to right
fan ok
Current temperature : 41.0 C degrees
Warning level : 64 C degrees, shutdown level : 80 C degrees
```

This command displays status information for the power supplies and the fans. The power supplies are numbered from left to right. These numbers assume you are facing the front of the device, not the rear.

If the display indicates “Installed (Failed)” for any of the slots, the power supply installed in that particular slot has failed.

## AC power supplies

Use the following procedures for AC power supplies in FastIron compact devices. Refer to [“Power supplies”](#) on page 17 for a list of which power supplies are supported in which devices, and for illustrations showing power supply placement in the Brocade devices.

### *Removing an AC power supply*

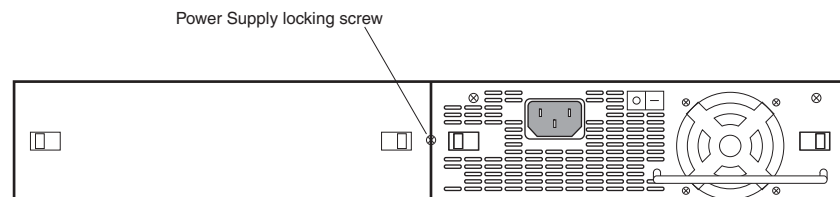
Complete the following steps to remove an AC power supply.

1. Unplug the power supply from the power source.
2. Disconnect the power cord from the power supply.
3. If necessary, remove the power supply locking screw located in the center rear of the device.
4. Press inward on the two latches near the edges of the power supply to unlock the supply.
5. Hold the bar on the front panel of the power supply and pull outward. This will disconnect the power supply from the backplane.
6. Continue to pull the power supply until it is removed from the device.
7. Place the power supply in an anti-static bag for storage.
8. Insert a new supply, or place the cover plate over the empty power supply bay and press the two latches near the edges of the supply outward to lock the plate into place.
9. If necessary, replace the power supply locking screw.

### *Installing an AC power supply*

To install an AC power supply, complete the following steps.

1. If necessary, remove the power supply locking screw located in the center rear of the device (illustrated below).



2. If the empty power supply bay has a cover plate, press inward on the two latches near the edges of the cover plate to unlock the plate, then remove the plate.
3. Remove the power supply from its packaging.
4. With one hand, hold the bar on the front panel of the power supply. With the other hand, support the underside of the power supply, and insert the power supply into the empty power supply slot. Press until the supply is completely in the slot, so that the connectors on the back of the supply are fully engaged with the pins on the power backplane.



#### **CAUTION**

**Make sure you insert the power supply right-side up. It is possible to insert the supply upside down, although the supply will not engage with the power backplane when upside down. The power supply is right-side up when the power connector is on the left and the fan vent is on the right.**

5. Press the two latches near the edges of the supply outward to lock the supply in place.
6. Connect the power cord to the power supply.
7. Connect the plug end of the power cord into an outlet.

## DC power supplies

Use the following procedures for DC power supplies in FastIron compact devices. Refer to [“Power supplies”](#) on page 17 for a list of which power supplies are supported in which devices, and for illustrations of power supply placement in the Brocade devices.



### **DANGER**

***Before beginning the installation, refer the precautions in [“Power precautions”](#) on page 26.***

### ***Removing a DC power supply***

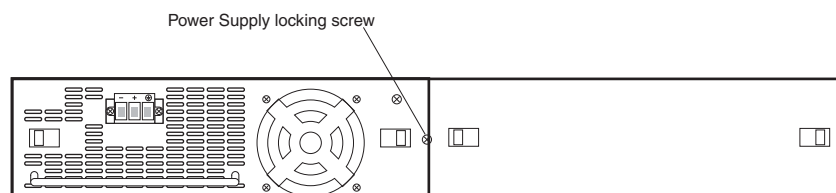
Complete the following steps to remove a DC power supply.

1. Turn off the DC power source or disconnect it from the power supply.
2. Loosen the three screws used to hold the wires in the connector, then pull out the wires.
3. If necessary, remove the power supply locking screw located in the center rear of the device.
4. Press the two latches near the edges of the supply inward to unlock the supply.
5. Hold the bar on the front panel of the power supply and pull outward. This will disconnect the power supply from the backplane.
6. Continue to pull the power supply until it is removed from the device.
7. Place the power supply in an anti-static bag for storage.
8. Insert a new supply, or place the cover plate over the empty power supply bay and press the two latches near the edges of the supply outward to lock the plate into place.
9. If necessary, replace the power supply locking screw.

### ***Installing a DC power supply***

Complete the following steps to install a DC power supply.

1. If necessary, before installing a power supply, remove the power supply locking screw located in the center rear of the device (illustrated below).



2. If the empty power supply bay has a cover plate, press inward on the two latches near the edges of the cover plate to unlock the plate, then remove the plate.
3. Remove the power supply from its packaging.
4. Prepare the positive, negative, and ground wires by stripping about 1/4 inch of insulation off the end of each one. (Use 14 AWG wire.)

- Loosen the three screws used to hold the wires in the connector. These are the wires under the following markings

– + ⊕

- Slip the ground wire into the opening under the marking shown below until the wire is fully in place, then tighten the screw to hold the wire in place.

⊕

- Repeat for the negative (–) and positive (+) wires.
- Pull gently on each wire to make sure they are securely fastened in the connector.
- With one hand, hold the bar on the front panel of the power supply. With the other hand, support the underside of the power supply, and insert the power supply into the empty power supply slot. Press until the supply is completely in the slot, so that the connectors on the back of the supply are fully engaged with the pins on the power backplane.



#### CAUTION

**Make sure you insert the power supply right-side up. It is possible to insert the supply upside down, although the supply will not engage with the power backplane when upside down. The power supply is right-side up when the power connector is on the left and the fan vent is on the right.**

- Press the two latches near the edges of the supply outward to lock the supply in place.
- If necessary, replace the power supply locking screw.
- After the power supply is properly inserted, connect the power source to the wires to activate the circuit.

## Verifying proper operation

To verify the proper operation of the power supply after power on, you can observe the LEDs on the power supply.

After the FastIron device powers on, you can observe the LEDs on the front of the device to verify that it initialized successfully. [Table 14](#) outlines the LEDs, the desired state of each LED, possible abnormal states of each LED, and what to do if an LED indicates an abnormal state.

[Table 14](#) lists the LEDs that show power status. The power supplies themselves do not have LEDs.

**TABLE 14** LEDs for power

LED	Desired State	Desired State Meaning	Abnormal State	Abnormal State Meaning
Power	ON – Green (steady)	The device is powered on and has enough power to operate.	OFF	The device is not powered on, or has been powered on but does not have sufficient power to operate.

## 5 Installing or replacing a 10-Gigabit Ethernet module

**TABLE 14** LEDs for power

LED	Desired State	Desired State Meaning	Abnormal State	Abnormal State Meaning
PS1	ON – Green (steady)	Power supply 1 is installed and is functioning normally. Power supply 1 is located in the right-hand bay (when you are facing the rear of the device).	OFF	Power supply 1 is not installed or is not providing power.
PS2	ON – Green (steady)	Power supply 2 is installed and is functioning normally. Power supply 2 is located in the left-hand bay (when you are facing the rear of the device).	OFF	Power supply 2 is not installed or is not providing power.

The software regularly polls the hardware for power status information. You can display the status information from any management session. In addition, the software automatically generates a Syslog message and SNMP trap if a status change occurs.

### Displaying the status of the power supplies

You can display the status of the power supplies by entering the **show chassis** command at any level of the CLI. The display shows whether a power supply is installed in the specified power supply slot and the status of the power supply, which can be one of the following:

- OK – The power supply is functioning properly and supplying power to the device and installed modules.
- Failed – The power supply is not functioning and is not supplying power to the device and installed modules.

#### NOTE

The device cannot detect whether the power supplies are of type AC or DC. Thus, the **show chassis** output will not display this information.

## Installing or replacing a 10-Gigabit Ethernet module

#### NOTE

This section applies to the FastIron X Series compact switches only.

The 1-port and 2-port 10-Gigabit Ethernet modules are optional. You can order the X Series switch with a 10-Gigabit module installed at the factory, or you can later upgrade your device:

- IPv4 (FESX4) devices optionally support one or two 10-Gigabit Ethernet uplink ports for 10-Gigabit Small Form Factor Pluggable (XFP) MSA-compliant optical transceivers.
- IPv6 (FESX6) devices optionally support two 10-Gigabit Ethernet uplink ports for 10-Gigabit Small Form Factor Pluggable (XFP) MSA-compliant optical transceivers.

#### NOTE

The IPv4 10-GbE modules are supported in IPv4 compact switches only. Likewise, the IPv6 10-GbE modules are supported in IPv6 compact switches only.

This section provides the steps for installing, removing, and replacing the 10-Gigabit Ethernet module. You will need the following tools to perform these procedures:

- #2 Phillips-head screwdriver
- Electrostatic Discharge (ESD) kit

## Disassembling the Device

This section provides instructions for disassembling the FastIron device so that you can install, remove, or replace a 10-Gigabit Ethernet module.

Follow the steps to disassemble the device.

1. Put on an Electrostatic Discharge (ESD) wrist strap and attach the clip end to a metal surface (such as an equipment rack) to act as ground.
2. Use a #2 Phillips-head screwdriver to remove the screw that secures the power supplies, or power supply and blank faceplate, in place. The screw is located on the rear of the device, in between the two power supply slots.
3. Remove the power supply and blank faceplate, or dual power supplies, as instructed in the section [“Removing an AC power supply”](#) on page 64 or [“Removing a DC power supply”](#) on page 66. Use the appropriate procedures according to the type of supply or supplies installed in the device.
4. Remove the device’s cover and faceplate:
  - Use a #2 Phillips-head screwdriver to remove the two screws on each side of the cover. (There are four screws altogether.) If the device was mounted on a rack, remove the two mounting brackets as well. [Figure 19](#) on page 33 shows the location of the mounting brackets and screws.
  - Gently slide the cover approximately one in. towards the rear of the unit, then lift the cover off of the device.
  - Remove the faceplate located in the upper left-hand corner of the front panel. Use a #2 Phillips-head screwdriver to remove the two screws that secure it in place. Place the blank faceplate in a safe place for future use.
5. Proceed to the section [“Removing a 10-Gigabit Ethernet module”](#) on page 69 or [“Installing a 10-Gigabit Ethernet module”](#) on page 70.

## Removing a 10-Gigabit Ethernet module

Complete the following steps to remove a 10-Gigabit Ethernet module.

1. Disassemble the FastIron device as instructed in the section [“Disassembling the Device”](#) on page 69.
2. Remove the 10-Gigabit module:
  - Unplug the power cable from the rear of the 10-Gigabit module.
  - Use a #2 Phillips-head screwdriver to loosen and remove the three screws on the 10-Gigabit module.
  - Gently lift the module up and out of the device.
3. Place the 10-Gigabit module in an anti-static bag for storage.
4. Unplug the power cable for the 10-Gigabit module from the main board and remove it from the device.

## 5 Installing or replacing a 10-Gigabit Ethernet module

5. Do one of the following:
  - Insert the new 10-Gigabit module as instructed in the section [“Installing a 10-Gigabit Ethernet module”](#) on page 70.
  - If you are removing the module without replacing it, install the blank face plate in the upper left-hand corner or the front panel.
6. Re-assemble the device as instructed in the section [“Re-assembling the device”](#) on page 70.

### Installing a 10-Gigabit Ethernet module

Follow these procedures when installing a 10-Gigabit Ethernet module.

1. Disassemble the FastIron device as instructed in the section [“Disassembling the Device”](#) on page 69.
2. Remove the 10-Gigabit Ethernet module, power cable, and faceplate from the protective packaging.
3. Install the 10-Gigabit module’s power cable (supplied with the 10-Gigabit module):
  - Plug one end of the cable into the power connector on the main board of the device. The connector is located on the rear of the main board towards the rear of the device.
  - Plug the other end of the cable into the power connector located on the rear of the 10-Gigabit module (the side opposite the port connectors).
4. Install the 10-Gigabit module in the device:
  - Use the two guide links (mounting posts) located towards the rear of the main board to properly place and align the 10-Gigabit Ethernet module inside the device and on top of the main board.
  - Depress the 10-Gigabit module, applying pressure in the location of the connector, and not at the side. Note that the connector must be fully seated and snapped into place. Otherwise, the module will not work.
  - Use a #2 Phillips-head screwdriver to fasten the three screws on the 10-Gigabit module. Affix the screws loosely at first, then tighten them once you are sure the board is properly positioned.
5. Mount the faceplate (provided with the 10-Gigabit module) on the upper left-hand corner of the front panel. Use a #2 Phillips-head screwdriver to fasten the two screws in place.
6. Re-assemble the device as described in the following section.

### Re-assembling the device

This section provides instructions for re-assembling the FastIron device after removing, installing, or replacing a 10-GbE module.

1. Replace the device’s cover by gently guiding the cover into place, taking care not to bump the connectors for the 10-Gigabit ports. To seat the cover, lift up slightly on the rear of the cover while affixing the front of the cover, then carefully seat the back of the cover into place.
2. Replace the power supplies or power supply and blank faceplate.
3. Once the cover and power supplies are properly positioned, re-fasten the screws on each side of the cover.

4. If the device is rack-mounted, replace the mounting brackets.
5. Replace the screw that secures the power supplies in place.

## Replacing a CPU DIMM

---

**NOTE**

This section applies to FESX IPv6 (FESX6) devices only.

---

The FESX IPv6-Ready models ship with 256 MB of SDRAM. The FESX-E models ship with 512 MB SDRAM. If needed, you can replace the DIMM installed in the device, or you can upgrade the DIMM in an IPv6-Ready device to support 512 MB SDRAM.

To replace the DIMM, perform the following steps.

1. Disassemble the FastIron device as instructed in the section [“Disassembling the Device”](#) on page 69.
2. If there is a 10-GbE module installed, remove it as instructed in the section [“Removing a 10-Gigabit Ethernet module”](#) on page 69.
3. Remove the existing CPU DIMM located near the upper left corner of the main board by pulling up on the metal tabs on both sides of the DIMM. The DIMM should pop out of the socket at an angle. Carefully remove the DIMM module.
4. If you are replacing the DIMM with a 512 MB DIMM on a 24-port model and the device has a 10-GbE module, remove the standoff or guide link (mounting post) located near the DIMM slot. This post can interfere with the larger 512 MB DIMM. Insert a screw in place of the post. The remaining post is sufficient to properly align the 10-GbE module for re-installation.
5. Place the new DIMM so that the pins line up correctly with the socket. Insert the new DIMM into the socket at an angle and push downward, towards the board until the metal tabs snap into place.
6. If applicable, re-install the 10-GbE module as instructed in the section [“Installing a 10-Gigabit Ethernet module”](#) on page 70.
7. Re-assemble the device as instructed in the section [“Re-assembling the device”](#) on page 70.

## Replacing a fiber optic module

You can remove an SFP or XFP from a port and replace it with a new one while the FastIron Compact device is powered on and running.

This section provides information about the following tasks:

- Removing a fiber optic module
- Installing a new fiber optic module
- Cabling a fiber optic module

## Removing a fiber optic module

You can remove a fiber SFP (also called a mini-GBIC) or an XFP from a port while the FastIron Compact device is powered on and running.

Before removing a fiber optic module, have the following on hand:

- An ESD wrist strap with a plug for connection to the ESD connector on the FastIron Compact device.



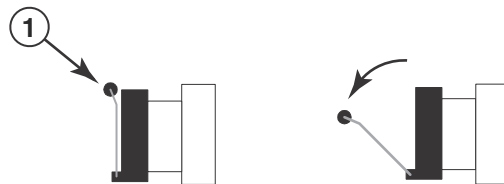
### **DANGER**

***For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.***

- The protective covering that you removed from the fiber optic module when you initially installed the module.

To remove a fiber optic module from a Gigabit Ethernet or 10-Gigabit Ethernet port, complete the following steps.

1. Put on the ESD wrist strap and ground yourself by attaching the clip end to a metal surface (such as an equipment rack).
2. Disconnect the fiber cable connector from the port connector.
3. Insert the protective covering into the port connectors.
4. Pull the fiber optic module out of the port by pulling the bail latch forward, away from the front panel of the module. This unlocks the module from the front panel.



- 1 Bail Latch

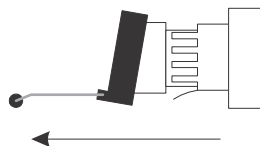
---

### **NOTE**

The bail latch may be attached to either the top or the bottom of the mini-GBIC.

---

5. Grasping the bail latch, pull the fiber optic module out of the port.



6. Store the fiber optic module in a safe, static-free place or in an anti-static bag.
7. Install a new fiber optic module in the port. For information about performing this task, refer to [“Installing a new fiber optic module”](#).

## Installing a new fiber optic module

You must install a fiber optic module (SFP or XFP transceiver) in each Gigabit Ethernet and 10-Gigabit Ethernet fiber port you want to use.

You can install a new fiber optic module in a port while the FastIron Compact device is powered on and running.

Before installing one of these modules into the port, have the following on hand:

- An ESD wrist strap with a plug for connection to a metal surface.



### **DANGER**

***For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.***

Complete the following tasks to install a fiber optic module.

1. Put on the ESD wrist strap and ground yourself by attaching the clip end to a metal surface (such as an equipment rack) to act as ground.
2. Remove the new module from its protective packaging.
3. Gently insert the fiber optic module into the port until the module clicks into place. The module is keyed to prevent incorrect insertion.

## Cabling a fiber optic module

Complete the following steps to cable a fiber optic module.

1. Remove the protective covering from the fiber-optic port connectors and store the covering for future use.
2. Before cabling a fiber optic module, Brocade strongly recommends cleaning the cable connectors and the port connectors. Refer to [“Cleaning the fiber optic connectors”](#) on page 73.
3. Gently insert the cable connectors (a tab on each connector should face upward) into the port connectors until the tabs lock into place.
4. Observe the link and active LEDs to determine if the network connections are functioning properly. For more information about the LED indicators, refer to [Table 10](#) on page 50.

# Cleaning the fiber optic connectors

To avoid problems with the connection between the fiber optic module (SFP (mini-GBIC) or XFP) and the fiber cable connectors, Brocade strongly recommends cleaning both connectors each time you disconnect and reconnect them. In particular, dust can accumulate in the connectors and cause problems such as reducing the optic launch power.

To clean the fiber cable connectors, Brocade recommends using the fiber-optic reel-type cleaner that shipped with your FastIron chassis. You can also purchase this type of cleaner from the following Website.

[http://www.fisfiber.com/Home\\_Page.asp](http://www.fisfiber.com/Home_Page.asp)

When not using an SFP or XFP connector, make sure to keep the protective covering on.

## 5 Upgrading the device to run layer 3 software

### Upgrading the device to run layer 3 software

You can upgrade the FastIron X Series device to run Layer 3 code. To do so, follow the instructions in [Appendix A, “Layer 3 Upgrade Procedures”](#).

# Hardware Specifications

## Device specifications

The following sections present the hardware specifications for the FastIron Compact devices.

### Physical dimensions

Table 15 lists the physical dimensions and weight for the FastIron family of switches.

**TABLE 15** Physical dimensions and weight of the FES, FESX, and FESX-E

Platform	Height	Width	Depth	Weight
FES2402	6.68 cm	44.45 cm	49.78 cm	<ul style="list-style-type: none"> <li>14.06 kgs (31 lb) fully loaded, including dual redundant power supplies</li> <li>10.66 kg (23.5 lbs) empty</li> </ul>
FES4802	2.63 in	17.5 in	19.6 in	
FES12GCF				
FESX424				
FESX424HF				
FESX624				
FESX624E-PREM6				
FESX624HF				
FESX624HFE-PREM6				
FESX448	6.68 cm	44.45 cm	49.78 cm	
FESX648	2.63 in	17.5 in	19.6 in	
FESX648E-PREM6				
FES9604	11.12 cm 4.38 in	44.45 cm 17.5 in	49.78 cm 19.6 in	<ul style="list-style-type: none"> <li>14.06 kg (31 lbs) fully loaded, including dual redundant power supplies</li> <li>10.66 kg (23.5 lbs) empty</li> </ul>
FES2402-POE	6.68 cm	44.45 cm	49.78 cm	<ul style="list-style-type: none"> <li>13.15 kg (29 lbs) fully loaded, including dual redundant power supplies</li> <li>7.94 kg (17.5 lbs) empty</li> </ul>
FES4802-POE	2.63 in	17.5 in	19.6 in	

## Environmental Considerations

For optimal performance, operate or store your Brocade device in compliance with the following environmental conditions.

**TABLE 16** Environmental conditions for the device

Description	Range
<b>Operating Environment</b>	
Operating temperature	0° – 40° C (32° – 104° F)
Operating altitude	0 – 2000 meters (0 – 6,600 ft)
Relative humidity	5 to 90%, @40° C (104° F), non-condensing or 20 to 90% non-condensing for DC power supply
Operating noise	Based on ISO 7779. Based on fan and power supply operating noise (refer to “Cooling” on page 76 and Table 21 on page 82).
<b>Storage Environment</b>	
Storage temperature	-40° to 70° C (-40° to 158° F)
Storage humidity	95% maximum relative humidity, non-condensing
Storage altitude	3000 meters (10,000 feet) maximum

## British Thermal Units (BTUs)

The following are the maximum BTUs for the following devices:

- FES and FESX non-POE devices: 100 watts(340 BTU/Hr) per power supply
- FES2402-POE: 580 watts(316 BTU/Hr) per power supply
- FES4802-POE: 580 watts(462 BTU/Hr) per power supply

## Cooling

The cooling fans cool the CPU, main memory, and voltage regulators. The fans use either a push or pull configuration to move the air from the left side of the device to the right side of the device:

- Total cooling capacity: 80 to 100 watts
- Total air flow: 200 LFM
- Fan operating noise:
  - Based on ISO 7779
  - < 43 dB-A

## Regulatory compliance

Table 17 lists the Electromagnetic Compatibility (EMC), Immunity standards, and safety agency approvals for the FastIron family of switches.

**TABLE 17** Regulatory compliance

### Certifications

#### Emissions:

- CISPR-22 Class A
- EN 55022
- FCC Class A
- VCCI Class A

#### Electromagnetic:

- Generic: EN 50082-1

## Power source interruptions

Table 18 shows how the FastIron compact switch protects against power surges and power drops.

**TABLE 18** Power surge and drop protection

Property	Protection Mechanism
Power surge	MOV and Spark Gap protection
Power drop (<=1 second)	An AC loss of >15ms will cause the power supply to shut down due to input under-voltage
Maximum power draw	195 watts with 2-port 10-Gigabit uplinks 110 watts without 2-port 10-Gigabit uplinks

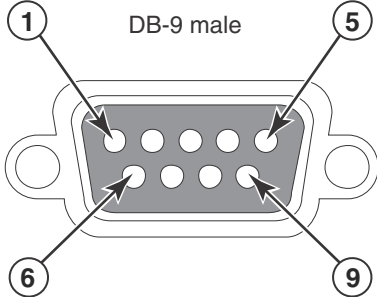
## Pinouts and signaling

This section lists the pinouts for the DB-9 connector and RJ-45 port jacks.

### *Serial (Console) port pinouts*

The Console port is a standard male DB-9 connector, as shown in Figure 24.

**FIGURE 24** Serial port pin and signalling details

Pin Assignment	Pin Number	Switch Signal
	1	Reserved
	2	TXD (output)
	3	RXD (input)
	4	Reserved
	5	GND
	6	Reserved
	7	CTS (input)
	8	RTS (output)
	9	Reserved

Most PC serial ports require a cable with a female DB-9 connector. However, terminal connections will vary, requiring a cable with either a DB-9 or DB-25 connector, male or female.

Serial cable options between the device and a PC or terminal are shown in [Figure 25](#).

**NOTE**

As indicated in [Figure 24](#) and [Figure 25](#), some of the wires should not be connected. If you do connect the wires that are labeled “Reserved”, you might get unexpected results with some terminals.

**FIGURE 25 Console port pin assignments showing cable connection options to a terminal or PC**

DB-9 to DB-9 Female Switch			Terminal or PC	DB-9 to DB-25 Female Switch			Terminal or PC
1	Reserved		1	1	Reserved	8	
2	→	2	2	2	→	3	
3	←	3	3	3	←	2	
4	Reserved		4	4	Reserved	20	
5	→	5	5	5	→	7	
6	Reserved		6	6	Reserved	6	
7	←	7	7	7	←	4	
8	→	8	8	8	→	5	
9	Reserved		9	9	Reserved	22	

**10/100 and Gigabit port pinouts**

[Figure 26](#) shows the pin assignment and signalling for 10Base-T/100Base-TX and 1000Base-T ports.

**FIGURE 26 Pin assignment and signalling for 10/100BaseTX and 1000BaseT ports**

Pin Assignment	10BaseT		100BaseTX and 1000BaseT	
	Pin Number	MDI-X ports	Pin Number	MDI-X ports
	1	RD+	1	RD+
	2	RD-	2	RD-
	3	TD+	3	TD+
	4	Not used	4	CMT
	5	Not used	5	CMT
	6	TD-	6	TD-
	7	Not used	7	CMT
	8	Not used	8	CMT

**Cable specifications**

[Table 19](#) lists the cable specifications for the cables used with the 10/100, Gigabit, and 10-Gigabit Ethernet ports.

**NOTE**

Cable installation and network configuration will affect overall transmission capability. The numbers provided below represent the accepted recommendations of the various standards. For network-specific recommendations, consult your local Brocade reseller or system engineer.

**TABLE 19** Cable specifications

Network Interface	Cable Type <sup>1</sup>	Connector Type	Core Diameter (microns)	Modal Bandwidth (MHz*km) or Wavelength (nm)	Range (meters)
1000Base-BX-D	Single-mode Fiber (SMF)	LC connector for SFP module	9	1490 nm	2 - 10000 (10km)
1000Base-BX-U	Single-mode Fiber (SMF)	LC connector for SFP module	9	1310 nm	2 - 10000 (10km)
1000Base-CWDM		LC connector for SFP module		1470 - 1610 nm	up to 80000 (80 km)
1000Base-LHA	SMF	LC connector for SFP module	9	1550 nm	2 - 70000 (70km)
1000Base-LHB	SMF	LC connector for SFP module	9	1550 nm	2 - 120000 (120km)
1000Base-LX	Multi-mode Fiber (MMF)	LC connector for SFP module	62.5	500	2 - 550
	MMF		50	400	2 - 550
	MMF		50	500	2 - 550
	SMF		9	1300 nm	2 - 10000
1000Base-SX	MMF	LC connector for SFP module	62.5/	160	2 - 200 <sup>2</sup>
	MMF		62.5	200	2 - 275 <sup>3</sup>
	MMF		50	400	2 - 500
	MMF		50	500	2 - 550 <sup>4</sup>
1000Base-SX 2	MMF	LC connector for SFP module	62.5	500	up to 2000 (2 k m)
1000Base-T	Copper	RJ-45 jack for standard unshielded twisted pair (UTP or Category 5)	n/a	n/a	up to 100 meters
100Base-BX	SMF	LC connector for SFP module	9	1310/1490	10000 (10 km)
100Base-FX-SR	MMF	LC connector for SFP module	62.5	500	up to 2000 (2 km)
100Base-FX IR	SMF	LC connector for SFP module	9	1310nm	up to 15000 (15km)
100Base-FX LR	SMF	LC connector for SFP module	9	1310nm	up to 40000 (40km)

**TABLE 19** Cable specifications (Continued)

Network Interface	Cable Type <sup>1</sup>	Connector Type	Core Diameter (microns)	Modal Bandwidth (MHz*km) or Wavelength (nm)	Range (meters)
10Base-T/100Base-TX	Copper	RJ-45 jack for standard unshielded twisted pair (UTP or Category 5)	n/a	n/a	up to 100 meters
10GBase-1310	MMF	LC connector for XFP module	9	1310 nm	up to 200 meters
10GBase-CX4	Copper	CX4 connector for XFP module	n/a	n/a	up to 15 meters
10GBase-ER	SMF	LC connector for XFP module	9	1550 nm	up to 40000 (40 km)
10GBase-LR	SMF	LC connector for XFP module	9	1310 nm	2 - 10000 (10km)
10GBase-SR	MMF	LC connector for XFP module	62.5/125	160	2 - 26
	MMF		62.5/125	200	2 - 33
	MMF		50/125	400	2 - 66
	MMF		50/125	500	2 - 82
	MMF		50/125	2000	2 - 300
10GBase-ZR	SMF	LC connector for XFP module	9	1550 nm	up to 80000 (80 km)
10GBase-ZRD	SMF	LC connector for XFP module	9	1530.33 - 1561.42 nm	up to 80000 (80 km)

1. SMF = Single Mode Fiber, MMF = Multi-Mode Fiber
2. The TIA 568 building wiring standard specifies 160/500 MHz\*km MMF (Multi-mode Fiber).
3. The international ISO/IEC 11801 building wiring standard specifies 200/500 MHz\*km MMF.
4. The ANSI Fibre Channel specification specifies 500/500 MHz\*km 50 micron MMF and 500/500 MHz\*km fiber has been proposed for addition to ISO/IEC 11801.

**NOTE**

Cable installation and network configuration will affect overall transmission capability. The numbers provided above represent the accepted recommendations of the various standards. For network-specific recommendations, consult your local Brocade reseller or system engineer.

**Power cords**

All of the FastIron devices ship with US-compatible power cords unless otherwise specified at the time of order. United Kingdom- and European-compatible power cords are also available.

For more details, refer to [“Input connector and plug”](#) on page 83.

## Power supply specifications

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### NOTE

For an overview of the power supplies, including which power supplies are supported in each FastIron compact switch model, refer to [“Power supplies”](#) on page 17.

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This section contains the following information for the power supplies that ship with the FastIron family of switches:

- [“Physical dimensions and weight”](#) on page 81
- [“Environmental considerations”](#) on page 82
- [“Electrical specifications”](#) on page 82
- [“Input connector and plug”](#) on page 83
- [“Regulatory compliance”](#) on page 84
- [“Safety warnings”](#) on page 84

### Physical dimensions and weight

**TABLE 20** Physical dimensions and weight of power supplies

Power Supply	Dimensions	Weight
RPS5 RPS-X424	6.25 cm (H) x 22.03 cm (W) x 19.30 cm (D) 2.46 in (H) x 8.67 in (W) x 7.6 in (D)	1.93 kg (4.25 lbs)
RPS5DC RPSDC-X424	5.99 cm (H) x 20.42 cm (W) x 16.38 cm (D) 2.36 in (H) x 8.04 in (W) x 6.45 in (D)	1.93 kg (4.25 lbs)
RPS8 RPS8DC RPSDC-X424-POE RPS-FGS RPS-X424-POE RPS-X448 RPSDC-X448	6.25 cm (H) x 22.03 cm (W) x 19.30 cm (D) 2.46 in (H) x 8.67 in (W) x 7.6 in (D)	2.72 kg (6 lbs )

---

## Environmental considerations

**TABLE 21** Environmental considerations for power supplies

Property	RPS5, RPS5DC, RPS-X424, and RPSDC-X424	RPS8, RPS8DC, RPSDC-X424-POE, RPS-FGS, RPS-X424-POE, RPS-X448, and RPSDC-X448
<b>Operating Environment</b>		
Operating temperature	0° to 40° C, 32° to 104° F	0° to 40° C, 32° to 104° F
Operating relative humidity	0 – 95%, non-condensing	0 – 95%, non-condensing
Operating altitude	up to 6,600 feet above sea level	up to 10,000 feet above sea level
Operating noise (based on ISO 7779)	47 dB-A	51 dB-A
Cooling	AC: internal fan, 50 mm DC: internal fan, 60 mm	internal fans, 50mm
<b>Storage Environment</b>		
Storage temperature	-40° to +85° C, -40° to 185° F	-40° to +85° C, -40° to 185° F
Storage altitude	up to 15,000 feet above sea level	up to 15,000 feet above sea level

## Electrical specifications

Table 22 lists the electrical specifications for the power supplies.

**TABLE 22** Power supply electrical specification ranges

Description	RPS5 and RPS-X424	RPS5DC and RPSDC-X424	RPS8, RPS-FGS, RPS-X424-POE, and RPS-X448	RPS8-DC, RPSDC-X424-POE, and RPSDC-X448
<b>Input Specifications</b>				
Input voltage range	100 - 240 VAC	-40 to -60 VDC	100 to 240 VAC	-48 to -60 VDC
Input current	< 3.5 Amps	< 9 Amps	<8 Amps	<18 Amps
Inrush current	< 4.2 Amps peak maximum	<10 Amps peak maximum < 150 ms (0.15 seconds)	< 11.25 Amps peak maximum	< 26 Amps peak maximum
<b>Output Specifications</b>				
Output power	220 watts of total output power		600 watts of total output power, including +12VDC @ 10A to the system and -48VDC @ 10 A for Power over Ethernet ap	

## Input connector and plug

Table 23 lists the input connectors for the power supplies.

**TABLE 23** Input connector for power supplies

Power Supply	Input Connector Properties
All AC Power Supplies	Standard IEC type (IEC 320) C14 type: UL/CSA 15A/250V, VDE 10A/250V Orientation: Ground pin down
All DC Power Supplies	3-position Phoenix Contact The power supply is connected to Earth Ground using wire attached to the ground stud on the power supply rear panel.

Figure 27 shows the power plug and connector for AC power supplies.

**FIGURE 27** AC power cable plug and input connector

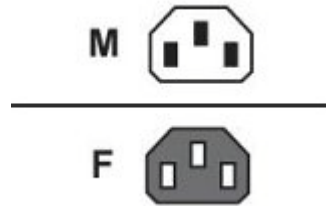
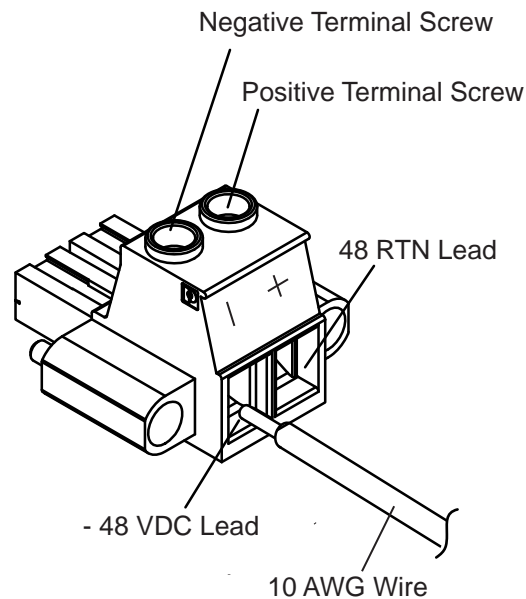


Figure 28 shows the power connector for DC power supplies.

**FIGURE 28** DC power connector



## Regulatory compliance

This section contains regulatory standards for the power supplies, including the following:

- Electromagnetic Compatibility (EMC) compliance
- Immunity regulations
- Safety certifications
- Safety warning labels
- Environmental standards

### *Electromagnetic Compatibility (EMC) and immunity standards*

The power supplies comply with the conducted and radiated test and immunity standards as listed in [Table 24](#). EMC standards are within a 6 dB minimum margin.

**TABLE 24** EMC and Immunity standards for power supplies

Description	Certifications
Electromagnetic Emissions	CISPR 22 Class A FCC Class A VCCI Class A IC ICES-003 Class A (Canada) – (600 watt power supplies only) EN55022 Class A Harmonic Current Emissions (Class A) - EN61000-3-2, with Amendment 14 (1999) Voltage Fluctuations and Flicker - EN61000-3-3
Immunity	EN 55024 EN 61000-4-5. The power supply is tested to level 2 (differential mode) and level 3 (common mode)
Safety	CSA/cUL UL CE TUV

## Safety warnings

The power supplies are marked with an electrical hazard label and with the safety warnings shown in [Table 25](#).

**TABLE 25** Safety warning labels on power supplies

<b>CAUTION: No operator serviceable parts inside. Refer servicing to qualified personnel.</b>	
<b>ATTENZIONE</b>	Non aprire. Rivolgersi a personale qualificado.
<b>ATTENZIONE</b>	Non aprire. Rivolgersi a personale qualificado.
<b>CUIDADO</b>	Partes adentro no reparables por el operador. Refiera reparo a personal autorizado.
<b>ATTENTION</b>	Entretien et réparations internes ne sont autorisés qu'au personnel technique qualifié.
<b>GEFAHR</b>	Zugang zur Bedienung nicht erforderlich. Wartung nur durch qualifiziertes Personal.



## 6 Power supply specifications

# Layer 3 Upgrade Procedures

## Overview

This appendix describes how to upgrade your device to run the full Layer 3 software code

If you have any questions about performing this upgrade, please contact your place of purchase or Brocade at 800-752-8061 inside the United States or 1-408-333-6061 outside the United States. You also can send e-mail to [IPsupport@brocade.com](mailto:IPsupport@brocade.com).



### **DANGER**

*The procedures in this guide are for qualified service personnel.*

## Upgrade kit contents

Before beginning the upgrade, please verify the package contents. If any items are missing from the kit, contact your place of purchase. The upgrade kit contains the following:

- Electrostatic Discharge (ESD) protection kit
- Upgrade sticker that says “PREMIUM”
- Upgrade instructions (this document)
- Dual Inline Package (DIP) key (also called a PROM) that has eight pins. You should have one of the part numbers listed in [Table 26](#).

**TABLE 26** FastIron switches in which a layer 3 upgrade DIP key can be installed

FastIron Compact Switch	Upgrade DIP Key Part Number	DIP Socket Placement on Main Board
<b>IPv4 Switches</b>		
FES12GCF	FES12GCF-L3U	U21
FES2402 FES2402-POE	FES3LU-2	U22
FES4802 FES4802-POE	FES3LU-4	U22
FES9604	FES3LU-9	U22
FESX424 FESX424HF FESX424-POE	FESX424-L3U FESX448-L3U	U1005
FESX448	FESX448-L3U	U3
<b>IPv6 Switches</b>		

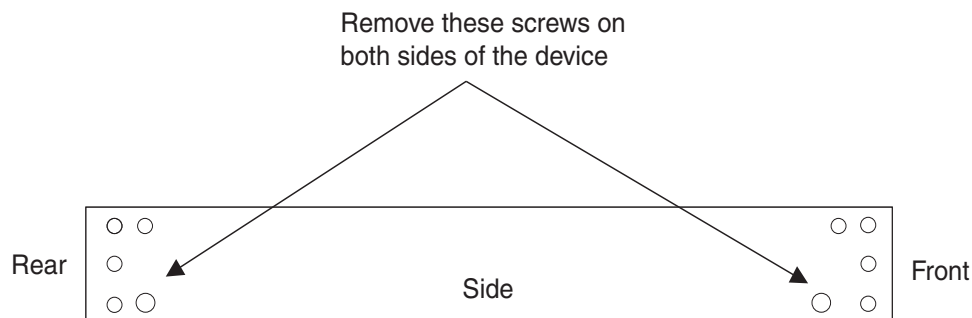
**TABLE 26** FastIron switches in which a layer 3 upgrade DIP key can be installed (Continued)

FastIron Compact Switch	Upgrade DIP Key Part Number	DIP Socket Placement on Main Board
FESX624 FESX624HF	FESX624-L3U-IPV4 FESX648-L3U-IPV4 FESX624-L3U-IPV6 FESX648-L3U-IPV6	U1005
FESX648	FESX648-L3U-IPV4 FESX648-L3U-IPV6	U3

**NOTES:**

- The **FESX624-L3U-IPV4** and **FESX648-L3U-IPV4** PROMs support IPv4 routing only and IPv6 host and management features.
- IPv6 routing services are available only with IPv6 PROMs (**FESX624-L3U-IPV6** and **FESX648-L3U-IPV6**).
- FastIron IPv4 switches do not support the Layer 3 upgrade kits designed for IPv6 switches. Likewise, FastIron IPv6 switches do not support the Layer 3 upgrade kits designed for IPv4 switches.
- FastIron compact switches do not support the Layer 3 upgrade kits designed for the FastIron chassis switches. Likewise, FastIron chassis devices do not support the Layer 3 upgrade kits designed for the FastIron compact switches.

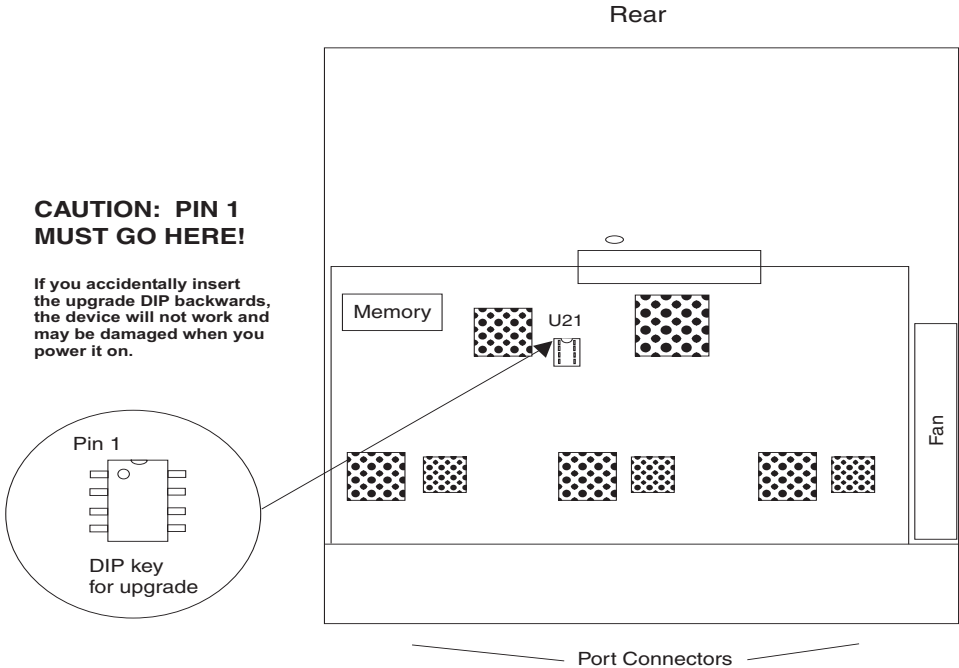
**FIGURE 29** Top cover removal on FastIron compact switches



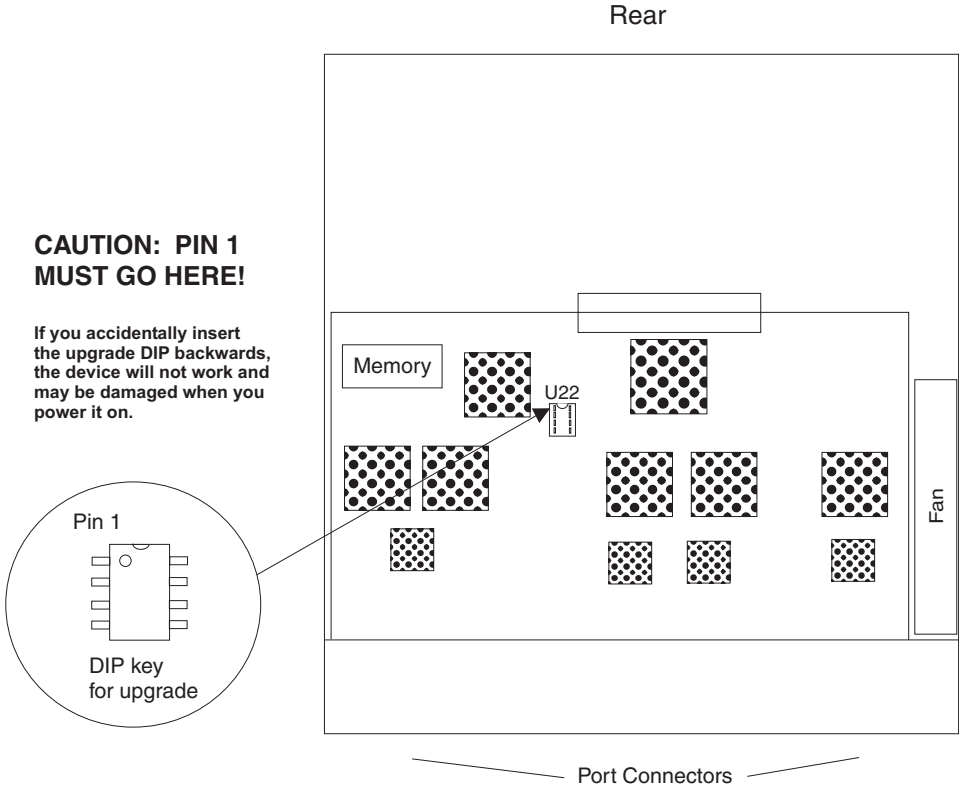
Note: If rack mount ears are installed, remove the four screws from each ear.

The following illustrations show the DIP key insertion and settings.

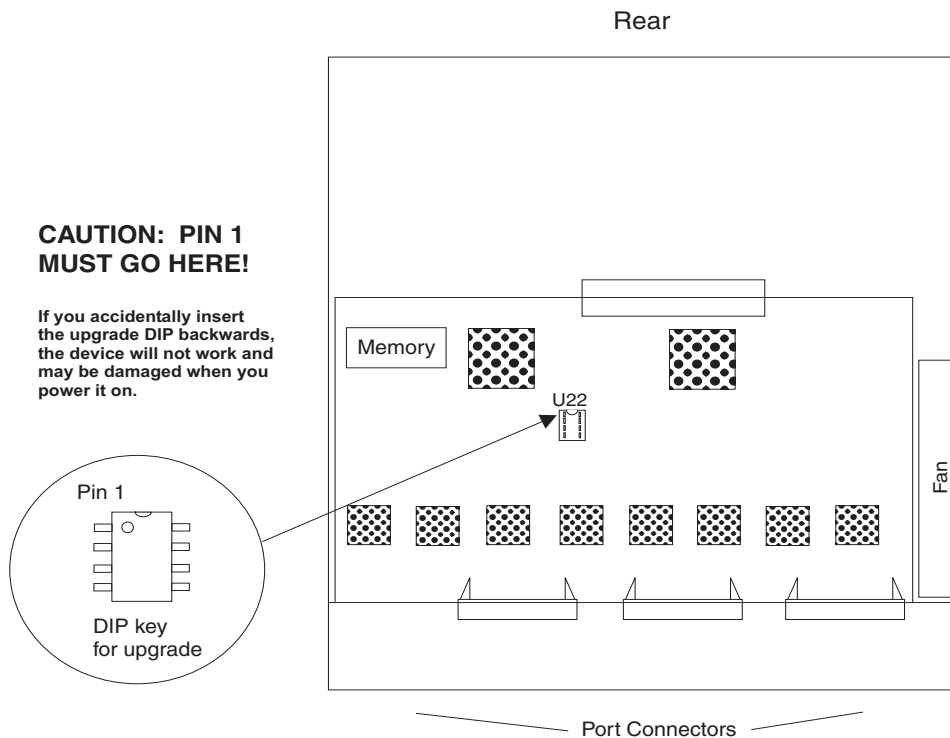
**FIGURE 30** DIP key insertion for FES12GCF



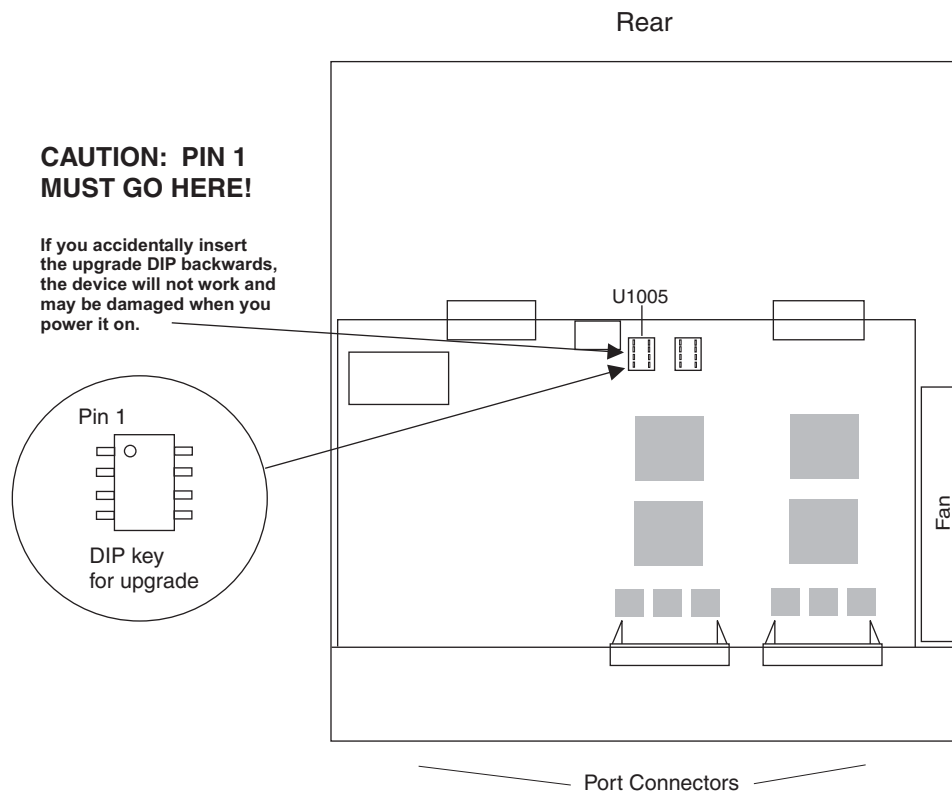
**FIGURE 31** DIP key insertion for FES2402 and FES2402-POE



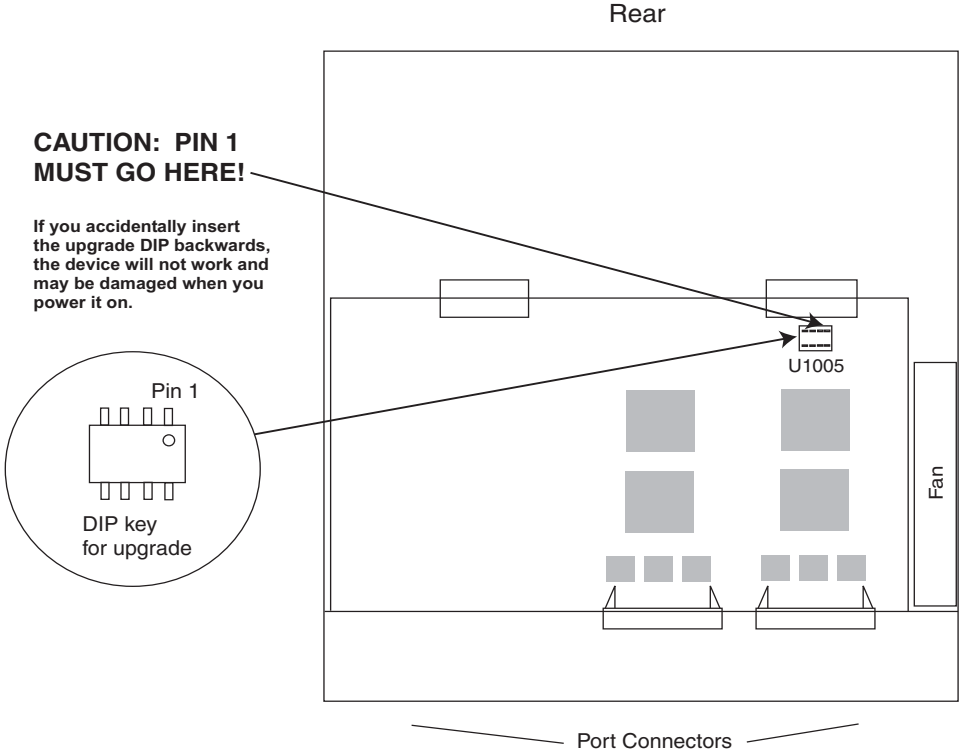
**FIGURE 32** DIP key insertion for FES4802, FES4802-POE, and FES9604



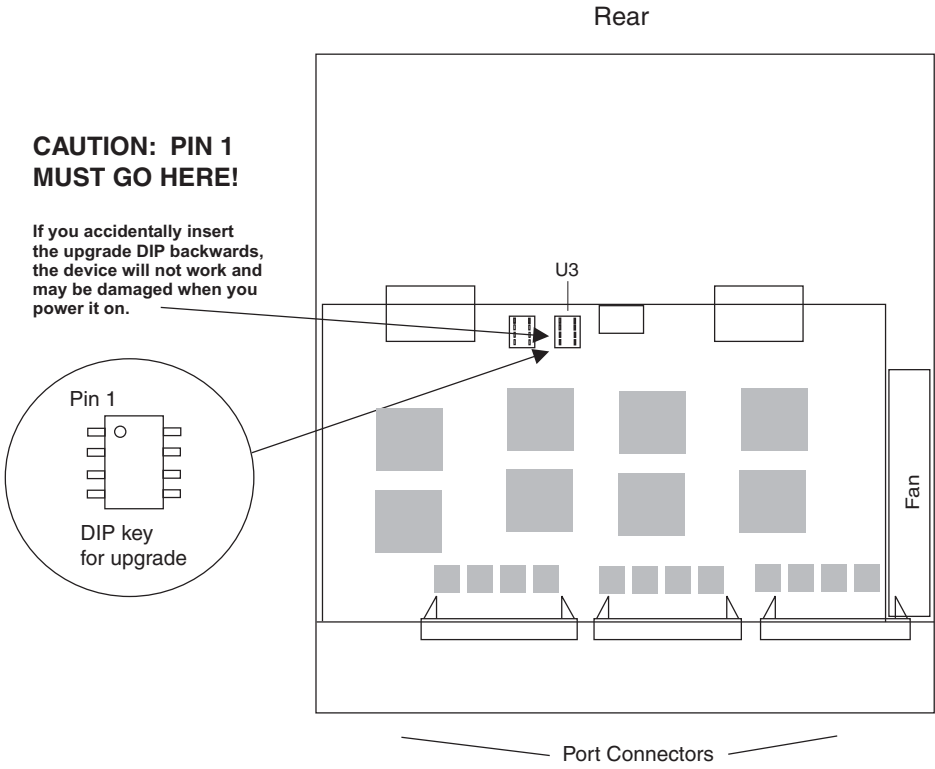
**FIGURE 33** DIP key insertion for FESX424, FESX424-POE, and FESX624



**FIGURE 34** DIP key insertion for FESX424HF, and FESX624HF



**FIGURE 35** DIP key insertion for FESX448 and FESX648



## Installation overview

You need a Phillips-head screwdriver and an ESD wrist strap to perform this procedure. You also need a static-free work area.

Complete the following steps to perform the upgrade.

1. Power down the device, remove it from the equipment rack (if installed in one) and place the device on a static-free work area.



### **DANGER**

***Disconnect the power cord from all power sources to completely remove power from the device.***

2. Remove the top cover from the device.
3. If you are upgrading a FESX model and the device has a 10-Gigabit Ethernet module installed, remove the faceplate from the front of the device and unseat the 10-Gigabit module from the main board, without disconnecting the cable at the rear of the 10-Gigabit module. Refer to the section “[Hardware installation](#)” on page 92 for details.
4. Insert the Dual Inline Package (DIP) key provided in this upgrade kit into the DIP socket on the motherboard. The location of the DIP socket is listed by device type in [Table 26](#) on page 87.



### **CAUTION**

**Make sure you insert the DIP key so that lead pin 1 goes into the correct hole as shown in [Figure 30](#), [Figure 31](#), [Figure 32](#), [Figure 33](#), [Figure 34](#) or [Figure 35](#), depending on your device. If you accidentally insert the DIP key backwards, the device will not work and may be damaged when you power it on.**

5. If applicable, replace the 10-Gigabit Ethernet module on top of the main board.
6. Replace the top cover.
7. If applicable, replace the faceplate.
8. If applicable, reinstall the device in its rack, then power on the device.
9. Install the full Layer 3 software. Note the precautions in “[Before installing the software](#)” on page 95.
10. Reboot the device.

## Detailed procedures

This section describes how to install the hardware and software contents in the Layer 3 upgrade kit.

### Hardware installation

You need a Phillips-head screwdriver and an ESD wrist strap to perform this procedure. You also need a static-free work area.

Complete the following steps to perform the upgrade.

1. Remove the power cables from the device.

**DANGER**

***Disconnect the power cord from all power sources to completely remove power from the device.***

2. If the device is mounted in an equipment rack, remove the device from the rack and place the device in a static-free work area.
3. Put on the supplied ESD wrist strap and attach the clip end to a metal surface (such as an equipment rack) to act as ground.
4. Disassemble the device as follows (refer to [Figure 29](#) on page 88):
  - Use a Phillips-head screwdriver to remove the two screws in the bottom corners of each side. If rack mounting ears are installed, remove the four screws that hold each ear to the device. Refer to [Figure 29](#).
  - Turn the device so that the front (where the port connectors are) is facing you.
  - Slide the cover backwards to free the lip edge of the cover from the front plate. Make sure the cover is completely free of the front panel.
5. If you are upgrading a FESX model and the device has a 10-Gigabit Ethernet module installed, perform the following additional steps. Otherwise, go to [step 6](#).

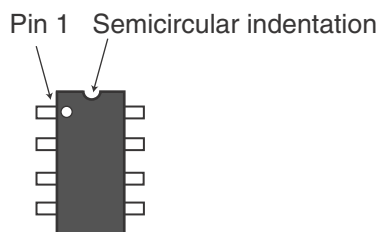
**DANGER**

***You may need an additional authorized person to help perform the last task in this step and the tasks in [step 6](#); one person to hold the 10-Gigabit module while the other installs the DIP key.***

- Remove the faceplate located in the upper left-hand corner of the front panel. Use a #2 Phillips-head screwdriver to remove the two screws that secure the faceplate in place.
  - Use a #2 Phillips-head screwdriver to loosen and remove the three screws on the 10-Gigabit module.
  - Without disconnecting the cable at the rear of the 10-Gigabit module, gently wriggle the 10-Gigabit module to dismount it from the main board. Once the board is unfastened, lift it straight up so that you can access the DIP socket.
6. Remove the DIP key from the package and align the lead pins over the DIP socket at the location listed in [Table 26](#) on page 87.

## A Detailed procedures

The circular or semicircular indentation on the DIP key indicates the position of lead pin 1. If the DIP key has a circular indentation, it is aligned with pin 1. The semicircular indentation on the DIP key is located on the same end as pin 1.



Align the semicircular indentation on the DIP key with the semicircular cut-out on the DIP socket. Refer to the appropriate illustration:

- “DIP key insertion for FES12GCF” on page 89
- “DIP key insertion for FES2402 and FES2402-POE” on page 89
- “DIP key insertion for FES4802, FES4802-POE, and FES9604” on page 90
- “DIP key insertion for FESX424, FESX424-POE, and FESX624” on page 90
- “DIP key insertion for FESX424HF, and FESX624HF” on page 91
- “DIP key insertion for FESX448 and FESX648” on page 91



### CAUTION

Make sure you insert the DIP key so that lead pin 1 goes into the correct hole as shown in the appropriate illustration. If you accidentally insert the DIP key backwards, the device will not work and may be damaged when you power it on.



### CAUTION

Do not push too hard. If the DIP key does not readily go into the DIP socket, stop pushing and verify that the lead pins are straightened and properly aligned over the holes, straighten any lead pins that need straightening, then try again.

7. If applicable, replace the 10-Gigabit module and faceplate as follows. Otherwise, go to [step 8](#).

---

### NOTE

Make sure the cable at the rear of the 10-Gigabit module (the power connector) is plugged in.

- Use the two guide links (mounting posts) located towards the rear of the main board to properly place and align the 10-Gigabit module inside the device and on top of the main board.
- Once in place, apply slight pressure in the location of the BGA connector, and not at the side. Note that the connector must be fully seated and snapped into place. Otherwise, the module will not work.
- Use a #2 Phillips-head screwdriver to fasten the three screws on the 10-Gigabit module. Affix the screws loosely at first, then tighten them once you are sure the board is properly positioned.

- Replace the faceplate on the upper left-hand corner of the front panel. Use a #2 Phillips-head screwdriver to fasten the two screws in place.
8. Replace the cover as follows:
    - Hold the cover on each side at the center and align the front of the cover with the end of the serial interface on the front panel, so that the cover extends slightly past the front panel of the device.
    - Slide the cover backwards until it is fully flush with the top of the device and slides into place.
    - Re-insert the cover screws.
  9. Place the upgrade sticker that says “PREMIUM” on the front panel, to the right of the product name, to indicate that this device has been upgraded.
  10. If applicable, re-attach the rack mounting ears.
  11. Reinstall the device in its equipment rack, if applicable.
  12. Re-insert the power cables to power on the device.
  13. Install the software as instructed in the following section.

## Software installation

Use the instructions in this section to install the software after installing a Layer 3 upgrade DIP key.

### *Before installing the software*

Note the following prior to installing the software:

- The device must have an IP address. If the device does not already have an IP address, configure one by entering the **ip address** <ip-addr> <ip-mask> or **ipv6 address** <ipv6-prefix>/<prefix-length> command at the global CONFIG level of the CLI for Layer 2 images, or at the Interface level of the CLI for base Layer 3 and full Layer 3 images. For detailed instructions, refer to the *FastIron Configuration Guide*.
- If an incorrect DIP key or no DIP key is installed, the switch will boot up on the Layer 2 or base Layer 3 software image. It will not boot up on the full Layer 3 software image.
- Except for IPv6 host and management features, the DIP key part numbers **FESX624-L3U-IPV6** and **FESX648-L3U-IPV6** require software release 04.1.00 or higher to run the supported IPv6 routing protocols and features.
- Before removing a DIP key (if you are not going to replace it with another one), Brocade recommends that you first install the Layer 2 or base Layer 3 software image, since the system will not boot up on the full Layer 3 software image after a DIP key is removed. If desired, prior to removing the DIP key, enter the **boot system tftp** CLI command into the startup configuration to allow the system to boot the Layer 2 or base Layer 3 software image from a TFTP server. Alternatively, you could enter the **boot system tftp** command from the boot monitor.

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#### **NOTE**

To boot the device from a TFTP server through a *fiber* connection, use the CLI command **boot system tftp <ip-address> <filename> fiber-port**.

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## *Installing the software*

Complete the following steps to install the software.

1. Copy the Layer 3 software from [kp.foundrynet.com](http://kp.foundrynet.com) onto a TFTP server to which the device has network access. If you are not sure which software image file is the one you want to install, refer to the release notes.
2. If you normally boot the device from the primary or secondary flash, continue with this step. Otherwise, skip to [step 5](#).

Enter the following command at the Privileged EXEC level of the CLI to copy the Layer 3 software from the TFTP server onto the device.

**copy tftp flash <ip-addr> <file-name> primary | secondary**

where <ip-addr> specifies the IP address of the TFTP server, <file-name> is the system software image file name, and **primary** or **secondary** specifies the flash area. For example, to copy software release FER03000.bin into the primary flash, enter the following command.

```
FES4802# copy tftp flash 209.1.4.69 FER03000.bin primary
```

The CLI will display a message showing that it is erasing the current contents of the flash area you specified. The CLI will then display a message when the copy is complete. If you receive an error message instead, refer to the “Diagnostic Error Codes and Remedies for TFTP Transfers” section of the “Updating Software Images and Configuration Files” chapter in the *FastIron Configuration Guide*.

3. Verify that the Layer 3 software is present in the flash area you specified by entering the following command.

**show flash**

The “Compressed Pri Code size” or “Compressed Sec Code size” line should list the software. If the software is not correct, perform [step 2](#) again.

4. Enter the following command at the Privileged EXEC level of the CLI to reboot the device using the new software: **boot system flash primary | secondary**

where **primary** or **secondary** specifies the flash area. Go to [step 6](#).

5. If you normally boot the device from a TFTP or BootP server, enter the following command at the Privileged EXEC level of the CLI to reboot the device using the new software:

**boot system tftp | bootp**

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### **NOTE**

If you are booting the device from a TFTP server through a *fiber* connection, use the CLI command **boot system tftp <ip-address> <filename> fiber-port**.

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6. Verify that the device booted using the Layer 3 software by observing the boot messages. The “SW” area lists the software running on the device. You also can display this information by entering the **show version** command.

# Regulatory Statements

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## U.S.A.

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



### **CAUTION**

**Changes or modifications made to this device which are not expressly approved by Brocade could void the user's authority to operate the equipment.**

## Industry Canada statement

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

### **English translation of above statement**

This Class A digital apparatus complies with Canadian ICES-003.

## Europe and Australia

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

## Japan VCCI statement

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

## B Japan Denan power cord statement

### English translation of above statement

This is Class A product based on the standard of the Voluntary Control Council For Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

## Japan Denan power cord statement



**注意** - 添付の電源コードを他の装置や用途に使用しない

添付の電源コードは本装置に接続し、使用することを目的として設計され、その安全性が確認されているものです。決して他の装置や用途に使用しないでください。火災や感電の原因となる恐れがあります。

### English translation of above statement

Never use the power cord packed with your equipment for other products.

## Korea

The following statement applies to the FES12GCF, FESX424 and FESX424-POE.

이 기기는 A급 기기로서, 업무용으로 전자파 적합 등록을 한 기기이오니 판매자 또는 사용자는 이 점을 유의하시기 바라며, 만약 잘못 판매 또는 구입하였을 경우에는 가정용으로 교환하시기 바랍니다.

### English translation of above statement

This apparatus has radio wave acceptability registration as a Class A device, so sellers or users should be aware of this. If it is sold or purchased incorrectly, it should be exchanged with a home apparatus (Class B).

## Russia

Сертификат Соответствия в "Системе сертификации в области связи" № ОС-2-СПД-0560, срок действия: с 29 октября 2009 г. до 29 октября 2012 г.

**English translation of above statement**

Certificate of Conformity in "Certification System in the field of telecommunications" #  
OC-2-СПД-0560, validity from the 29 of October 2009 to the 29 of October 2012.

## B Russia

## Caution and Danger Notices

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### Caution

A caution calls your attention to a possible hazard that can damage equipment.

“Vorsicht” weist auf die Gefahr einer möglichen Beschädigung des Gerätes in.

Une mise en garde attire votre attention sur un risque possible d'endommagement de l'équipement. Ci-dessous, vous trouverez les mises en garde utilisées dans ce manuel.

Un mensaje de precaución le advierte sobre un peligro posible que pueda dañar el equipo. Las siguientes son precauciones utilizadas en este guide.

<b>CAUTION</b>	The RPS8 power supply is designed exclusively for use with the FES2402-POE and FES4802-POE devices. The power supply produces extensive power to support 802.3af applications. Installing the power supply in a device other than the FES2402-POE or FES4802-POE will cause extensive damage to your equipment.
<b>VORSICHT</b>	Das Netzgerät RPS8 ist für den ausschließlichen Gebrauch in Model FES2402-POE und FES4802-POE konzipiert. Installation des Netzgerätes in anderen Geräten als FES2402-POE und FES4802-POE verursacht erheblichen Schaden an Ihrer Anlage.
<b>MISE EN GARDE</b>	Le bloc d'alimentation RPS8 est conçu exclusivement pour être utilisé avec les dispositifs FES2402-POE et FES4802-POE. Le bloc d'alimentation produit une alimentation très importante pour prendre en charge les applications 802.3af. Si vous l'installez dans un dispositif autre que les FES2402-POE ou FES4802-POE, il endommagera gravement votre équipement.
<b>PRECAUCIÓN</b>	El suministro de corriente alterna del RPS8 está diseñado exclusivamente para uso con los dispositivos FES2402-POE y FES4802-POE. El suministro de corriente produce suficiente energía para abastecer a las aplicaciones 802.3af. Si se instala el suministro de corriente en un dispositivo que no sea el FES2402-POE o el FES4802-POE, se producirán daños de consideración al equipo.

## C Caution

<b>CAUTION</b>	Remove the power cord from a power supply before you install it in or remove it from the device. Otherwise, the power supply or the device could be damaged as a result. (The device can be running while a power supply is being installed or removed, but the power supply itself should not be connected to a power source.)
<b>VORSICHT</b>	Nehmen Sie vor dem Anschließen oder Abtrennen des Geräts das Stromkabel vom Netzteil ab. Ansonsten könnten das Netzteil oder das Gerät beschädigt werden. (Das Gerät kann während des Anschließens oder Annehmens des Netzteils laufen. Nur das Netzteil sollte nicht an eine Stromquelle angeschlossen sein.)
<b>MISE EN GARDE</b>	Enlevez le cordon d'alimentation d'un bloc d'alimentation avant de l'installer ou de l'enlever du dispositif. Sinon, le bloc d'alimentation ou le dispositif risque d'être endommagé. (Le dispositif peut être en train de fonctionner lorsque vous installez ou enlevez un bloc d'alimentation, mais le bloc d'alimentation lui-même ne doit pas être connecté à une source d'alimentation.)
<b>PRECAUCIÓN</b>	Retire el cordón de corriente del suministro de corriente antes de instalarlo o retirarlo del instrumento. De no hacerse así, el suministro de corriente o el instrumento podrían resultar dañados. (El instrumento puede estar encendido mientras se instala o retira un suministro de corriente, pero el suministro de corriente en sí no deberá conectado a la corriente).

<b>CAUTION</b>	Do not install the device in an environment where the operating ambient temperature might exceed 40° C (104° F).
<b>VORSICHT</b>	Das Gerät darf nicht in einer Umgebung mit einer Umgebungsbetriebstemperatur von über 40° C (104° F) installiert werden.
<b>MISE EN GARDE</b>	N'installez pas le dispositif dans un environnement où la température d'exploitation ambiante risque de dépasser 40° C (104° F).
<b>PRECAUCIÓN</b>	No instale el instrumento en un entorno en el que la temperatura ambiente de operación pueda exceder los 40° C (104° F).

<b>CAUTION</b>	Make sure the air flow around the front, sides, and back of the device is not restricted.
<b>VORSICHT</b>	Stellen Sie sicher, dass an der Vorderseite, den Seiten und an der Rückseite der Luftstrom nicht behindert wird.
<b>MISE EN GARDE</b>	Vérifiez que rien ne restreint la circulation d'air devant, derrière et sur les côtés du dispositif et qu'elle peut se faire librement.
<b>PRECAUCIÓN</b>	Asegúrese de que el flujo de aire en las inmediaciones de las partes anterior, laterales y posterior del instrumento no esté restringido.

<b>CAUTION</b>	Use a separate branch circuit for each AC power cord, which provides redundancy in case one of the circuits fails.
<b>VORSICHT</b>	Es empfiehlt sich die Installation eines separaten Stromkreisweiges für jede Wechselstrom-Elektroschnur als Redundanz im Fall des Ausfalls eines Stromkreises.
<b>MISE EN GARDE</b>	Utilisez un circuit de dérivation différent pour chaque cordon d'alimentation C.A. Ainsi, il y aura un circuit redondant en cas de panne d'un des circuits.
<b>PRECAUCIÓN</b>	Use un circuito derivado separado para cada cordón de alimentación de CA, con lo que se proporcionará redundancia en caso de que uno de los circuitos falle.

<b>CAUTION</b>	Ensure that the device does not overload the power circuits, wiring, and over-current protection. To determine the possibility of overloading the supply circuits, add the ampere (amp) ratings of all devices installed on the same circuit as the device. Compare this total with the rating limit for the circuit. The maximum ampere ratings are usually printed on the devices near the input power connectors.
<b>VORSICHT</b>	Stromkreise, Verdrahtung und Überlastschutz dürfen nicht durch das Gerät überbelastet werden. Addieren Sie die Nennstromleistung (in Ampere) aller Geräte, die am selben Stromkreis wie das Gerät installiert sind. Somit können Sie feststellen, ob die Gefahr einer Überbelastung der Versorgungsstromkreise vorliegt. Vergleichen Sie diese Summe mit der Nennstromgrenze des Stromkreises. Die Höchstnennströme (in Ampere) stehen normalerweise auf der Geräterückseite neben den Eingangsstromanschlüssen.
<b>MISE EN GARDE</b>	Assurez-vous que le dispositif ne risque pas de surcharger les circuits d'alimentation, le câblage et la protection de surintensité. Pour déterminer le risque de surcharge des circuits d'alimentation, additionnez l'intensité nominale (ampères) de tous les dispositifs installés sur le même circuit que le dispositif en question. Comparez alors ce total avec la limite de charge du circuit. L'intensité nominale maximum en ampères est généralement imprimée sur chaque dispositif près des connecteurs d'entrée d'alimentation.
<b>PRECAUCIÓN</b>	Verifique que el instrumento no sobrecargue los circuitos de corriente, el cableado y la protección para sobrecargas. Para determinar la posibilidad de sobrecarga en los circuitos de suministros, añada las capacidades nominales de corriente (amp) de todos los instrumentos instalados en el mismo circuito que el instrumento. Compare esta suma con el límite nominal para el circuito. Las capacidades nominales de corriente máximas están generalmente impresas en los instrumentos, cerca de los conectores de corriente de entrada.

<b>CAUTION</b>	All devices with DC power supplies are intended for installation in restricted access areas only. A restricted access area is where access can be gained only by service personnel through the use of a special tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.
<b>VORSICHT</b>	Alle Geräte mit DC-Netzteil sind nur für die Installation in Bereichen mit beschränktem Zugang gedacht. Ein Bereich mit beschränktem Zugang ist ein Bereich, zu dem nur Wartungspersonal mit Spezialwerkzeug, Schlüssel oder anderen Sicherheitsvorrichtungen Zugang hat. Dieser Zugang wird von für den Bereich zuständigen Personen überwacht.
<b>MISE EN GARDE</b>	Tous les dispositifs avec bloc d'alimentation C.C. sont conçus pour l'installation dans des zones à accès réglementé uniquement. Une zone à accès réglementé est une zone dont l'accès n'est possible qu'au personnel de service utilisant un verrou, une clé ou un outil spécial, ou d'autres moyens de sécurité, et qui est contrôlée par les autorités responsables du site.
<b>PRECAUCIÓN</b>	Todos los instrumentos con suministros de corriente continua han sido diseñados únicamente para instalación en áreas restringidas. Se entiende como área de acceso restringido un lugar al que solo puede acceder personal de servicio mediante el uso de una herramienta especial, llave y cerrojo u otro medio de seguridad similar, y que esté controlado por la autoridad responsable de esa ubicación.

## C Caution

<b>CAUTION</b>	For the DC input circuit to an FES or FESX (DC power supply part number RPS5DC and RPSDC-X424), make sure there is a 10-amp listed circuit breaker, minimum -48VDC, double pole, on the input to the terminal block. The input wiring for connection to the product should be Listed copper wire, 14 AWG, marked VW-1, and rated 90 degrees Celsius.
<b>VORSICHT</b>	Für den Eingangs-Gleichstromkreis an ein FES- oder FESX-Netzteil (Gleichstromnetzteile mit der Teilernr. RPS5DC und RPSDC-X424) muss gewährleistet werden, dass ein zweipoliger 10 A-Leistungsschalter (min. -48VDC) am Eingang zur Reihenklemme installiert wird. Beim Eingangsdraht für den Anschluss am Produkt muss es sich um einen zulässigen Kupferdraht (14 AWG gekennzeichnet mit VW-1), der für mindestens 90 ° C ausgelegt ist, handeln.
<b>MISE EN GARDE</b>	Pour le circuit d'alimentation C.C. d'un FES ou FESX (références du bloc d'alimentation C.C. RPS5DC et RPSDC-X424), assurez-vous de la présence d'un disjoncteur de 10 ampères, minimum -48 V C.C., double coupure, sur l'entrée vers le bloc d'alimentation. Les câbles d'alimentation pour le produit doivent être en fils de cuivre, 14 AWG (American Wire Gauge), marqués VW-1 et classés 90 degrés Celsius.
<b>PRECAUCIÓN</b>	Para el circuito de entrada de CC a un modelo FES o FESX (suministro de corriente continua con No. de referencia RPS5DC y RPSDC-X424), verifique que haya un cortacircuitos catalogado para 10 amperios, mínimo de -48 VCC, bipolar, en la entrada al bloque terminal. El cableado de entrada para la conexión al producto deberá ser catalogado de cobre, 14 AWG, marcado VW-1, y nominal para 90 grados Celsius.

<b>CAUTION</b>	For a DC system (DC power supply part number RPSDC-X424-POE), use a grounding wire of at least 10 American Wire Gauge (AWG). The 10 AWG wire should be attached to an agency-approved crimp connector, crimped with the proper tool.
<b>VORSICHT</b>	Für ein Gleichstromsystem (Gleichstromnetzteile mit der Teilernr RPSDC-X424-POE) ist ein Erdungsdraht (wenigstens 10 AWG) erforderlich. Der 10 AWG-Draht sollte an einen behördlich genehmigten Crimpverbinder angebracht werden, der mit einem ordnungsgemäßen Werkzeug gecrimpt wurde.
<b>MISE EN GARDE</b>	Pour les systèmes C.C. (références du bloc d'alimentation C.C. RPSDC-X424-POE), utilisez un fil de mise à la terre d'au moins 10 AWG (American Wire Gauge). Ce fil de 10 AWG doit être relié à un connecteur à sertissage homologué, sertit avec l'outil approprié. Le connecteur à sertissage doit permettre la sécurisation aux deux vis de borne de terre sur le boîtier.
<b>PRECAUCIÓN</b>	Para un sistema de CC (suministro de corriente continua con No. de referencia RPSDC-X424-POE), utilice un cable de conexión a tierra de calibre de cable norteamericano (AWG) número 10. El cable 10 AWG deberá acoplarse a un conector engarzado aprobado, y engarzado con la herramienta apropiada.

<b>CAUTION</b>	For the DC input circuit to the system (DC power supply part number RPSDC-X424-POE), make sure there is a Listed 30 amp circuit breaker, minimum -48Vdc, double pole, on the input to the terminal block. The input wiring for connection to the product should be Listed copper wire, 10 AWG, marked VW-1, and rated minimum 90 degrees celcius.
<b>VORSICHT</b>	Für den Eingangs-Gleichstromkreis zum System (Gleichstromnetzteile mit der Teilennr. RPSDC-X424-POE) ist ein 30 A-Leistungsschalter (Minimum), -48 V DC, doppelpolig, am Eingang zur Reihenklemme zu installieren. Bei der Eingangsverdrahtung zum Anschluss des Produkts sollte es sich um einen 10 AWG-Kupferdraht (VW-1) und einer Mindestnenntemperatur von 32° handeln.
<b>MISE EN GARDE</b>	Pour le circuit d'alimentation C.C du système (références du bloc d'alimentation C.C. RPSDC-X424-POE), assurez-vous de la présence d'un disjoncteur de 30 ampères, minimum -48 V C.C., double coupure, sur l'entrée vers le bloc d'alimentation. Les câbles d'alimentation pour le produit doivent être en fils de cuivre, 10 AWG (American Wire Gauge), marqués VW-1 et classés 90 degrés Celsius.
<b>PRECAUCIÓN</b>	Para el circuito de entrada de CC al sistema (suministro de corriente continua con No. de referencia RPSDC-X424-POE), verifique que existe un cortacircuitos catalogado de 30 amperios, como mínimo, -48 VCC, bipolar, en la entrada al bloque terminal. El cableado de entrada para la conexión al producto deberá ser de cable de cobre catalogado, 10 AWG, marcado con VW-1, y tener una capacidad nominal mínima para 90 grados centígrados.

<b>CAUTION</b>	Make sure you insert the power supply right-side up. It is possible to insert the supply upside down, although the supply will not engage with the power backplane when upside down. The power supply is right-side up when the power connector is on the left and the fan vent is on the right.
<b>VORSICHT</b>	Sicher Sie sicher, dass Sie das Netzteil mit der richtigen Seite nach oben weisend einstecken. Man kann die Karte auch umgekehrt einstecken. Allerdings rastet das umgekehrte Netzteil nicht in die Netzstrom-Rückwandplatine ein. Die rechte Seite des Netzteils weist nach oben, wenn sich der Stromanschlusstecker links und der Ventilatorschlitz rechts befindet.
<b>MISE EN GARDE</b>	Assurez-vous d'insérer le bloc d'alimentation dans le bon sens. Il est possible de l'insérer " la tête en bas ", mais le bloc d'alimentation ne s'enclenchera pas dans la face arrière d'alimentation s'il est inséré à l'envers. Le bloc d'alimentation est dans le bon sens lorsque le connecteur se trouve sur le côté gauche et le ventilateur sur la droite.
<b>PRECAUCIÓN</b>	Verifique que inserta el suministro de corriente con la cara correcta hacia arriba. Es posible insertar el suministro hacia abajo, pese a que este no se conectará con el enchufe posterior de esta forma. El suministro de potencia estará con la cara correcta hacia arriba cuando el conector de corriente quede a la izquierda y la abertura del ventilador queda a la derecha.

## C Caution

<b>CAUTION</b>	Use the erase startup-config command only for new systems. If you enter this command on a system you have already configured, the command erases the configuration. If you accidentally do erase the configuration on a configured system, enter the write memory command to save the running configuration to the startup-config file.
<b>VORSICHT</b>	Verwenden Sie den Befehl "Erase startup-config" (Löschen Startup-Konfig) nur für neue Systeme. Wenn Sie diesen Befehl in ein bereits konfiguriertes System eingeben, löscht der Befehl die Konfiguration. Falls Sie aus Versehen die Konfiguration eines bereits konfigurierten Systems löschen, geben Sie den Befehl "Write Memory" (Speicher schreiben) ein, um die laufende Konfiguration in der Startup-Konfig-Datei zu speichern.
<b>MISE EN GARDE</b>	N'utilisez la commande erase startup-config que pour les nouveaux systèmes. Si vous entrez cette commande sur un système que vous avez déjà configuré, elle efface la configuration. Si vous effacez la configuration par accident sur un système configuré, entrez la commande write memory pour enregistrer la configuration actuelle dans le fichier startup-config.
<b>PRECAUCIÓN</b>	Use el comando erase startup-config (borrar configuración de inicio) para sistemas nuevos solamente. Si usted introduce este comando en un sistema que ya ha configurado, el comando borrará la configuración. Si usted borra accidentalmente la configuración en un sistema ya configurado, introduzca el comando write memory (escribir memoria) para guardar la configuración en ejecución en el archivo startup-config.

<b>CAUTION</b>	Never leave tools inside the chassis.
<b>VORSICHT</b>	Lassen Sie keine Werkzeuge im Chassis zurück.
<b>MISE EN GARDE</b>	Ne laissez jamais d'outils à l'intérieur du châssis.
<b>PRECAUCIÓN</b>	No deje nunca herramientas en el interior del chasis.

<b>CAUTION</b>	If you do not install a module in a slot, you must keep the slot panel in place. If you run the chassis with an uncovered slot, the system will overheat.
<b>VORSICHT</b>	Falls kein Modul im Steckplatz installiert wird, muss die Steckplatztafel angebracht werden. Wenn ein Steckplatz nicht abgedeckt wird, läuft das System heiß.
<b>MISE EN GARDE</b>	Si vous n'installez pas de module dans un slot, vous devez laisser le panneau du slot en place. Si vous faites fonctionner le châssis avec un slot découvert, le système surchauffera.
<b>PRECAUCIÓN</b>	Si no instala un módulo en la ranura, deberá mantener el panel de ranuras en su lugar. Si pone en funcionamiento el chasis con una ranura descubierta, el sistema sufrirá sobrecalentamiento.

<b>CAUTION</b>	Changes or modifications made to this device that are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
<b>VORSICHT</b>	Falls dieses Gerät verändert oder modifiziert wird, ohne die ausdrückliche Genehmigung der für die Einhaltung der Anforderungen verantwortlichen Partei einzuholen, kann dem Benutzer der weitere Betrieb des Gerätes untersagt werden.
<b>MISE EN GARDE</b>	Les éventuelles modifications apportées à cet équipement sans avoir été expressément approuvées par la partie responsable d'en évaluer la conformité sont susceptibles d'annuler le droit de l'utilisateur à utiliser cet équipement.
<b>PRECAUCIÓN</b>	Si se realizan cambios o modificaciones en este dispositivo sin la autorización expresa de la parte responsable del cumplimiento de las normas, la licencia del usuario para operar este equipo puede quedar anulada.

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## Danger

A danger notice calls your attention to a possible hazard that can cause injury or death. The following are the danger notices used in this guide.

"Gefahr" weist auf eine mögliche Gefährdung hin, die zu Verletzungen oder Tod führen können. Sie finden die folgenden Warnhinweise in diesem Handbuch.

Un danger attire votre attention sur un risque possible de blessure ou de décès. Ci-dessous, vous trouverez les dangers utilisés dans ce manuel.

Una peligro le llama la atención sobre cualquier peligro posible que pueda ocasionar daños personales o la muerte. A continuación se dan las advertencias utilizadas en este guide.

<b>DANGER</b>	The procedures in this guide are for qualified service personnel.
<b>GEFAHR</b>	Die Verfahren in diesem Handbuch sind nur für qualifiziertes Wartungspersonal gedacht.
<b>DANGER</b>	Les procédures décrites dans ce manuel doivent être effectuées par le personnel de service qualifié uniquement.
<b>PELIGRO</b>	Los procedimientos de este guide se han hecho para personal de servicio cualificado.

<b>DANGER</b>	All fiber optic interfaces use Class 1 lasers.
<b>GEFAHR</b>	Alle Glasfaser-Schnittstellen verwenden Laser der Klasse 1.
<b>DANGER</b>	Toutes les interfaces en fibres optiques utilisent des lasers de classe 1.
<b>PELIGRO</b>	Todas las interfaces de fibra óptica utilizan láser de clase 1.

<b>DANGER</b>	Make sure the rack or cabinet housing the device is adequately secured to prevent it from becoming unstable or falling over.
<b>GEFAHR</b>	Stellen Sie sicher, dass das Gestell oder der Schrank für die Unterbringung des Geräts auf angemessene Weise gesichert ist, so dass das Gestell oder der Schrank nicht wackeln oder umfallen kann.
<b>DANGER</b>	Vérifiez que le bâti ou le support abritant le dispositif est bien fixé afin qu'il ne devienne pas instable ou qu'il ne risque pas de tomber.
<b>PELIGRO</b>	Verifique que el bastidor o armario que alberga el instrumento está asegurado correctamente para evitar que pueda hacerse inestable o que caiga.

## C Danger

<b>DANGER</b>	Mount the devices you install in a rack or cabinet as low as possible. Place the heaviest device at the bottom and progressively place lighter devices above.
<b>GEFAHR</b>	Montieren Sie die Geräte im Gestell oder Schrank so tief wie möglich. Platzieren Sie das schwerste Gerät ganz unten, während leichtere Geräte je nach Gewicht (je schwerer desto tiefer) darüber untergebracht werden.
<b>DANGER</b>	Montez les dispositifs que vous installez dans un bâti ou support aussi bas que possible. Placez le dispositif le plus lourd en bas et le plus léger en haut, en plaçant tous les dispositifs progressivement de bas en haut du plus lourd au plus léger.
<b>PELIGRO</b>	Monte los instrumentos que instale en un bastidor o armario lo más bajos posible. Ponga el instrumento más pesado en la parte inferior y los instrumentos progresivamente más livianos más arriba.

<b>DANGER</b>	Disconnect the power cord from all power sources to completely remove power from the device.
<b>GEFAHR</b>	Ziehen Sie das Stromkabel aus allen Stromquellen, um sicherzustellen, dass dem Gerät kein Strom zugeführt wird.
<b>DANGER</b>	Débranchez le cordon d'alimentation de toutes les sources d'alimentation pour couper complètement l'alimentation du dispositif.
<b>PELIGRO</b>	Para desconectar completamente la corriente del instrumento, desconecte el cordón de corriente de todas las fuentes de corriente.

<b>DANGER</b>	Make sure that the power source circuits are properly grounded, then use the power cord supplied with the device to connect it to the power source.
<b>GEFAHR</b>	Stellen Sie sicher, dass die Stromkreise ordnungsgemäß geerdet sind. Benutzen Sie dann das mit dem Gerät gelieferte Stromkabel, um es an die Stromquelle anzuschließen.
<b>DANGER</b>	Vérifiez que les circuits de sources d'alimentation sont bien mis à la terre, puis utilisez le cordon d'alimentation fourni avec le dispositif pour le connecter à la source d'alimentation.
<b>PELIGRO</b>	Verifique que circuitos de la fuente de corriente están conectados a tierra correctamente; luego use el cordón de potencia suministrado con el instrumento para conectarlo a la fuente de corriente.

<b>DANGER</b>	Do not use the handles on the power supply units to lift or carry a Foundry device.
<b>GEFAHR</b>	Die Griffe an den Netzteilen dürfen nicht zum Anheben oder Tragen eines Foundry geräte verwendet werden.
<b>DANGER</b>	N'utilisez pas les poignées des unités de bloc d'alimentation pour soulever ou porter un dispositif en châssis.
<b>PELIGRO</b>	No use las asas de las unidades de suministro de corriente para alzar o transportar un instrumento de Foundry.

<b>DANGER</b>	If the installation requires a different power cord than the one supplied with the device, make sure you use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.
<b>GEFAHR</b>	Falls für die Installation ein anderes Stromkabel erforderlich ist (wenn das mit dem Gerät gelieferte Kabel nicht passt), müssen Sie sicherstellen, dass Sie ein Stromkabel mit dem Siegel einer Sicherheitsbehörde verwenden, die für die Zertifizierung von Stromkabeln in Ihrem Land zuständig ist. Das Siegel ist Ihre Garantie, dass das Stromkabel sicher mit Ihrem Gerät verwendet werden kann.
<b>DANGER</b>	Si l'installation nécessite un cordon d'alimentation autre que celui fourni avec le dispositif, assurez-vous d'utiliser un cordon d'alimentation portant la marque de l'organisation responsable de la sécurité qui définit les normes et réglementations pour les cordons d'alimentation dans votre pays. Cette marque vous assure que vous pouvez utiliser le cordon d'alimentation avec le dispositif en toute sécurité.
<b>PELIGRO</b>	Si la instalación requiere un cordón de corriente distinto al que se ha suministrado con el instrumento, verifique que usa un cordón de corriente que venga con la marca de la agencia de seguridad que defina las regulaciones para cordones de corriente en su país. Esta marca será su garantía de que el cordón de corriente puede ser utilizado con seguridad con el instrumento.

<b>DANGER</b>	Power supplies are hot swappable. However, Foundry recommends that you disconnect the power supply from AC power before installing or removing the supply. The device can be running while a power supply is being installed or removed, but the power supply itself should not be connected to a power source. Otherwise, you could be injured or the power supply or other parts of the device could be damaged.
<b>GEFAHR</b>	Netzteile können unter Strom stehend ausgetauscht werden. Allerdings empfiehlt Foundry, dass Sie das Netzteil vom Netzstrom abtrennen, bevor Sie das Netzteil anschließen oder abtrennen. Das Gerät kann während des Anschließens oder Abnehmens des Netzteils laufen. Nur das Netzteil sollte nicht an eine Stromquelle angeschlossen sein. Ansonsten können Sie verletzt oder das Netzteil bzw. andere Geräteteile beschädigt werden.
<b>DANGER</b>	Les blocs d'alimentation peuvent être changés à chaud. Cependant, Foundry vous conseille de débrancher le bloc d'alimentation de l'alimentation C.A. avant d'installer ou d'enlever le bloc d'alimentation. Le dispositif peut être en cours de fonctionnement pendant que vous installez ou enlevez un bloc d'alimentation, mais le bloc d'alimentation lui-même ne doit pas être connecté à une source d'alimentation. Sinon, vous risquez d'être blessé ou le bloc d'alimentation ou d'autres pièces du dispositif risquent d'être endommagés.
<b>PELIGRO</b>	Los suministros de corriente pueden intercambiarse sin necesidad de ajustes. No obstante, Foundry recomienda que desconecte el suministro de corriente de la toma de corriente alterna antes de instalar o retirar el suministro. El instrumento puede estar activado cuando se esté instalando o retirando un suministro de corriente, pero el suministro de corriente en sí no deberá estar conectado a la fuente de corriente. De no hacerlo así, podría sufrir daños personales o el suministro de corriente u otras piezas podrían resultar dañadas.

## C Danger

<b>DANGER</b>	Before beginning the installation, refer to the precautions in "Power precautions" on page 26
<b>GEFAHR</b>	Vor der Installation siehe Vorsichtsmaßnahmen unter " Power Precautions " (Vorsichtsmaßnahmen in Bezug auf elektrische Ablagen) auf den Seiten 2 - 4.
<b>DANGER</b>	Avant de commencer l'installation, consultez les précautions décrites dans " Power Precautions " (Précautions quant à l'alimentation), pages 2-4.
<b>PELIGRO</b>	Antes de comenzar la instalación, consulte las precauciones en la sección " Power Precautions" (Precauciones sobre corriente) que se encuentra en las páginas 2-4.

<b>DANGER</b>	For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.
<b>GEFAHR</b>	Aus Sicherheitsgründen sollte ein EGB-Armband zum Schutz von elektronischen gefährdeten Bauelementen mit einem 1 Megaohm-Reihenwiderstand ausgestattet sein.
<b>DANGER</b>	Pour des raisons de sécurité, la dragonne ESD doit contenir une résistance de série 1 méga ohm.
<b>PELIGRO</b>	Por razones de seguridad, la correa de muñeca ESD deberá contener un resistor en serie de 1 mega ohmio.

<b>DANGER</b>	A fully populated chassis is heavy. TWO OR MORE PEOPLE ARE REQUIRED WHEN LIFTING, HANDLING, OR MOUNTING THESE DEVICES.
<b>GEFAHR</b>	Ein voll bestücktes Gehäuse ist schwer. ZUM ANHEBEN, HANDHABEN ODER MONTIEREN DIESER GERÄTE SIND MINDESTENS ZWEI PERSONEN ERFORDERLICH.
<b>DANGER</b>	Les châssis sont lourds quand ils sont entièrement remplis. POUR SOULEVER, MANIPULER OU MONTER CES DISPOSITIFS, DEUX PERSONNES MINIMUM SONT NÉCESSAIRES.
<b>PELIGRO</b>	Un chasis muy concurrido es muy pesado. SE REQUIEREN DOS O MÁS PERSONAS CUANDO SE VAYA A ALZAR, MANEJAR O MONTAR ESTE DISPOSITIVO.

<b>DANGER</b>	Be careful not to accidentally insert your fingers into the fan tray while removing it from the chassis. The fan may still be spinning at a high speed.
<b>GEFAHR</b>	Die Finger dürfen nicht versehentlich in das Ventilatorblech gesteckt werden, wenn dieses vom Gehäuse abgenommen wird. Der Ventilator kann sich unter Umständen noch mit hoher Geschwindigkeit drehen.
<b>DANGER</b>	Faites attention de ne pas accidentellement insérer vos doigts dans le boîtier du ventilateur lorsque vous l'enlevez du châssis. Il est possible que le ventilateur tourne encore à grande vitesse.
<b>PELIGRO</b>	Procure no insertar los dedos accidentalmente en la bandeja del ventilador cuando esté desmontando el chasis. El ventilador podría estar girando a gran velocidad.