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18 March 2010



# Brocade FastIron WS

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## Hardware Installation Guide

Supporting Release 07.0.01b

**BROCADE**

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<i>Brocade FastIron WS Hardware Installation Guide</i>	53-1001825-02	Added Russian regulatory statement	February 2010
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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, ISIS, IGMP, PIM, DVMRP, and VRRP.

## Supported hardware and software

This guide supports FastIron WS devices running software release 07.0.01.

## 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>code text</code>	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.

---



### CAUTION

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

---



### DANGER

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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These references are made for informational purposes only.

Corporation	Referenced trademarks and products
Phillips Screw Company, Inc.	Phillips

## Related publications

The following Brocade documents supplement the information in this guide:

- *FastIron Configuration Guide*
- *IronWare MIB Reference*

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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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# Product Overview

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## Hardware features

This chapter contains an overview of the FastIron WS Switch.

The FastIron WS Series includes the following models:

- FWS624
- FWS648
- FWS624G
- FWS648G
- FWS624-POE
- FWS648-POE
- FWS624G-POE
- FWS648G-POE

These models support an optional external redundant AC power supply that can power up to four units.

The following sections describe the physical characteristics of the FastIron WS models. For more details about physical dimensions, power supply specifications, and pinouts, refer to [Chapter 6, “Hardware Specifications”](#).

### FWS624, FWS648, FWS624G, FWS648G

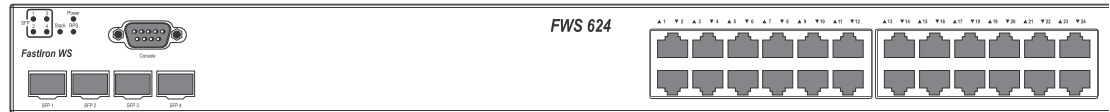
FastIron WS devices provide high 10/100 Mbps port density and Gigabit Ethernet uplinks in a compact form factor:

- FastIron WS624 includes 20 x 10/100 Mbps PoE ports plus 4 Combo 10/100/1000 Mbps copper (RJ45) or 100/1000 Ethernet Fiber (SFP) ports.
- FastIron WS648 includes 44 x 10/100 Mbps PoE ports plus 4 Combo 10/100/1000 Mbps copper (RJ45) or 100/1000 Ethernet Fiber (SFP) ports.
- FastIron WS624G includes 20 x 10/100/1000 Mbps PoE ports plus 4 Combo 10/100/1000 Mbps copper (RJ45) or 100/1000 Ethernet Fiber (SFP) ports.
- FastIron WS648G includes 44 x 10/100/1000 Mbps PoE ports plus 4 Combo 10/100/1000 Mbps copper (RJ45) or 100/1000 Ethernet Fiber (SFP) ports.

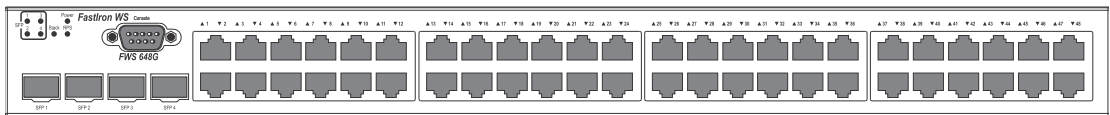
# 1 Hardware features

The following figures show the front and rear panels of the FastIron WS models.

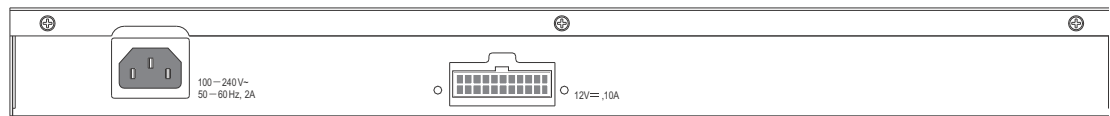
**FIGURE 1 FWS624, FWS624G**



**FIGURE 2 FWS648, FWS648G**



**FIGURE 3 FWS624, FWS648, FWS624G, FWS648G rear panel**

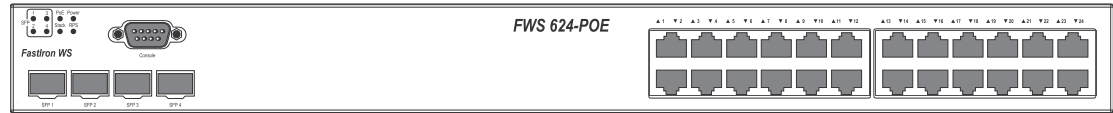
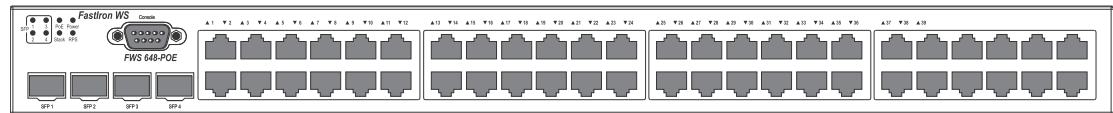
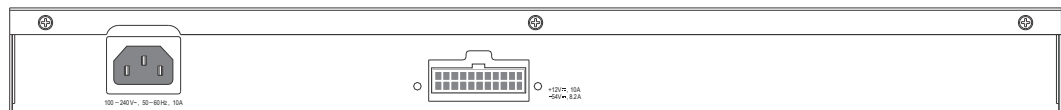


## FWS624-POE, FWS648-POE, FWS624G-POE, FWS648G-POE

FastIron WS POE devices provide high 10/100 port density and Gigabit Ethernet uplinks in a compact form factor:

- FastIron WS624-POE includes 20 x 10/100 Mbps PoE ports plus 4 Combo 10/100/1000 Mbps copper (RJ45 PoE) or 100/1000 Ethernet Fiber (SFP) ports. Unit supports 802.3af PoE.
- FastIron WS648-POE includes 44 x 10/100 Mbps PoE ports plus 4 Combo 10/100/1000 Mbps copper (RJ45 PoE) or 100/1000 Ethernet Fiber (SFP) ports. Unit supports 802.3af PoE.
- FastIron WS624G-POE includes 20 x 10/100/1000 Mbps PoE ports plus 4 Combo 10/100/1000 Mbps copper (RJ45 PoE) or 100/1000 Ethernet Fiber (SFP) ports. Unit supports 802.3af PoE.
- FastIron WS648G-POE includes 44 x 10/100/1000 Mbps PoE ports plus 4 Combo 10/100/1000 Mbps copper (RJ45 PoE) or 100/1000 Ethernet Fiber (SFP) ports. Unit supports 802.3af PoE.

The following figures show the front and rear panels of these FastIron WS models.

**FIGURE 4** FWS624-POE, FWS624G-POE**FIGURE 5** FWS648-POE, FWS648G-POE**FIGURE 6** FWS624-POE, FWS648-POE, FWS624G-POE, FWS648G-POE rear panel

## Control features

### *Serial management interface (console port)*

The serial management interface allows 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 or F) ships with the device. The serial management interface (the console port) is located in the left corner of the front panel.

### *POE applications*

FWS POE devices provide Power over Ethernet (POE), 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, offering 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 Brocade FWS624-POE and FWS648-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 FWS devices, refer to the *FastIron Configuration Guide*.

### *FastIron WS network interfaces*

FWS624 and FWS648 devices provide the following interfaces:

- 10/100 Mbpsports with RJ-45 copper connectors (Ports 5~24 or Ports 5~48)

# 1 Hardware features

- 10/100/1000 RJ-45 or 100/1000 SFP (1-GE) combo ports (Ports 1~4)

FWS624G and FWS648G devices provide the following interfaces:

- 10/100/1000 Mbps ports with RJ-45 copper connectors (Ports 5~24 or Ports 5~48)
- 10/100/1000 RJ-45 or 100/1000 SFP (1-GE) combo ports (Ports 1~4)

## **FastIron WS 10/100/1000 BASE-T ports**

These devices contain 24/48 RJ-45 ports that operate at 10 Mbps or 100 Mbps, half or full duplex, or at 1000 Mbps, full duplex. Because all ports support automatic MDI or MDI-X operation, you can use straight-through cables for all network connections to PCs or servers, or to other switches or hubs. (See [“Pinouts and signalling”](#) on page 57.) Brocade recommends using MDIX cable for switch-to-switch connections.

Because each port supports auto-negotiation, the optimum transmission mode (half or full duplex), and data rate (10, 100, or 1000 Mbps) can be selected automatically. If a device connected to one of these ports does not support auto-negotiation, the communication mode of that port can be configured manually.

## **Combination Ports**

FWS devices contain four Small Form Factor Pluggable (SFP) combination ports (ports 1~4), that are shared with four of the RJ45 ports. In the default configuration. If an SFP transceiver is installed in a slot and has a valid link on its port, the associated RJ45 port is disabled and cannot be used.

## SFP network interfaces

Table 1 describes the network interfaces supported on the device. For network interface specifications, refer to the table “Cable length summary table” on page 59.

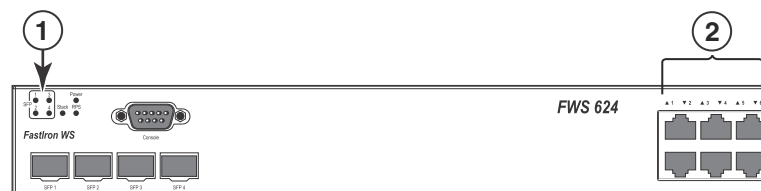
**TABLE 1** Supported SFP network interfaces for FWS devices

Interface	Show media description
1000Base-BX-D	M-GBXD
1000Base-BX-U	M-GBXU
1000Base-LHA	M-LHA
1000Base-LHB	M-LHB
1000Base-LX	M-LX
1000Base-LH	M-LH
1000Base-SX	M-SX
1000Base-SX2	M-SX2
1000Base-T	C
100Base-BX	M-FBX
100Base-FX	M-FX
1310-MMF 10GbE	1310-NM

## Port and system status LEDs

FWS devices include an LED display panel on the front panel with indicators for key system and port indications to simplify installation and network troubleshooting. The LEDs are shown in Figure 7 and Figure 8, and described in Table 2 and Table 3.

**FIGURE 7** Port status LEDs



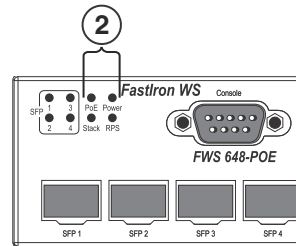
1 Port status LEDs    2 Port status LEDs

**TABLE 2** Port status LEDs

LED	Status	Status
Link or Activity or Speed (1-24/48) SFP(1-4)	On or Flashing Amber	Port has a valid link at 10 or 100 Mbps. Flashing indicates activity.
	On or Flashing Green	Port has a valid link at 1000 Mbps. Flashing indicates activity.
	Off	The link is down.

# 1 Hardware features

**FIGURE 8** System status LEDs



2 System status LEDs

**TABLE 3** System status LEDs

LED	Condition	Status
Power	Green	Internal power is operating normally.
	Amber	Internal power supply fault.
	Off	Power off or failure.
Stack	Off	System stand alone
	Green	System in stacking master mode
	Amber	System in stacking slave mode
RPS	Green	Redundant power supply is providing power.
	Amber	Primary power supply is active, RPS is on standby.
	Off	Redundant power supply is off or not plugged in.
POE	Green	POE module is operating normally.
	Amber	POE module fault.
	Off	POE module not present.

## Power supplies

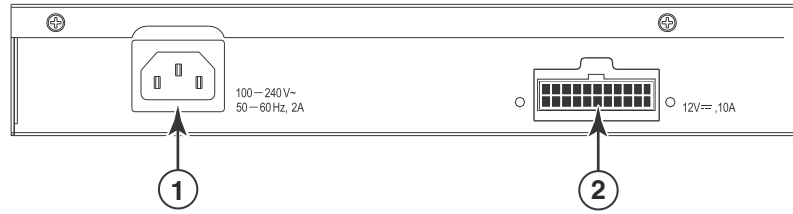
### *Optional redundant power supply*

FWS devices support an optional redundant power supply (RPS), that can provide power to the switch in the event the internal power supply fails.

### *Power supply receptacles*

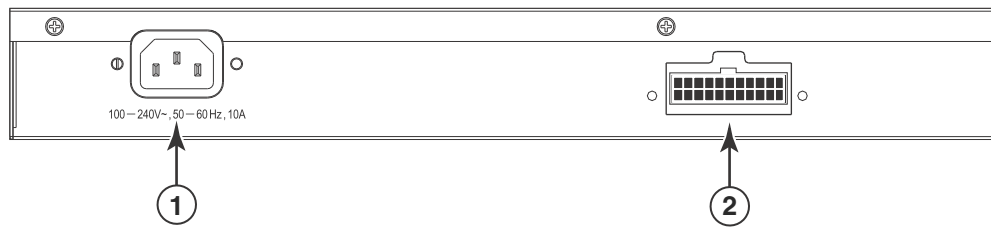
There are two power receptacles on the rear panel of each switch. The standard power receptacle is for the AC power cord. The receptacle labeled “RPS” is for the optional redundant power supply cord.

**FIGURE 9 Power supply receptacles**



- 1 Power socket
- 2 Redundant power socket

**FIGURE 10 Power supply receptacles (POE Models)**



- 1 Power socket
- 2 Redundant power socket

# 1 Hardware features

# Installing FWS624 and FWS648 Models

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## Unpacking the device

---

**NOTE**

The procedures in this manual are intended for qualified service personnel.

---

---

**NOTE**

Before beginning the installation, refer to the precautions in [“Power precautions”](#) on page 11.

---

This chapter describes how to physically install the FastIron WS.

Information about configuring IP addresses and connecting network devices is located in [Chapter 4, “Connecting Network Devices and Checking Connectivity”](#).

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

### Package contents

The package contents of device are listed below:

- Brocade FastIron WS
- 115V AC power cable (for AC sourced devices)
- Rack mount brackets
- CD-ROM containing software images and the user documentation (including this guide)
- Warranty card
- A straight-through EIA/TIA DB-9 serial cable (F or F). The serial cable can be ordered separately from Brocade Communications Systems Inc.. If you prefer to build your own cable, refer to the pinout information in [“Attaching a PC or terminal”](#) on page 27.

### 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.

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 to manage the system using the Web Management Interface or IronView Network Manager or using the CLI through Telnet.

## Summary of installation tasks

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

**TABLE 4** 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 12
2	Install any required optional modules into the switch.	<a href="#">“Powering on the system”</a> on page 26
3	Install the Brocade device on a desktop, in an equipment rack.	<a href="#">“Installing the device”</a> on page 13
4	Once the device is physically installed, plug the device into a nearby power source that adheres to the regulatory requirements outlined in this manual.	<a href="#">“Powering on the system”</a> on page 26
5	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 27
6	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 27
7	No default password is assigned to the CLI. For additional access security, assign a password.	<a href="#">“Assigning permanent passwords”</a> on page 37
8	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 38
9	Once you power on the device and assign IP addresses, the system is ready to accept network equipment.	<a href="#">“Devices running layer 3 software”</a> on page 40
10	Test IP connectivity to other devices by pinging them and tracing routes.	<a href="#">“Testing connectivity”</a> on page 45
11	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>
12	Secure access to the device.	<i>FastIron Configuration Guide</i>

## 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 40° C (104° F).



### CAUTION

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



### CAUTION

Never leave tools inside the device.

## 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

*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.

## 2 Preparing the installation site



### CAUTION

To avoid high voltage shock, do not open the device while the power is on.



### 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.



### DANGER

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



### 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 at 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. Switches can be mounted in a standard 19-inch equipment rack or on a flat surface. Be sure to follow the guidelines below when choosing a location.

The site should:

- Maintain temperatures within 0 to 40 °C (32 to 104 °F) and humidity levels within 5% to 95%, non-condensing.
- Allow a minimum of 3in. of space between the sides and the back of the device and walls or other obstructions for proper air flow.

- Allow at least 3in. of space at the front and back of the device for the twisted-pair, fiber-optic, and power cabling.
- Be accessible for installing, cabling and maintaining the devices.
- Allow the status LEDs to be clearly visible.
- Allow for twisted-pair cable to be always routed away from power lines, fluorescent lighting fixtures and other sources of electrical interference, such as radios and transmitters.
- Allow for the unit to be connected to a separate grounded power outlet that provides 110 to 240 VAC, 50 to 60 Hz, is within 2 m (6.6 feet) of each device and is powered from an independent circuit breaker. As with any equipment, a filter or surge suppressor is recommended.

## Installing the device

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



### **DANGER**

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

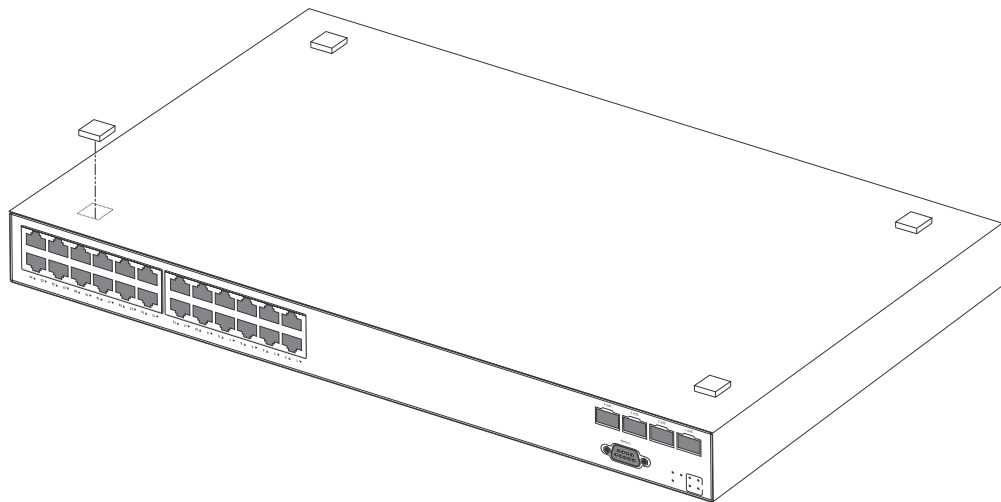


### **DANGER**

*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.*

## Desktop installation

**FIGURE 11** Attaching the adhesive feet



## 2 Preparing the installation site

1. Attach the four adhesive feet to the bottom of the first switch.
2. Set the device on a flat desktop, table, or shelf near an AC power source. Make sure that adequate ventilation is provided for the system. A 3-inch clearance is recommended on each side.
3. If installing a single switch only, go to [“Powering on the system”](#) on page 26.
4. If installing multiple switches, attach the adhesive feet to each one. Place each device squarely on top of the one below, in any order.
5. If also installing an RPS, place it close to the device.

## Rack mount installation

---

### NOTE

You need a #2 Phillips screwdriver for installation.

---

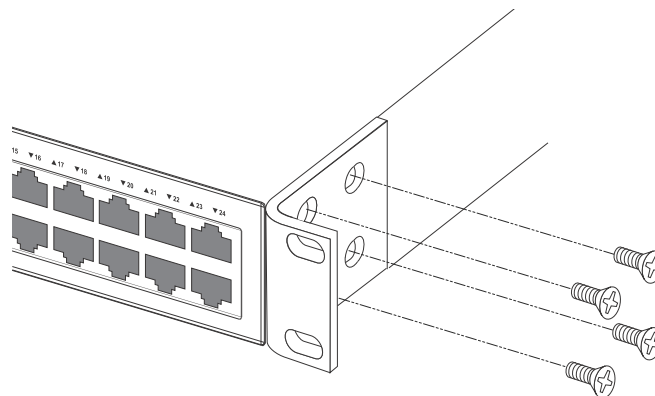
Before mounting the switch in a rack, pay particular attention to the following factors:

- **Temperature:** Since the temperature within a rack assembly may be higher than the ambient room temperature, check that the rack-environment temperature is within the specified operating temperature range. (Refer to [“Operating environment”](#) on page 55.)
- **Mechanical loading:** Do not place any equipment on top of a rack-mounted unit.
- **Circuit overloading:** Be sure that the supply circuit to the rack assembly is not overloaded.
- **Grounding:** Rack-mounted equipment should be properly grounded. Particular attention should be given to supply connections other than direct connections to the mains.

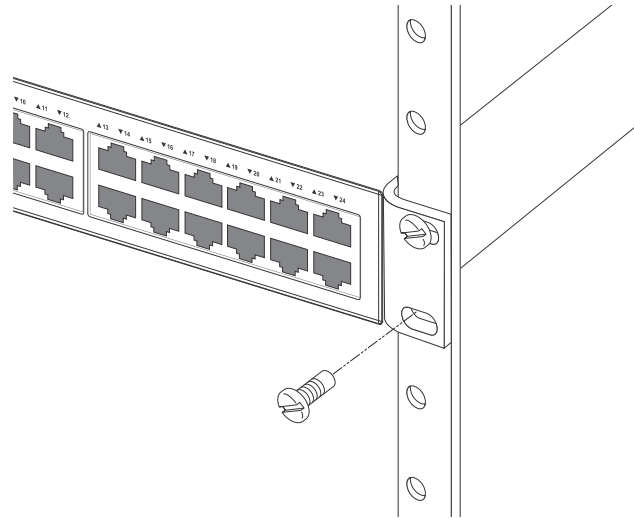
To mount devices in rack follow the steps given below.

1. Remove the rack mount kit from the shipping carton. The kit contains two L-shaped mounting brackets and mounting screws.
2. Attach the mounting brackets to the sides of the device as illustrated in [Figure 12](#).

**FIGURE 12** Attaching the brackets



3. Attach the device in the rack as illustrated in [Figure 13](#).

**FIGURE 13** Installing the device in a rack

4. If installing a single switch only, proceed to [“Powering on the system”](#) on page 26.
5. If installing multiple switches, mount them in the rack, one below the other, in any order.
6. If also installing an RPS, mount it in the rack below the other devices.

## Installing a Redundant Power Supply

### About the RPS2-EIF Redundant Power Supply

#### *Overview*

The Brocade External Redundant Power Supply (RPS2-EIF) can supply a maximum of 150 Watts of output power per port, a total of 600 Watts of backup power to four FastIron WS devices in the event of an AC loss or failure of an internal power supply.

The system operates as a backup to a switch's internal power supply. If an internal power supply fails, the RPS will support the full load of the switch without affecting network operation.

The following devices are supported by the FastIron RPS2-EIF:

- Brocade FastIron WS FWS624
- Brocade FastIron WS FWS648

---

#### **NOTE**

The *Edgelron 24G-POE*, *Edgelron 2402-POE* and *Edgelron 4802-POE* are not supported by neither of the Edgelron RPS units.

---

#### *Features and benefits*

The features and benefits of RPS2-EIF are listed below:

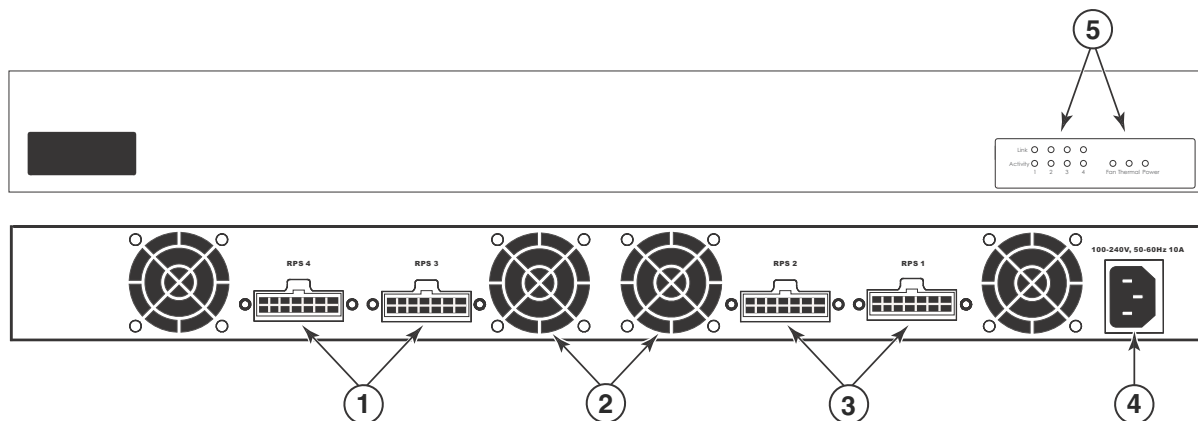
## 2 Installing a Redundant Power Supply

- Supports four FastIron WS devices with 12V DC output
- Status LEDs located on the front panel
- AC line cord can draw power from a different supply circuit
- DC line cord provides backup power to the attached device
- Thermal overload protection prevents the RPS from overheating if a thermal overload occurs.
- Over-voltage protection shuts down an output channel if the voltage exceeds a preset threshold.
- Over-current protection shuts down the RPS if the output load exceeds a preset threshold.
- Short-circuit protection prevents the RPS from being damaged from a short circuit on any output channel.
- The power supply will operate under a no-load condition.

### *Front and rear panels*

Four power indicators and one fan indicator are located on the RPS front panel. The AC supply and DC backup receptacles are located on the RPS rear panel.

**FIGURE 14** Front and rear panels



- |                               |                                     |
|-------------------------------|-------------------------------------|
| 1 Redundant power sockets 4-3 | 4 Power socket                      |
| 2 Fans                        | 5 Port and system status indicators |
| 3 Redundant power sockets 2-1 |                                     |

### *Package contents*

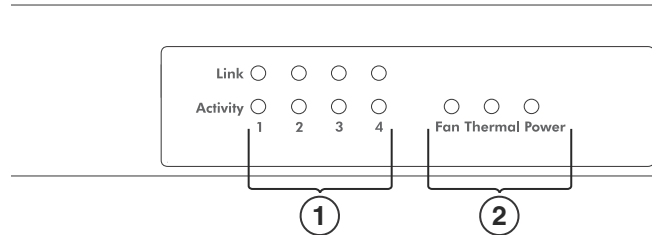
The package contents for RPS2-EIF are listed below:

- Redundant Power Supply Unit (RPS2-EIF)
- One AC Supply Power Cord – US, Continental Europe or UK
- One DC Backup Power Cords with IEC connectors on both ends (length 152 cm each)
- Rack Mounting Kit containing brackets and screws
- Adhesive feet
- User Agreement envelope

- Registration card

## LEDs

The following diagram and tables describe the functions of the RPS2-EIF LEDs.



- 1 Port indicators      2 System indicators

**TABLE 5** Port status LEDs - RPS2-EIF

LED (1~4)	Condition	Status
Link	Off	The port does not have a valid connection to a switch.
	On Yellow	The port has a valid connection to a switch.
	Flashing Yellow	There has been a RPS internal power failure.
Activity	Off	The port is not providing power to the connected switch.
	Flashing Green	The port has been shut down due to one of the following conditions: <ul style="list-style-type: none"> <li>• The unit has detected an over-current condition.</li> <li>• One or more of the unit's fans have failed.</li> </ul>
	On Green	The port is providing power to a connected switch.

**TABLE 6** System status LEDs - RPS2-EIF

LED	Condition	Status
Power	On Green	AC power is being supplied to the RPS.
	Off	No AC power is being supplied to the RPS.

## About the RPS12 Redundant Power Supply

### Overview

The External Redundant Power Supply (RPS12) can supply backup power to one of four connected switches in the event of an AC loss or failure of an internal power supply. The system supplies the failed switch with up to 120 W for primary 12 VDC power, and up to 780 W of -54 VDC PoE power (for PoE devices connected to the failed switch).

The system operates as a backup to a switch's internal power supply. The RPS monitors the power status for all attached switches and provides power to first unit with a detected power failure. The RPS will support the full load of the switch without affecting network operation. When the RPS is supplying power to a switch, it cannot provide power to other connected switches.

## 2 Installing a Redundant Power Supply

When a connected switch fails, the RPS sends status information to the other connected switches, which then communicate the RPS status to network management software.

The following devices are supported by the FastIron RPS12:

- Brocade FastIron WS FWS624-POE
- Brocade FastIron WS FWS648-POE

**Note:** The *Edgelron 24G-POE*, *Edgelron 2402-POE* and *Edgelron 4802-POE* are not supported by neither of the Edgelron RPS units.

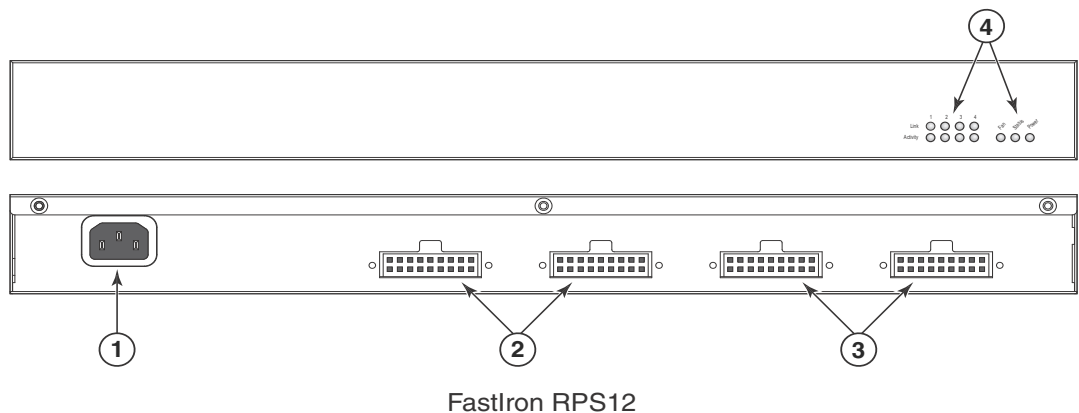
### *Features and Benefits*

- Supports up to four connections to the FastIron WS PoE devices
- Can supply one out of four connected switch with 12V DC primary power and -54V DC PoE power
- Status LEDs located on the front panel
- AC line cord can draw power from a different supply circuit
- DC line cord provides backup power to the attached device
- Thermal overload protection prevents the RPS from overheating if a thermal overload occurs.
- Over-voltage protection shuts down an output channel if the voltage exceeds a preset threshold.
- Over-current protection shuts down the RPS if the output load exceeds a preset threshold.
- Short-circuit protection prevents the RPS from being damaged from a short circuit on any output channel.
- The power supply will operate under a no-load condition.
- Supports hot connection of FastIron WS PoE devices

### *Front and Rear Panels*

Four power indicators and one fan indicator are located on the RPS's front panel. The AC supply and DC backup receptacles are located on the RPS's rear panel.

**FIGURE 15** Front and Rear Panels



- |   |                             |   |                               |
|---|-----------------------------|---|-------------------------------|
| 1 | Power socket                | 2 | Redundant power sockets 4-3   |
| 3 | Redundant power sockets 2-1 | 4 | Power system status indicator |

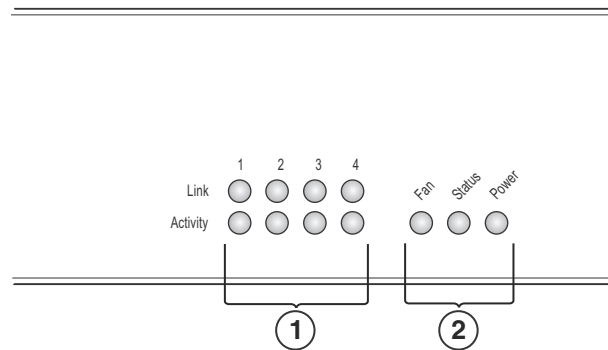
### Package Contents

- Redundant Power Supply Unit (RPS12)
- One AC Supply Power Cord – US, Continental Europe or UK
- Four DC Backup Power Cords with IEC connectors on both ends (length 152 cm each)
- Rack Mounting Kit containing brackets and screws
- Adhesive feet
- User Agreement envelope
- Registration card

### LEDs

The following diagram and tables describe the functions of the RPS12 LEDs.

**FIGURE 16** FastIron RPS 12 LEDs



- |   |                 |   |                   |
|---|-----------------|---|-------------------|
| 1 | Port indicators | 2 | System indicators |
|---|-----------------|---|-------------------|

**TABLE 7** Port Status LEDs - RPS12

LED (1~4)	Condition	Status
Link	Off	The port does not have a valid connection to a switch.
	On Yellow	The port has a valid connection to a switch.
Activity	Off	The port may be connected to a switch, but it is not delivering power to the switch.
	On Green	The port is providing power to a connected switch.

**TABLE 8** System Status LEDs - RPS12

LED	Condition	Status
Power	On Green	AC power is being supplied to the RPS.
	Off	No AC power is being supplied to the RPS.
Status	On Green	The RPS is operating normally.
	On Red	The RPS has detected an abnormal condition.
Fan	On Green	The RPS cooling fan is operating normally.
	On Red	The RPS cooling fan is not operating normally.

### Selecting a site

An RPS may be placed on a desktop or mounted in a rack.



#### **DANGER**

*Do not place an RPS unit on the floor as the case is not waterproof. It is recommended that either of the RPS units be installed in a network equipment rack.*



#### **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.)

RPS2-EIF and RPS12 units can be mounted in a standard 19-inch equipment rack or on a flat surface. Be sure to follow the guidelines below when choosing a location.

The site should:

- Be at the center of all the devices you want to link and near a power outlet.
- Maintain temperatures within 0 to 40 °C (32 to 104 °F) and humidity levels within 5% to 95%, non-condensing.
- Provide adequate space (approximately 5.08 cm (2 inches) on all sides for proper air flow.
- Be accessible for installing, cabling and maintaining the devices.
- Allow the status LEDs to be clearly visible.
- Allow for twisted-pair cable to be always routed away from power lines, fluorescent lighting fixtures and other sources of electrical interference, such as radios and transmitters.
- Provide a separate grounded power outlet that provides 100 to 240 VAC, 50-60 Hz, is within 2.44 m (8 feet) of each device and is powered from an independent circuit breaker. As with any equipment, a filter or surge suppressor is recommended.

## Equipment checklist

After unpacking the FastIron RPS2-EIF or RPS12, check the contents to be sure you have received all the components. (Refer to “[Package contents](#)” on page 16.) Then, before beginning the installation, be sure you have all other necessary installation equipment.

### *Optional rack-mounting equipment*

If you plan to rack-mount the RPS, be sure to have the following equipment available:

- Four mounting screws for each device you plan to install in a rack—these are not included
- A screwdriver (Phillips or flathead, depending on the type of screws used)

## Mounting

FastIron RPS units can be mounted in a standard 19-inch equipment rack or on a desktop or shelf. Mounting instructions for each type of site follow.

### *Rack mounting*

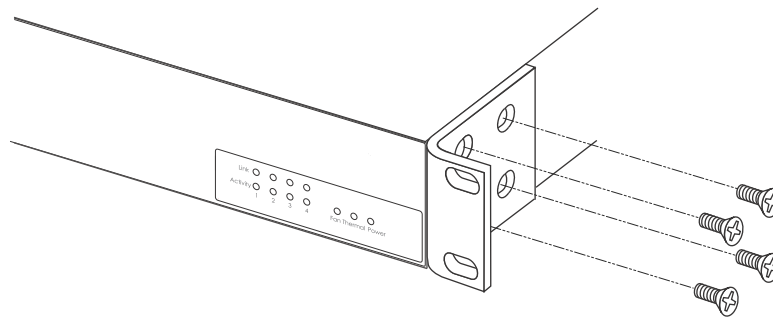
Before mounting the unit in a rack, pay particular attention to the following factors:

- **Temperature:** Since the temperature within a rack assembly may be higher than the ambient room temperature, check that the rack-environment temperature is within the specified operating temperature range.
- **Mechanical loading:** Do not place any equipment on top of a rack-mounted unit.
- **Circuit overloading:** Be sure that the supply circuit to the rack assembly is not overloaded.
- **Grounding:** Rack-mounted equipment should be properly grounded. Particular attention should be given to supply connections other than direct connections to the mains.

To rack-mount devices, follow the steps given below.

1. Attach the brackets to the device using the screws provided in the Bracket Mounting Kit.

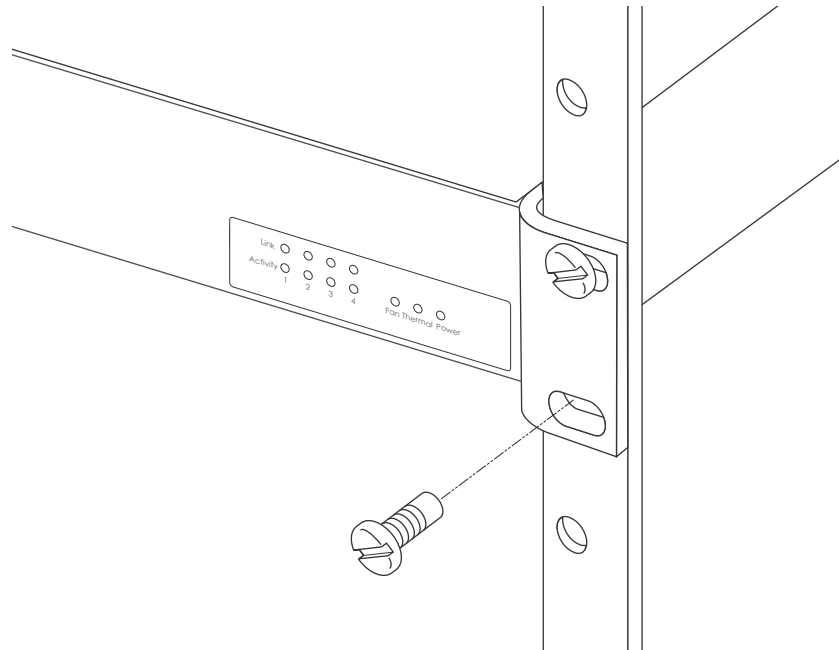
**FIGURE 17** Attaching the brackets



2. Mount the device in the rack, using four rack-mounting screws (not provided).

## 2 Installing a Redundant Power Supply

**FIGURE 18** Installing the RPS in a rack

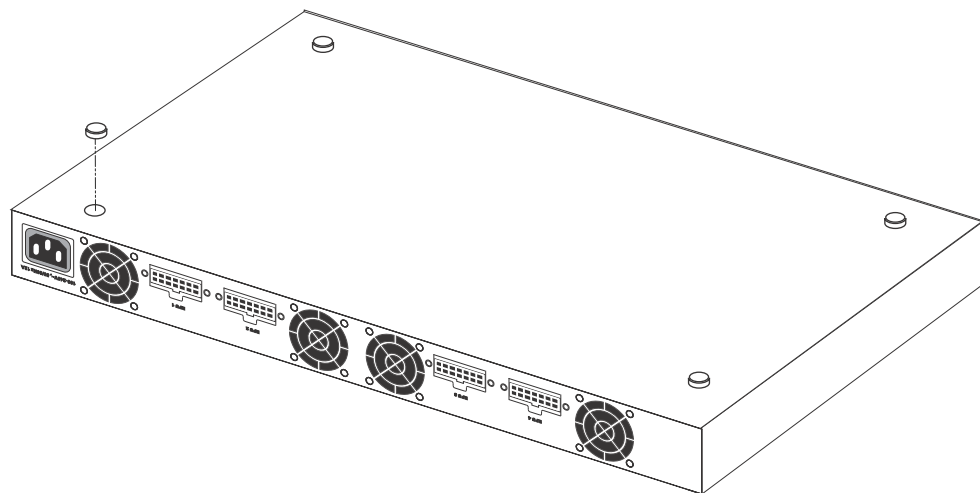


3. If installing multiple RPS units, mount them in the rack, one below the other, in any order.

### *Desktop or shelf mounting*

1. Attach the four adhesive feet to the bottom of the first RPS unit.

**FIGURE 19** Attaching the adhesive feet



2. Set the device on a flat surface near an AC power source, making sure there are at least 5.08 cm (2 inches) of space on all sides for proper air flow.

## Connecting switches to the RPS

The following devices are supported by the FastIron RPS2-EIF: FastIron WS624 and FastIron WS648.

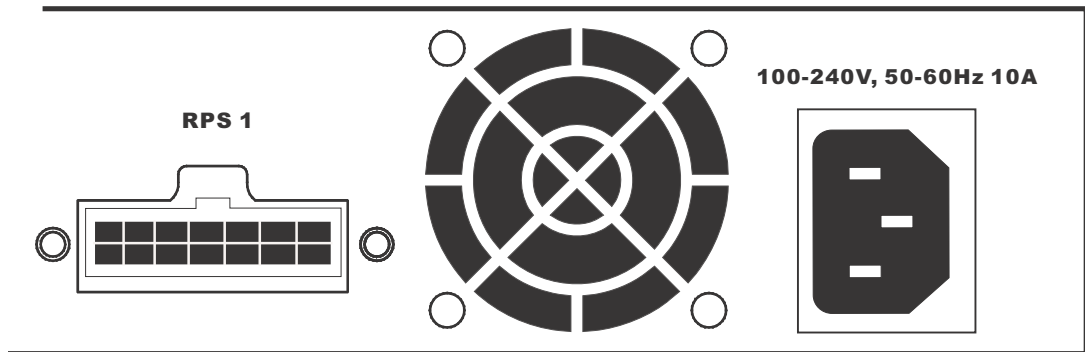
The following devices are supported by the FastIron RPS12:

- Brocade FastIron FWS624-POE
- Brocade FastIron FWS648-POE.

To connect switches to the RPS, follow the steps given below.

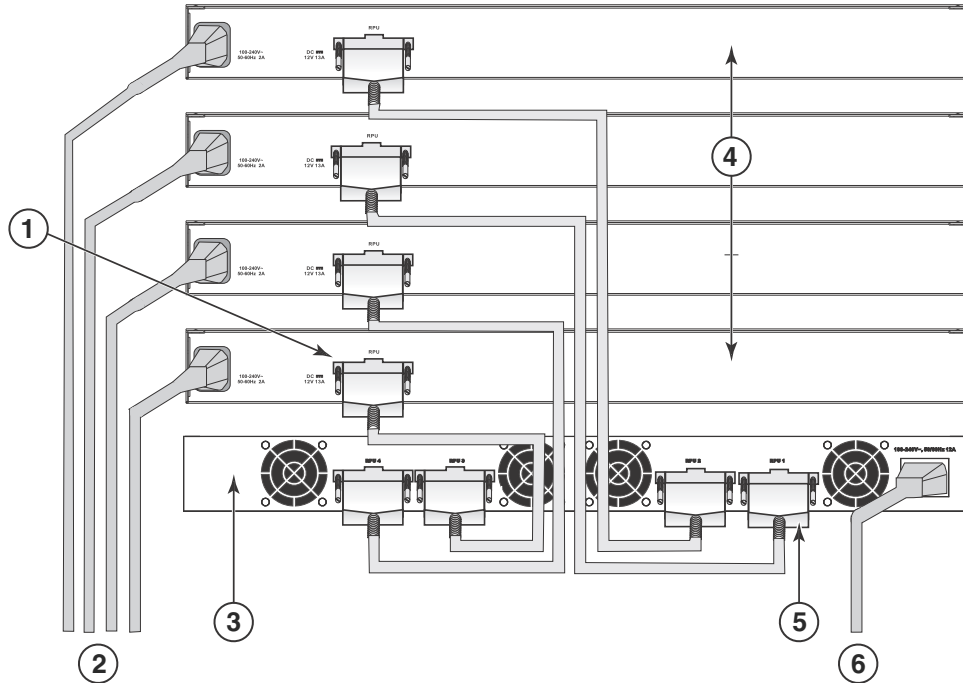
1. Connect one end of the AC cord to the AC receptacle on the supported switches, and the other end to a grounded power outlet.

**FIGURE 20** Power receptacle



2. Connect one end of a DC cord to the redundant power receptacle on the supported switch and the other end to an available receptacle on the RPS.
3. Repeat [step 1](#) and [step 2](#) for connecting up to four supported switches to the RPS.
4. Connect one end of the AC cord to the AC receptacle on the RPS, and the other end to a grounded power outlet.
5. Check the LEDs on the RPS to ensure proper operation. On the RPS2-EIF and RPS12, the Power LED should light up. If the LEDs indicate otherwise, refer to [“Troubleshooting”](#) on page 61 for more information.

## 2 Installing a Redundant Power Supply



- |                        |                        |
|------------------------|------------------------|
| 1 RPS input port       | 4 FWS units            |
| 2 AC power supply no.1 | 5 RPS output port      |
| 3 RPS unit             | 6 AC power supply no.2 |

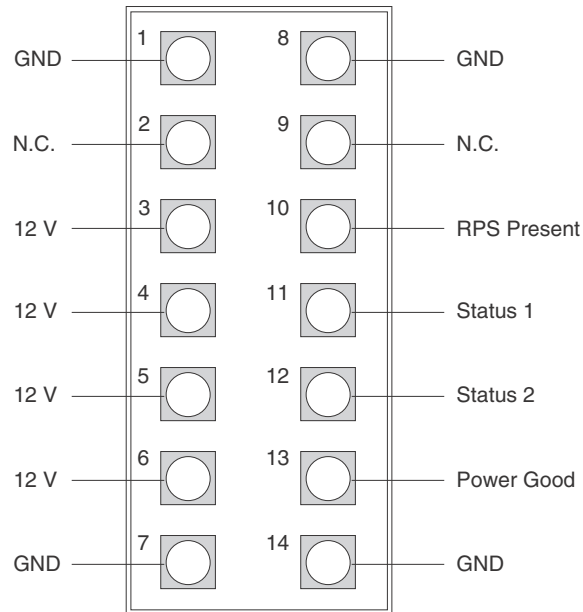
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### NOTE

For International use, you may need to change the AC line cord. You must use a line cord set that has been approved for the receptacle type in your country.

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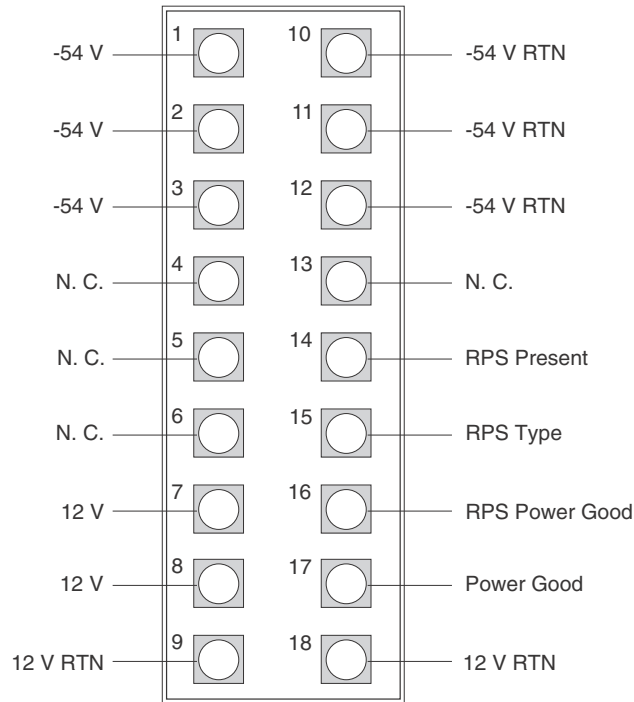
## Ports pin-out (RPS2-EIF)



**TABLE 9** Port pin-outs - RPS2-EIF

Pin	Name	Description
1, 7, 8, 14	GND	Ground connection
2, 9	N.C.	No current
3, 4, 5, 6	12 V	12 volts current
10	RPS Present	Indicates that an RPS unit is attached and functioning
11, 12	Status 1, Status 2	Status indicator
13	Power Good	Indicates that power is being supplied to the RPS

## Ports Pin-Out (RPS12)



**TABLE 10** Port Pin-Outs - RPS12

Pin	Name	Description
1, 2, 3	-54 V	-54 volts connection
4, 5, 6, 13	N.C.	No connection
7, 8	12 V	12 volts connection
9, 18	12 V RTN	12 volts return connection
10, 11, 12	-54 V RTN	-54 volts return connection
14	RPS Present	Indicates that an RPS unit is attached and functioning
15	RPS Type	Indicates either load-sharing or redundant mode
16	RPS Power Good	Indicates that power is being supplied to the RPS
17	Power Good	Connected switch internal power supply status

## Powering on the system

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

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

---

**NOTE**

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

---

---

**NOTE**

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

---

---

**NOTE**

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

---

## Verifying proper operation

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

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.

---

**NOTE**

The devices 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.

---

3. Verify that the LED for the power supply is green.
4. Verify proper operation by observing the LEDs.

All of 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 those that are attached by cables to other devices. If the links on these cables are good and the device has power, the link LEDs will light.

For more details on specific LED conditions after system start-up, refer to the section, “LEDs” on page 17 and [Chapter 6, “Hardware Specifications”](#).

## 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 *FastIron Configuration Guide*.

## 2 Attaching a PC or terminal

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.

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**

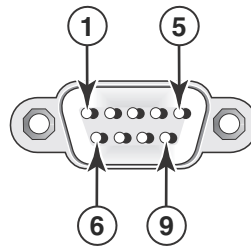
You need to run a terminal emulation program on the PC.

---

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

The EIA/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 21](#).

**FIGURE 21** Serial port (DB-9 DTE) pin-out



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 [Table 11](#).

## Wiring map for serial cable

**TABLE 11** Serial cable wiring

Switch's 9-pin serial port	Null modem	PC's 9-pin DTE port
2 TXD (transmit data)	----->	2 RXD (receive data)

No other pins are used.

**TABLE 11** Serial cable wiring

Switch's 9-pin serial port	Null modem	PC's 9-pin DTE port
3 RXD (receive data)	<-----	3 TXD (transmit data)
5 SGND (signal ground)	<----->	5 SGND (signal ground)
No other pins are used.		

**NOTE**

As indicated in [Table 11](#), some of the wires should not be connected.

## 2 Attaching a PC or terminal

# Edge PREM Upgrade for FastIron WS Series Devices

---

## Upgrade kit contents

These installation instructions describe how to upgrade your FastIron WS device to support Edge Layer 3 software (IronWare software release FGS 04.3.00).

To upgrade your device, you will need to install the Edge PREM upgrade. Refer to [“Upgrade kit contents”](#) on page 31.

If you have any questions about performing this upgrade, please contact your place of purchase or Brocade Communications Systems Inc. (See [“Getting technical help or reporting errors”](#) on page ix.)

<b>DANGER</b>	A danger calls your attention to a possible hazard that can cause injury or death.
<b>GEFAHR</b>	"Gefahr" weist auf eine mögliche Gefährdung hin, die zu Verletzungen oder Tod führen können.
<b>DANGER</b>	Un danger attire votre attention sur un risque possible de blessure ou de décès.
<b>PELIGRO</b>	Una peligro le llama la atención sobre cualquier peligro posible que pueda ocasionar daños personales o la muerte.

<b>DANGER</b>	The procedures in this manual 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 manual se han hecho para personal de servicio cualificado.

Before beginning the upgrade, verify the contents of your upgrade kit. If any items are missing, contact your place of purchase.

The upgrade kit contains the following items:

- Electrostatic Discharge (ESD) protection kit
- Edge Layer 3 EEPROM
- CD with documentation and software
- Installation Instructions

## Upgrading hardware

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

### 3 Upgrading hardware

1. Remove any power cables from the device.

<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.

2. If the device is mounted in an equipment rack, remove it from the rack and place the device in a static-free work area.

---

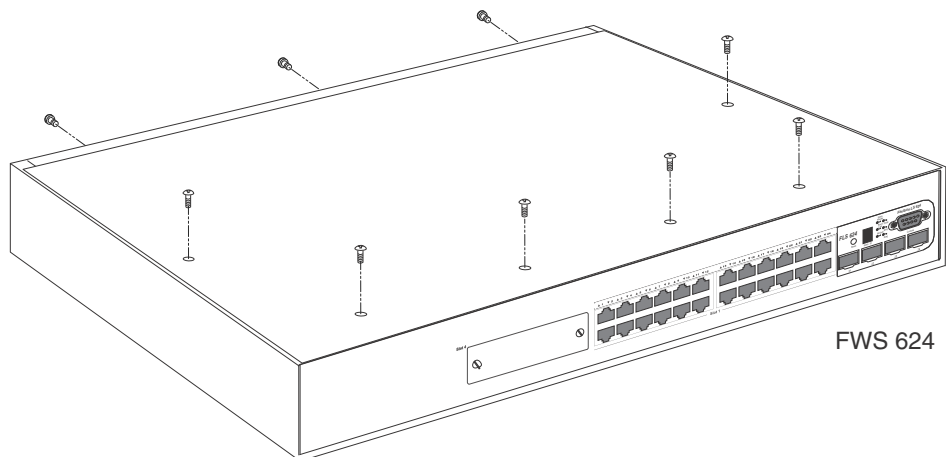
**NOTE**

It is not necessary to remove the rack-mount ears to perform this upgrade.

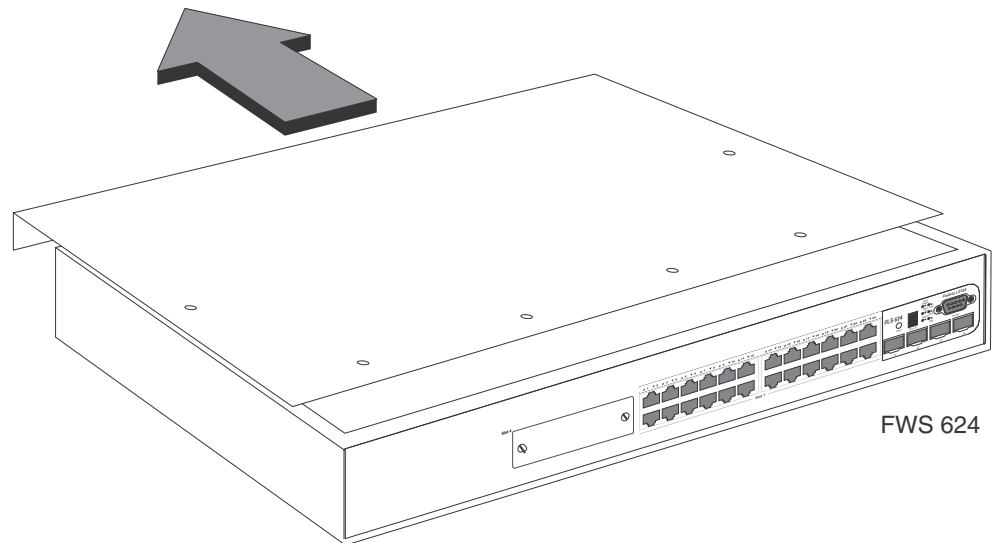
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3. Put on the supplied ESD wrist strap and ground yourself as described in the ESD kit instructions.
4. Disassemble the chassis as follows (refer to [Figure 22](#) on page 32):
  - Use a Phillips-head screwdriver to remove the two screws on the top sides of the cover, four screws from the top front of the cover, and three screws from the back of the cover. Refer to [Figure 22](#).
  - 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.

**FIGURE 22** Removing cover screws on FWS devices.



5. Slide the cover to the rear of the device until the lip on the front of the cover clears the chassis and then lift the cover off as shown in [Figure 23](#).

**FIGURE 23** Removing the cover from FWS devices.

6. Remove the EEPROM from the package and align the lead pins over the EEPROM socket. Refer to [Figure 24](#) on page 34 for the EEPROM socket locations on FWS devices. EEPROM sockets for FWS models are:

- FWS624 devices: socket U15
- FWS648 devices: socket U23

The semicircular indentation on the EEPROM is located on the same end as pin 1.

Align the semicircular indentation on the EEPROM with the semicircular cut-out on the EEPROM socket and gently push the EEPROM into the socket.

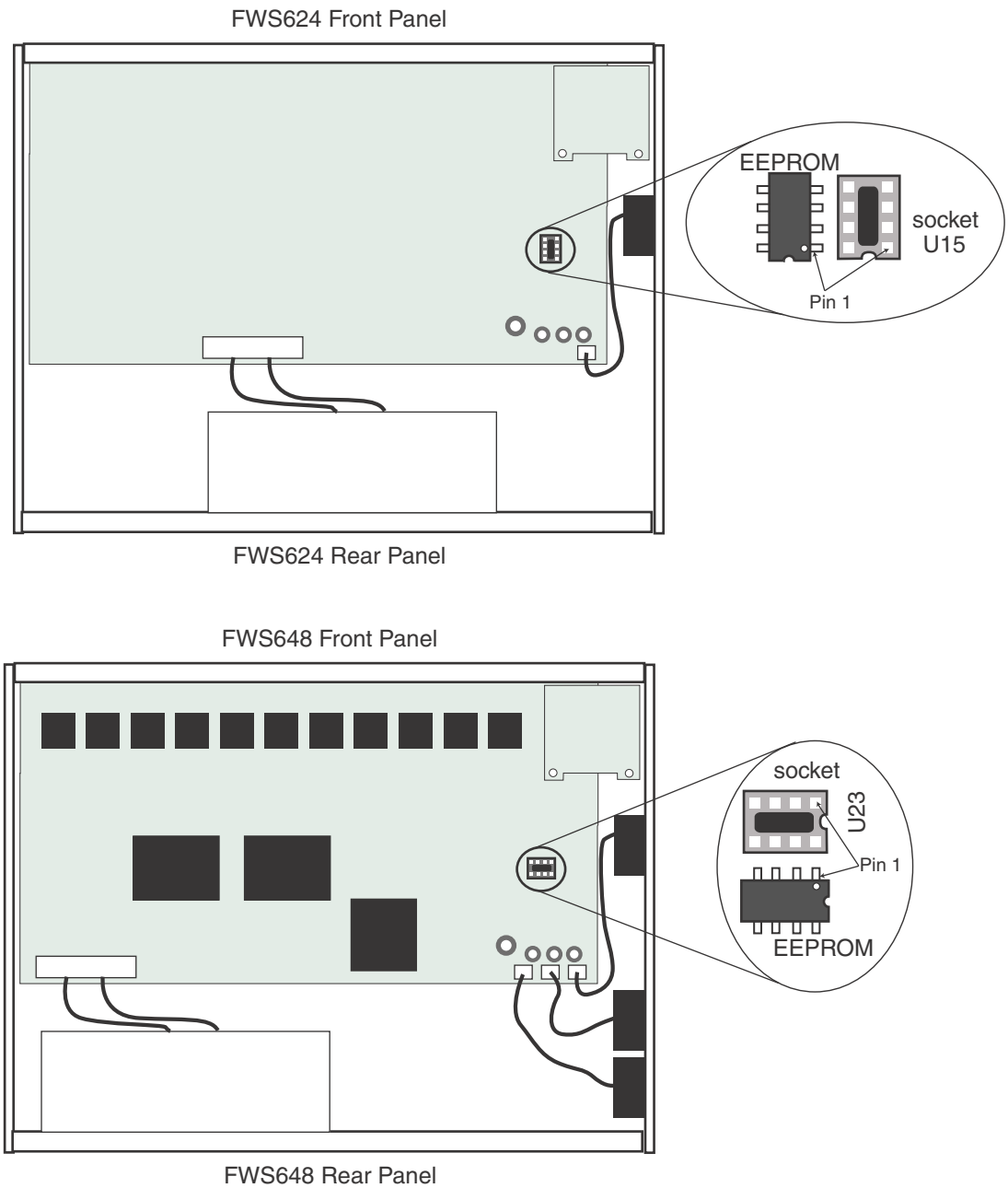
**CAUTION**

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

**CAUTION**

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

**FIGURE 24** EEPROM locations on FWS devices



7. Replace the cover.
  - Hold the cover on each side at the center and slide the front lip of the cover under the front edge of the chassis.
  - Re-insert the cover screws.
8. Reinstall the device in its equipment rack, if applicable.
9. Re-insert any power cables to power on the device.

Your EPREM upgrade is now complete. You will be able to access the EPREM features available in software release FGS 04.3.00. Refer to the *FastIron Configuration Guide* for information about your software.

### 3 Upgrading hardware

# Connecting Network Devices and Checking Connectivity

---

## Assigning permanent passwords

This chapter provides the details for connecting network devices.



### **DANGER**

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

By default, the CLI is not protected by passwords. To secure CLI access, Brocade strongly recommends assigning passwords. Refer to the *FastIron Configuration Guide*.

---

### **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.
- **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.

Set passwords.

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

```
FWSSwitch>enable
```

## 4 Configuring IP addresses

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

```
FWSSwitch# configure terminal
FWSSwitch(config)#
```

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

```
FWSSwitch(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.

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

---

**NOTE**

If you forget your super-user password, refer to [“Recovering from a lost password”](#) on page 38.

---

**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.

---

Recover from 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.

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.

Brocade 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 (example: 255.255.255.0). You can change the display to the prefix format. Refer to the *FastIron Configuration Guide*.

## Devices running layer 2 software

Configure an IP Address on a device running Layer 2 software.

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

```
FWSSwitch> enable
```

2. Enter the following command at the Privileged EXEC level prompt (for example, FWSSwitch#), then press **Enter**. This command erases the factory test configuration if still present:

```
FWSSwitch# 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.

```
FWSSwitch# configure terminal (Privileged EXEC Level)
FWSSwitch(config)# (Global CONFIG Level)
```

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

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

5. Set a default gateway address for the switch.

```
FWSSwitch(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>`

### Devices running layer 3 software

---

**NOTE**

Devices require an EEPROM upgrade to be able to run Edge Layer 3 features.

---

#### *Configuring IP addresses*

You can configure an IP address on the following types of Layer 3 switch interfaces:

- Ethernet port
- Virtual routing interface (also called a Virtual Ethernet or “VE”)
- Loopback interface

By default, you can have up to 24 IP addresses on each interface, but you can increase this number to 128 IP addresses.

---

**NOTE**

Once you configure a virtual routing interface on a VLAN, you cannot configure Base Layer 3 interface parameters on individual ports in the VLAN. Instead, you must configure the parameters on the virtual routing interface itself.

---

Brocade 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 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 bits (ones).

By default, the CLI displays network masks in classical IP address format (example: 255.255.255.0). You can change the display to prefix format.

#### *Assigning an IP address to an Ethernet port*

To assign an IP address to port 0/1/1, enter the following commands.

```
FWSSwitch(config)# interface ethernet 0/1/1
FWSSwitch(config-if-0/1/1)# ip address 192.45.6.1 255.255.255.0
```

---

**NOTE**

You also can enter the IP address and mask in CIDR format, as follows.

```
FWSSwitch(config-if-0/1/1)#ip address 192.45.6.1/24
```

---

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

or

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

### *Assigning an IP address to a loopback interface*

Loopback interfaces are always up, regardless of the states of physical interfaces. You can configure up to eight loopback interfaces.

You can add up to 24 IP addresses to each loopback interface.

To add a loopback interface, enter commands such as those shown in the following example.

```
FWSSwitch(config)# exit
FWSSwitch(config)# int loopback 1
FWSSwitch(config-lbif-1)# ip address 10.0.0.1/24
```

**Syntax:** `interface loopback <num>`

The `<num>` parameter specifies the virtual interface number. You can specify from 1 to the maximum number of virtual interfaces supported on the device. To display the maximum number of virtual interfaces supported on the device, enter the **show default values** command. The maximum is listed in the System Parameters section, in the Current column of the virtual-interface row.

### *Assigning an IP address to a virtual routing interface*

A virtual interface is a logical port associated with a Layer 3 Virtual LAN (VLAN) configured on a Base Layer 3 Switch. You can configure routing parameters on the virtual interface to enable the Layer 3 Switch to route protocol traffic from one Layer 3 VLAN to the other, without using an external router.

This section describes how to configure an IP address on a virtual interface.

---

#### **NOTE**

The switch uses the lowest MAC address on the device (the MAC address of port 1 or 0/1/1) as the MAC address for all ports within all virtual interfaces you configure on the device.

---

To add a virtual interface to a VLAN and configure an IP address on the interface, enter commands such as the following.

```
FWSSwitch(config)# vlan 2 name IP-Subnet_1.1.2.0/24
FWSSwitch(config-vlan-2)# untag 0/1/1 to 0/1/4
FWSSwitch(config-vlan-2)# router-interface ve1
FWSSwitch(config-vlan-2)# interface ve1
FWSSwitch(config-vif-1)# ip address 1.1.2.1/24
```

The first two commands in this example create a Layer 3 protocol-based VLAN name “IP-Subnet\_1.1.2.0/24” and add a range of untagged ports to the VLAN. The **router-interface** command creates virtual interface 1 as the routing interface for the VLAN. The last two commands change to the interface configuration level for the virtual interface and assign an IP address to the interface.

**Syntax:** `router-interface ve <num>`

**Syntax:** `interface ve <num>`

### *Deleting an IP address*

To delete an IP address, enter a command such as the following.

```
FWSSwitch(config-if-0/1/1)# no ip address 1.1.2.1
```

## 4 Configuring IP addresses

This command deletes IP address 1.1.2.1. You do not need to enter the subnet mask.

To delete all IP addresses from an interface, enter the following command.

```
FWSSwitch(config-if-0/1/1)# no ip address *
```

**Syntax:** no ip address <ip-addr> | \*

## Connecting network devices

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

## Connectors

Refer to “[Cable length summary table](#)” on page 59.

For port pinouts, refer to the section “[Pinouts and signalling](#)” on page 57.

## Cable specifications

Refer to “[Cable specifications](#)” on page 58 for cable lengths and types.

## 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 25](#) and [Figure 26](#)). If the hub is equipped with an uplink port, it will require a straight-through cable instead of a crossover cable.

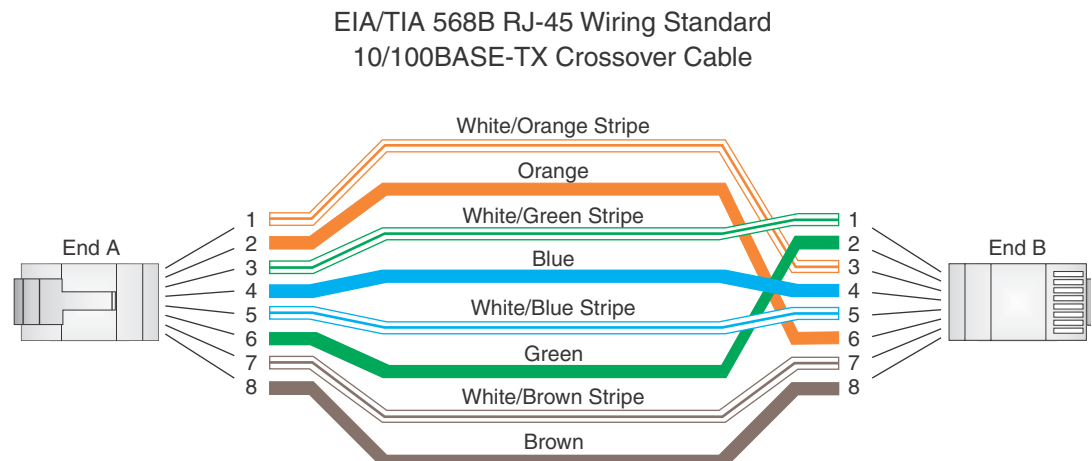
---

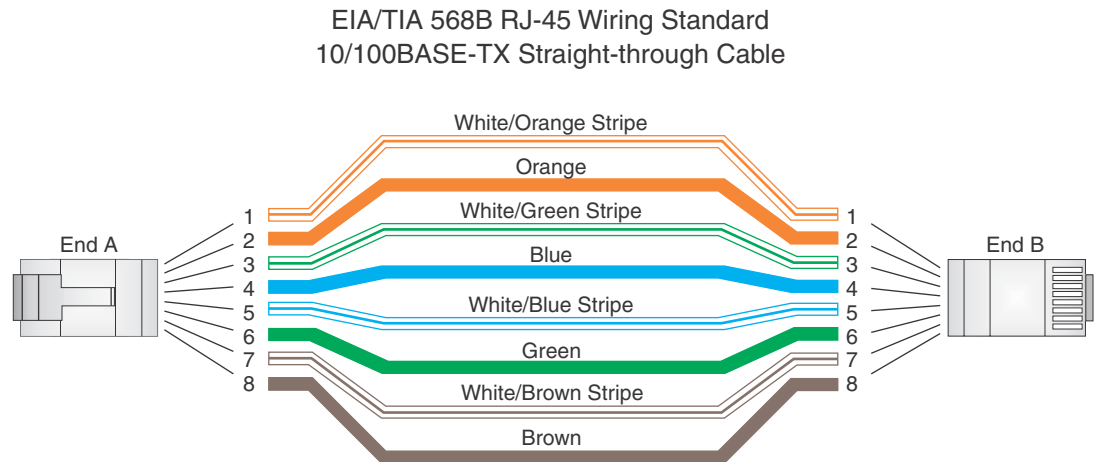
### NOTE

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*.

---

**FIGURE 25** UTP crossover cable



**FIGURE 26** Straight-through cable

## 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 43.

### *Automatic MDI or MDIX detection*

All 10/100 and Gigabit Ethernet Copper ports on the Brocade FastIron WS 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*.

## 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.

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)
- 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) in each SFP slot you want to use.

## 4 Configuring IP addresses

You can install a new fiber optic module in an SFP slot while the FastIron WS CHE1 is powered on and running.

Before installing one of these modules into the slot, have the following on hand.

---

### NOTE

An ESD wrist strap with a plug for connection to a metal surface. For safety reasons, the ESD wrist strap should contain a series 1 meg ohm resistor.

---



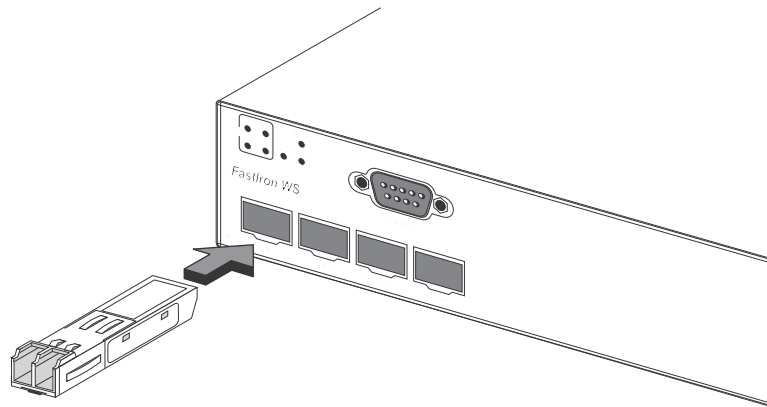
### DANGER

*All fiber optic interfaces use Class 1 lasers.*

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 slot until the module clicks into place. The module is keyed to prevent incorrect insertion.

**FIGURE 27** Installing a fiber optic module



### *Cabling a fiber optic module*

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 45.
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 12](#) on page 46.

### *Cleaning the fiber-optic connectors*

To avoid problems with the connection between the fiber optic module (SFP (mini-GBIC)) 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 WS CHE1. 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 connector, make sure to keep the protective covering on.

## Testing connectivity

You can observe the LEDs related to network connection.

### Pinging an IP address

To verify that a FastIron WS device can reach another device through the network, enter a command such as the following at any level of the CLI on the Brocade device:

```
FWSSwitch>ping 192.33.4.7
```

**Syntax:** ping <ip addr> | <hostname> [source <ip addr>] [count <num>] [timeout <msec>] [ttl <num>] [size <byte>] [quiet] [numeric] [no-fragment] [verify] [data <1-to-4 byte hex>] [brief]

---

**NOTE**

If you send the ping to the IP broadcast address, the device lists the first four responses to the ping.

---

### Observing LEDs

After you install the network cables, you can observe certain LEDs to determine if the network connections are functioning properly. [Table 12](#) 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.

## 4 Testing connectivity

**TABLE 12** Network connection-related LED states

LED	Desired state	Meaning	Abnormal state	Meaning or action
Link (1-24/48) SFP (1-4)	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 45.</li><li>• If the other actions do not resolve the problem, try using a different port or a different cable.</li></ul>
Active (1-24/48) SFP (1-4)	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.

### Tracing a route

To determine the path through which a Brocade device can reach another device, enter a command such as the following at any level of the CLI on the Brocade device.

```
FWSSwitch>traceroute 192.33.4.7
```

**Syntax:** `traceroute <host-ip-addr> [maxttl <value>] [minttl <value>] [numeric] [timeout <value>] [source-ip <ip addr>]`

The CLI displays trace route information for each hop as soon as the information is received. Traceroute requests display all responses to a given TTL. In addition, if there are multiple equal-cost routes to the destination, the Brocade device displays up to two responses by default.

## Troubleshooting network connections

Follow these guidelines when troubleshooting your network connections:

- 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 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.
- 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.
- If the other procedures do not resolve the problem, try using a different port or a different cable.

### Using Virtual Cable Testing to diagnose a cable

FastIron WS devices support Virtual Cable Test (VCT) technology. VCT technology enables you to diagnose a conductor (wire or cable) by sending a pulsed signal into the conductor, then examining the reflection of that pulse. This method of cable analysis is referred to as Time Domain Reflectometry (TDR). By examining the reflection, the Brocade device can detect and report cable statistics such as local and remote link pair, cable length, and link status.

#### *Configuration notes*

Refer to these configuration notes when troubleshooting network connections:

- This feature is supported on copper ports only. It is not supported on fiber ports.
- The port to which the cable is connected must be enabled when you issue the command to diagnose the cable. If the port is disabled, the command is rejected.
- If the port is operating at 100 Mbps half-duplex, the TDR test on one pair will fail.
- If the remote pair is set to forced 100 Mbps, any change in MDI or MDIX may cause the device to interpret the Multilevel Threshold-3 (MLT-3) as a reflected pulse, in which case, the device will report a faulty condition. In this case, Brocade recommends that you run the TDR test a few times for accurate results.

#### *Command syntax*

To diagnose a cable using TDR, enter a command such as the following at the Privileged EXEC level of the CLI.

```
FWSSwitch#phy cable-diag tdr 0/1/1
```

The above command diagnoses the cable attached to port 0/1/1.

**Syntax:** `phy cable-diag tdr <port-num>`

## Viewing the results of the cable analysis

To display the results of the cable analysis, enter a command such as the following at the Privileged EXEC level of the CLI.

```
FWSSwitch#show cable-diag tdr 0/1/1
Port      Speed Local pair Pair Length Remote pair Pair status
-----
0/1/1     1000M Pair A    <50M      Pair B    Terminated
          Pair B    <50M      Pair A    Terminated
          Pair C    <50M      Pair D    Terminated
          Pair D    <50M      Pair C    Terminated
```

**Syntax:** `show cable-diag tdr <port-num>`

Table 13 defines the fields shown in the command output.

**TABLE 13** Cable statistics

This line...	Displays...
Port	The port that was tested.
Speed	The port's current line speed.
Local pair	The local link name.
Pair Length	The cable length when terminated, or the distance to the point of fault when the line is not up.
Remote pair	The remote link name.
Pair status	The status of the link. This field displays one of the following: <ul style="list-style-type: none"> <li>Terminated: The link is up.</li> <li>Shorted: A short is detected in the cable.</li> <li>Open: An opening is detected in the cable.</li> <li>ImpedMis: The impedance is mismatched.</li> <li>Failed: The TDR test failed.</li> </ul>

## Digital Optical Monitoring

You can configure your FWS to monitor optical transceivers in the system, either globally or by specified port. When this feature is enabled, the system monitors 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 SFP manufacturer's recommended thresholds. For more information about digital optical monitoring, refer to the *FastIron Configuration Guide*

# Managing the FastIron WS Hardware

---

## Managing FastIron WS temperature settings

This chapter provides instructions for managing the device.



### **DANGER**

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

This section describes how to display temperature settings on the device and how to change the temperature warning and shutdown levels.

### *Using the temperature sensor on the device*

The device comes with three built-in temperature sensors. The temperature sensors cause the device to generate a Syslog message and SNMP trap if the temperature exceeds a specified warning level or shutdown level. If the device's temperature exceeds the safe threshold (shutdown level), the device will reboot.

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 consecutive polls of the temperature by the software, the software will reboot the device to prevent damage.

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

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

### *Displaying the temperature on the FastIron WS*

By default, the software polls the temperature sensor every 60 seconds to get the current temperature. 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 a device, enter the following command at any level of the CLI.

## 5 Managing FastIron WS temperature settings

```
FWS648G Router# show chassis
  chassis                Power supply/fan/temperature
FWS648G Router# show chassis
Power supply 1 (NA - AC - Regular) present, status ok Power supply 2 not present

Fan 1 ok, speed (auto): [[1]]<->2<->3
Fan 2 ok, speed (auto): [[1]]<->2<->3

Fan controlled temperature: 50.5 deg-C

Fan speed switching temperature thresholds:
      Speed 1: NM<----->53                deg-C
      Speed 2:      37<----->55            deg-C
      Speed 3:      50<-----> 90 deg-C (shutdown)

Sensor B Temperature Readings:
  Current temperature : 50.5 deg-C
  Warning level.....: 55.0 deg-C
  Shutdown level.....: 90.0 deg-C
Sensor A Temperature Readings:
  Current temperature : 42.0 deg-C
Boot Prom MAC: 001b.ed7e.7040 Management
MAC: 001b.ed7e.7040 FWS648G Router#tempera
  temperature          temperature sensor commands
FWS648G Router#temperature war
  warning              Temperature at which the module sends a warning
FWS648G Router#temperature warning 40
FWS648G Router#
!!! Temperature is over warning level !!!

SYSLOG: <9>Jan  1 00:00:00 FWS648G Router System: Temperature 50.0 C degrees,
warning level 40.0 C degrees, shutdown level 90.0 C degrees

SYSLOG: <12>Jan  1 00:00:00 FWS648G Router System: Temperature is over warning
level

FWS648G Router#temper
  temperature          temperature sensor commands
FWS648G Router# temperature shut 45
```

**Syntax: show chassis**

### *Displaying Syslog messages for temperature on the FastIron WS*

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 to the documentation for the server or receiver.

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

```
FWS 624 Router#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 40.0 C degrees, warning level 35.0 C degrees, shutdown level 45.0 C
degrees
```

### ***Changing the temperature warning and shutdown levels***

The default warning temperatures and the default shutdown temperatures for the device shown below.

For all models.

- Warning temperature is 85°C (measured on mainboard)
- Shutdown temperature is 90°C (measured on mainboard)

---

#### **NOTE**

These temperatures reflect the temperature of the board inside the device.

---

To change the temperature at which the device sends a warning, enter a command such as the following at the Privileged EXEC level of the CLI.

```
FWS 624 Router#temperature warning 47
```

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

The <value> can be 0 – 125.

To change the shutdown temperature, enter a command such as the following at Privileged EXEC level of the CLI.

```
FWS 624 Router#temperature shutdown 57
```

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

The <value> can be 0 – 125.

### ***Changing the shutdown temperature threshold***

The default warning temperature is 45.0°C. You can change the warning temperature using the following command. The valid range is 0 – 125°C.

The FastIron WS devices will automatically reset and reload the software when the internal temperature reaches or exceeds the configured shutdown level for five minutes. This release also adds the capability for the system to register negative temperature settings.

## 5 Managing FastIron WS temperature settings

To change the temperature at which the device sends a warning, enter a command such as the following at the Privileged EXEC level of the CLI.

```
FWS 624 Router#temperature warning 47
```

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

The <value> can be 0 – 125.

### *Changing the temperature polling interval*

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

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

```
FWS 624 Router(config)#chassis poll-time 200
```

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

The <value> can be 0 – 65535.

## Removing MAC address entries

You can remove the following learned MAC address entries from the system MAC address table:

- All MAC address entries
- 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>`

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.

## Displaying CPU usage

You can display the amount of the CHE1 CPU in use. To do so, enter the following command at any level of the CLI.

```
FWS 624 Router#show cpu
31 percent busy, from 3248 sec ago
1  sec avg: 10 percent busy
5  sec avg: 10 percent busy
60 sec avg: 10 percent busy
300 sec avg: 10 percent busy
```

**Syntax:** `show cpu`

## Hardware maintenance schedule

The device 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 replace the following hardware components as needed:

- Copper and fiber optic modules (SFPs (mini-GBICs))

## Replacing a fiber optic module

You can remove an SFP from a slot and replace it with a new one while the FWS624 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) from a slot while the 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 device.



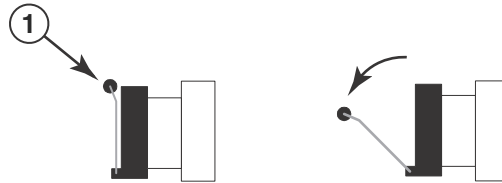
#### **DANGER**

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

## 5 Cabling a fiber optic module

Remove a fiber optic module from an SFP slot.

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. 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

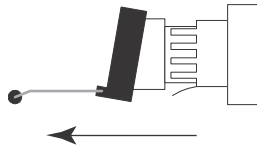
---

**NOTE**

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

---

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



5. Store the fiber optic module in a safe, static-free place or in an anti-static bag.
6. 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

For instruction on installing a fiber optic module refer to [“Installing a fiber optic module”](#) on page 43.

## Cabling a fiber optic module

For instruction on cabling a fiber optic module refer to [“Cabling a fiber optic module”](#) on page 44.

## Cleaning the fiber-optic connectors

For instruction on cleaning a fiber optic module refer to [“Cleaning the fiber-optic connectors”](#) on page 45.

# Hardware Specifications

## Hardware specifications for FastIron WS models

This chapter contains hardware specifications for the Brocade Communications Systems Inc. FastIron WS.

### Physical dimensions and weight

Table 14 lists the physical dimensions and weight for the FastIron WS family of switches.

**TABLE 14** Physical dimensions and weight of the FWS624, FWS624G

Platform	Height	Width	Depth	Weight
FWS624, FWS624G	4.34 cm 1.7 in	44 cm 17.32 in	35 cm 13.78 in	• 4.1 kg (9 lbs )

**TABLE 15** Physical dimensions and weight of the FWS648, FWS648G

Platform	Height	Width	Depth	Weight
FWS648, FWS648G	4.34 cm 1.7 in	44 cm 17.32 in	35 cm 13.78 in	• 4.5 kg (10.8 lbs)

**TABLE 16** Physical dimensions and weight of the FWS624-PoE, FWS624G-PoE

Platform	Height	Width	Depth	Weight
FWS624-PoE, FWS624G-PoE	4.34 cm 1.7 in	44 cm 17.32 in	35 cm 13.78 in	• 4.9 kg (10.8 lbs)

**TABLE 17** Physical dimensions and weight of the FWS648-PoE, FWS648G-PoE

Platform	Height	Width	Depth	Weight
FWS648-PoE, FWS648G-PoE	4.34 cm 1.7 in	44 cm 17.32 in	35 cm 13.78 in	• 5.3 kg (11.7 lbs)

### Environmental considerations

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

#### *Operating environment*

Table 18 provides the operating environment specifications for the FastIron WS.

**TABLE 18** Operating environment

Operating temperature	Relative humidity	Operating altitude
0° - 40° C (32° - 104° F)	40° C (5 to 95%, @ 104.9°F), non-condensing	0 - 2000 meters (0 - 6,600 ft)

- Maximum BTUs:
  - FWS624 and FWS648: 100 watts (340 BTU/Hr) per power supply

### Storage environment

Table 19 provides the storage environment specifications for the FastIron WS.

**TABLE 19** Storage environment

Storage temperature	Storage humidity	Storage altitude
-40° to 70° C, -40° to 158° F	95% maximum, non-condensing	3,000 meter (10,000 feet) maximum

### Cooling system and fans

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 right side of the device to the left side of the device:

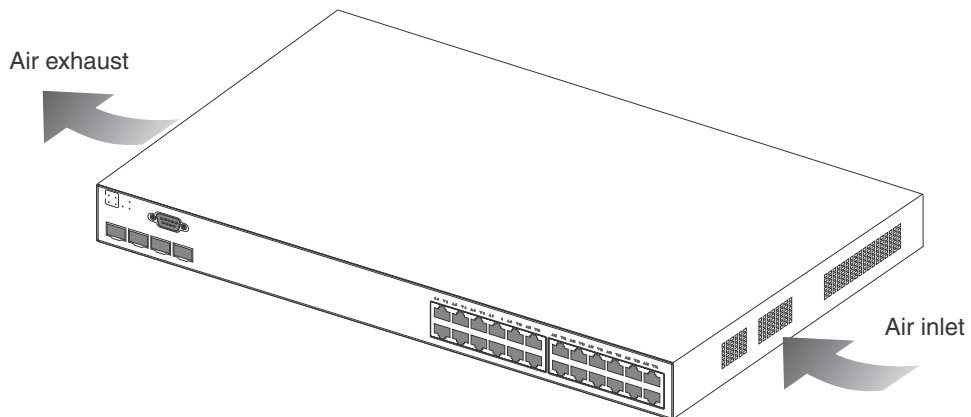
- Total cooling capacity: 80 to 100 watts
- Total air flow: 200 LFM
- Operating noise: < 50 dB-A (non-POE models)
- Operating noise: < 55 dB-A (POE models)

**NOTE**

Operating noise is based on the ISO 7779 standard.

The following figure shows the airflow.

**FIGURE 28** FastIron WS FWS624 airflow



For a complete list of Regulatory Compliances refer to “Russia” on page 64

## Mean Time Between Failure

Table 20 provides the initial MTBF result for the FastIron WS (including the Power Supply Unit).

**TABLE 20** Mean time between failure specifications

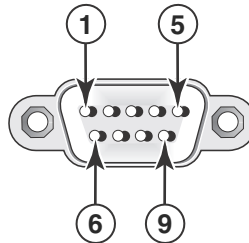
Platform	Temperature	System MTBF
FWS624, FWS624G	25° C (76.9° F)	370,521 hours
	50° C (122° F)	124,237 hours
FWS648, FWS648G	25° C (76.9° F)	276,651 hours
	50° C (122° F)	114,969 hours
FWS624-PoE, FWS624G-PoE	25° C (76.9° F)	92,567 hours
	50° C (122° F)	52,156 hours
FWS648-PoE, FWS648G-PoE	25° C (76.9° F)	88,513 hours
	50° C (122° F)	49,745 hours

## Pinouts and signalling

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 the following figure



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 FastIron WS and a PC or terminal are shown in [Figure 29](#).

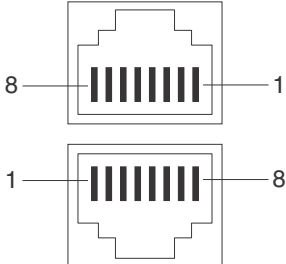
#### **NOTE**

As indicated in [Figure 29](#) and [Figure 30](#), 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 29** 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		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	

**FIGURE 30** 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 21 lists the cable specifications for the cables used with the 10/100 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 21** Cable length summary table

	<b>Cable type</b>	<b>Connector type</b>	<b>Core diameter (microns)</b>	<b>Modal bandwidth (MHz*km) or wavelength (nm)</b>	<b>Range (meters)</b>
1000Base-BX-D	Single-mode Fiber (SMF)	LC connector for SFP module	9	1490 nm	2 – 10000 (10km)
1000Base-BX-U	SMF	LC connector for SFP module	9	1310 nm	2 – 10000 (10km)
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	62.5/125	200	.5 – 275
	MMF		62.5/125	500	.5 – 550
	MMF		50/125	900	.5 – 595
	MMF		50/125	1500	.5 – 740
	MMF		50/125	2000	.5 – 860
1000Base-SX 2	MMF	LC connector for SFP module	62.5	500	up to 2000 (2 km)
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 100Base-BX-D	SMF	LC connector for SFP module	9	1310/1490	10000 (10 km)
100Base-FX	MMF	LC connector for SFP module	62.5	500	up to 2000 (2 km)
100Base-FX-IR	MMF	SC	62.5	125	2 km (1.24 miles)
100Base-FX-LR	SMF	SC	9	125	20 km (12.43 miles)
100Base-TX	Copper	RJ-45 jack for standard unshielded twisted pair (UTP or Category 5)	n/a	n/a	up to 100 meters
10Base-TX	Copper	RJ-45 jack for standard unshielded twisted pair (UTP or Category 5)	n/a	n/a	up to 100 meters

## Power cords

All of the FastIron WS 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.

## AC power supply specifications

The FastIron WS switches include an integrated AC power supply:

- standard IEC type (IEC320) input connector
- operating 90 VAC to 264 VAC input, universal/wide input

### Specifications

**TABLE 22** Specifications for AC power

Property	FWS624, FWS624G	FWS648, FWS648G	FWS624-PoE, FWS624G-PoE	FWS648-PoE, FWS648G-PoE
Input voltage range	100 – 240 VAC	100 – 240 VAC	100 – 240 VAC	100 – 240 VAC
Input current	< 2 Amps	< 2 Amps	< 10 Amps	< 10 Amps
Inrush current	< 60 Amps peak maximum	< 60 Amps peak maximum	< 75 Amps peak maximum	< 75 Amps peak maximum
Power consumption	31 W	63 W	MB: 41 W POE: < 410 W	MB: 73 W POE: < 410 W
Max output power	65 W	100 W	530 W	530 W

## Power specifications for POE

The implementation of the 802.3af standard limits power to 15.4W (44V to 57V) from the power sourcing device. This limit complies with safety standards and existing wiring limitations. Though limited by the 802.3af standard, 15.4 watts of power is ample, as most powered devices consume an average of 5 to 12 watts of power. IP phones, wireless LAN access points, and network surveillance cameras each consume an average of 3.5 to 9 watts of power.

Brocade 48-volt power supplies provide power to the POE daughter card, and ultimately to POE power-consuming devices. The number of POE power-consuming devices that one 48-volt power supply can support depends on the number of watts required by each device. Each 48-volt power supply provides 480 watts of power for POE, and each POE port supports a maximum of 15.4 watts of power per POE power-consuming device. For example, if each POE power-consuming device attached to the FWS consumes 12 watts of power, one 48-volt supply will power up to 40 POE ports.

If your FastIron WS chassis has 48 ports, and each POE-enabled port needs 15.4 watts, then a maximum of 27 ports can supply power to connected devices.

For power supply specifications, refer to [“AC power supply specifications”](#) on page 60. For POE configuration procedures, refer to the *FastIron Configuration Guide*.

# Troubleshooting

## Diagnosing switch indicators

**TABLE 23** Troubleshooting chart

Symptom	Action
Power LED is Off	<ul style="list-style-type: none"> <li>Internal power supply is disconnected.</li> <li>Check connections between the switch, the power cord, and the wall outlet.</li> <li>Contact Technical Support.</li> </ul>
Power LED is Amber	<ul style="list-style-type: none"> <li>Internal power supply has failed. Contact Technical Support.</li> </ul>
Diag LED is Amber	<ul style="list-style-type: none"> <li>The switch's self test has detected a fault.</li> <li>Power cycle the switch to try and clear the condition. If the condition persists, contact Technical Support.</li> </ul>
Link LED is Off	<ul style="list-style-type: none"> <li>Verify that the switch and attached device are powered on.</li> <li>Be sure the cable is plugged into both the switch and corresponding device.</li> <li>Verify that the proper cable type is used and its length does not exceed specified limits.</li> <li>Check the adapter on the attached device and cable connections for possible defects. Replace the defective adapter or cable if necessary.</li> </ul>
(RPS2-EIF and RPS12) Link LED is Off	<ul style="list-style-type: none"> <li>The port does not have a valid connection to the switch.</li> <li>Check connections between the switch, the power cord, and the wall outlet.</li> </ul>
(RPS2-EIF and RPS12) Link LED is Amber	<ul style="list-style-type: none"> <li>Primary power supply is active. RPS is on standby.</li> </ul>
(RPS2-EIF and RPS12) Activity LED is Green	<ul style="list-style-type: none"> <li>Primary power supply is off. RPS is now active</li> </ul>

## Power and cooling problems

If the power indicator does not turn on when the power cord is plugged in, you may have a problem with the power outlet, power cord, or internal power supply. However, if the unit powers off after running for a while, check for loose power connections, power losses or surges at the power outlet, and verify that the fans on the unit are unobstructed and running prior to shutdown. If you still cannot isolate the problem, then the internal power supply may be defective. In this case, contact Technical Support for assistance.

## Installation

Verify that all system components have been properly installed. If one or more components appear to be malfunctioning (such as the power cord or network cabling), test them in an alternate environment where you are sure that all the other components are functioning properly.

### **In-band access**

You can access the management agent in the switch from anywhere within the attached network using Telnet, a Web browser, or other network management software. However, you must first configure the switch with a valid IP address, subnet mask, and default gateway. If you have trouble establishing a link to the management agent, check to see if you have a valid network connection. Then verify that you entered the correct IP address. Also, be sure the port through which you are connecting to the switch has not been disabled. If it has not been disabled, then check the network cabling that runs between your remote location and the switch.

## Regulatory Statements

---

### USA (FCC CFR 47 part 15 warning)

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 manual, 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 (CISPR 22 class A warning)

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)

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。

## A Japan power cord

### 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 power cord



**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

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

## Korea

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" # ОС-2-СПД-0560, validity from the 29 of October 2009 to the 29 of October 2012.

# Regulatory compliance

Table 24 lists the Electromagnetic Compatibility (EMC), Immunity standards, and safety agency approvals for the FastIron family of switches.

**TABLE 24** Regulatory compliance and safety approvals

---

**Certifications**

---

**Emissions:**

- ICES-003, Electromagnetic Emission
- FCC Part 15 Class A
- EN 55022/CISPR 22 Class A
- VCCI Class A
- EN 61000-3-2, Power Line Harmonics
- EN 61000-3-3, Voltage Fluctuation & Flicker
- EN 61000-6-3, Electromagnetic Compatibility, Generic Standard
- AS/NZS CISPR 22, Electromagnetic Compatibility

**Immunity:**

- EN 61000-6-1, Electromagnetic Compatibility, Generic Standard
- EN 55024, Information Technology equipment - Immunity Characteristics

**Safety:**

- BI-NAT CSA 60950-1-03/UL 60950-1
- EN 60950-1:2001
- IEC 60950-1:2001

**RoHS Compliance:**

- Complies with the EU standard 2002/95/EC
-

## A Regulatory compliance

## Caution and Danger Notices

The caution and danger notices that appear in this manual are listed below in English, German, French, and Spanish.

### Cautions

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 manual.

<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 Cautions

<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>	Use the <b>erase startup-config</b> 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 " <b>Erase startup-config</b> " (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 <b>erase startup-config</b> 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 <b>erase startup-config</b> (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>	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.

<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>	Vor dem Installieren einer Stromversorgung im Gerät bzw. vor dem Herausnehmen einer Stromversorgung aus dem Gerät das Netzkabel von der Stromversorgung trennen. Geschieht das nicht, kann dies zur Beschädigung der Stromversorgung bzw. des Geräts führen. (Die Stromversorgung kann im laufenden Gerätebetrieb herausgenommen bzw. installiert werden, sollte dabei aber nicht an einer Stromquelle angeschlossen sein.)
<b>MISE EN GARDE</b>	Débrancher le cordon secteur de l'alimentation avant de le la raccorder à l'équipement ou de le la déconnecter de celui-ci, faute de quoi le circuit d'alimentation de l'équipement pourrait être endommagé. (L'équipement peut fonctionner pendant la dépose ou le remplacement d'une alimentation électrique, mais il est important que celle-ci ne soit pas raccordée au secteur.)
<b>PRECAUCIÓN</b>	Desenchufe el cable eléctrico de una fuente de alimentación antes de proceder a montarla o a desmontarla del dispositivo. En caso contrario, la fuente de alimentación o el dispositivo podrían sufrir daños. (Aunque el dispositivo podrá mantenerse en funcionamiento durante la instalación o desinstalación de la fuente de alimentación, dicha fuente de alimentación no deberá estar conectada a una toma de corriente).

<b>CAUTION</b>	Make sure you insert the EEPROM so that lead pin 1 goes into the correct hole as shown in the appropriate illustrations. If you accidentally insert the EEPROM backwards, the device will not work and may be damaged when you power it on.
<b>VORSICHT</b>	Beim Einsatz des EEPROM darauf achten, dass Anschlussstift 1 gemäß den entsprechenden Abbildungen in das richtige Loch eingeführt wird. Wird das EEPROM aus Versehen verkehrt herum eingesetzt, funktioniert das Gerät nicht und kann beim Einschalten beschädigt werden.
<b>MISE EN GARDE</b>	Veiller à insérer l'EEPROM de façon à placer la broche 1 dans l'orifice correct (voir les illustrations appropriées). En cas d'inversion de l'EEPROM lors de son insertion, l'équipement ne fonctionnera pas et risque d'être endommagé à la mise sous tension.
<b>PRECAUCIÓN</b>	Asegúrese de introducir la EEPROM de modo que el pin 1 del cable quede insertado en el orificio correcto, tal y como se muestra en las ilustraciones correspondientes. Si accidentalmente introdujera la EEPROM al revés, el dispositivo no funcionaría y podría dañarse al encenderlo.

## B Danger

<b>CAUTION</b>	Do not push too hard. If the EEPROM does not readily go into the socket, stop pushing and verify that the lead pins are straight and aligned over the holes. Straighten any crooked pins, then try again.
<b>VORSICHT</b>	Nicht zu fest drücken. Wenn sich das EEPROM nicht leicht einführen lässt, nicht drücken, sondern überprüfen, ob die Anschlussstifte gerade und über den Löchern ausgerichtet sind. Alle nicht gerade ausgerichteten Stifte gerade ausrichten und dann den Vorgang wiederholen.
<b>MISE EN GARDE</b>	Ne pas appuyer excessivement sur l'EEPROM. Si elle ne s'insère pas aisément dans son emplacement, vérifier immédiatement que les broches de guidage sont bien droites et alignées en face des orifices correspondants. Si nécessaire, redresser toute broche tordue avant d'essayer à nouveau.
<b>PRECAUCIÓN</b>	No ejerza demasiada presión. Si la EEPROM no entra fácilmente en la toma, deje de presionar y compruebe que los pines del cable estén rectos y alineados sobre los orificios. Rectifique los pines torcidos e inténtelo de nuevo.

## Danger

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

"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 manual.

<b>DANGER</b>	The procedures in this manual 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 manual se han hecho para personal de servicio cualificado.

<b>DANGER</b>	Before beginning the installation, refer to the precautions in " <a href="#">Power precautions</a> " on page 11.
<b>GEFAHR</b>	Vor der Installation siehe Vorsichtsmaßnahmen unter " Power Precautions " (Vorsichtsmaßnahmen in Bezug auf elektrische Ablagen) auf den Seiten <a href="#">page 11</a> .
<b>DANGER</b>	Avant de commencer l'installation, consultez les précautions décrites dans " Power Precautions " (Précautions quant à l'alimentation), <a href="#">page 11</a> .
<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 <a href="#">page 11</a> .

<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.

<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>	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>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>	Do not place an RPS unit on the floor as the case is not waterproof. It is recommended that either of the RPS units be installed in a network equipment rack
<b>GEFAHR</b>	Eine RPS-Einheit darf NICHT auf den Fußboden gestellt werden, da das Gehäuse nicht wasserdicht ist. Es wird empfohlen, dass RPS-Einheiten in einem Rack für Netzwerkgeräte installiert werden.
<b>DANGER</b>	NE PAS placer une alimentation stabilisée directement sur le sol, car son boîtier n'est pas étanche. Il est recommandé d'installer les unités d'alimentation stabilisée dans un rack.
<b>PELIGRO</b>	NO coloque la unidad RPS en el suelo, pues la carcasa no es impermeable. Se recomienda la instalación de alguna de las unidades RPS en un armazón para equipos de red.