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# QFX3000 Hardware Documentation



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## Documentation and Release Notes

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To obtain the most current version of all Juniper Networks<sup>®</sup> technical documentation, see the product documentation page on the Juniper Networks website at <http://www.juniper.net/techpubs/>.

If the information in the latest release notes differs from the information in the documentation, follow the product Release Notes.

Juniper Networks Books publishes books by Juniper Networks engineers and subject matter experts. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration. The current list can be viewed at <http://www.juniper.net/books>.

## Supported Platforms

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For the features described in this document, the following platforms are supported:

- QFX Series

## Documentation Conventions

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Table 1 on page xxiv defines notice icons used in this guide.

Table 1: Notice Icons

Icon	Meaning	Description
	Informational note	Indicates important features or instructions.
	Caution	Indicates a situation that might result in loss of data or hardware damage.
	Warning	Alerts you to the risk of personal injury or death.
	Laser warning	Alerts you to the risk of personal injury from a laser.

Table 2 on page xxiv defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
<b>Bold text like this</b>	Represents text that you type.	To enter configuration mode, type the <b>configure</b> command:  <code>user@host&gt; configure</code>
Fixed-width text like this	Represents output that appears on the terminal screen.	<code>user@host&gt; show chassis alarms</code> <code>No alarms currently active</code>
<i>Italic text like this</i>	<ul style="list-style-type: none"> <li>Introduces important new terms.</li> <li>Identifies book names.</li> <li>Identifies RFC and Internet draft titles.</li> </ul>	<ul style="list-style-type: none"> <li>A policy <i>term</i> is a named structure that defines match conditions and actions.</li> <li><i>Junos OS System Basics Configuration Guide</i></li> <li>RFC 1997, <i>BGP Communities Attribute</i></li> </ul>
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name:  <code>[edit]</code> <code>root@# set system domain-name <i>domain-name</i></code>
Text like this	Represents names of configuration statements, commands, files, and directories; interface names; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> <li>To configure a stub area, include the <b>stub</b> statement at the <code>[edit protocols ospf area area-id]</code> hierarchy level.</li> <li>The console port is labeled <b>CONSOLE</b>.</li> </ul>
< > (angle brackets)	Enclose optional keywords or variables.	<code>stub &lt;default-metric <i>metric</i>&gt;;</code>

Table 2: Text and Syntax Conventions (*continued*)

Convention	Description	Examples
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	<b>broadcast   multicast</b>  <i>(string1   string2   string3)</i>
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	<b>rsvp { # Required for dynamic MPLS only</b>
[ ] (square brackets)	Enclose a variable for which you can substitute one or more values.	<b>community name members [ community-ids ]</b>
Indentation and braces ( { } )	Identify a level in the configuration hierarchy.	<b>[edit]</b> routing-options { static { route default { nexthop <i>address</i> ; retain; } } }
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
<b>J-Web GUI Conventions</b>		
<b>Bold text like this</b>	Represents J-Web graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> <li>In the Logical Interfaces box, select <b>All Interfaces</b>.</li> <li>To cancel the configuration, click <b>Cancel</b>.</li> </ul>
> (bold right angle bracket)	Separates levels in a hierarchy of J-Web selections.	In the configuration editor hierarchy, select <b>Protocols&gt;Ospf</b> .

## Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can send your comments to [techpubs-comments@juniper.net](mailto:techpubs-comments@juniper.net), or fill out the documentation feedback form at <https://www.juniper.net/cgi-bin/docbugreport/>. If you are using e-mail, be sure to include the following information with your comments:

- Document or topic name
- URL or page number
- Software release version (if applicable)

## Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or JNASC support contract,

or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at <http://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf> .
- Product warranties—For product warranty information, visit <http://www.juniper.net/support/warranty/> .
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

## Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- Find CSC offerings: <http://www.juniper.net/customers/support/>
- Search for known bugs: <http://www2.juniper.net/kb/>
- Find product documentation: <http://www.juniper.net/techpubs/>
- Find solutions and answer questions using our Knowledge Base: <http://kb.juniper.net/>
- Download the latest versions of software and review release notes: <http://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <https://www.juniper.net/alerts/>
- Join and participate in the Juniper Networks Community Forum: <http://www.juniper.net/company/communities/>
- Open a case online in the CSC Case Management tool: <http://www.juniper.net/cm/>

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: <https://tools.juniper.net/SerialNumberEntitlementSearch/>

## Opening a Case with JTAC

You can open a case with JTAC on the Web or by telephone.

- Use the Case Management tool in the CSC at <http://www.juniper.net/cm/> .
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, see <http://www.juniper.net/support/requesting-support.html> .

## PART 1

# Overview

- [QFX3000 QFabric Switch Overview on page 3](#)
- [QFX3100 Overview on page 21](#)
- [QFX3008-I Overview on page 33](#)
- [QFX3500 Overview on page 59](#)



## CHAPTER 1

# QFX3000 QFabric Switch Overview

- [QFabric System Overview on page 3](#)
- [Understanding the QFabric System Hardware Architecture on page 7](#)
- [Understanding QFX3000-G QFabric System Hardware Configurations on page 10](#)
- [Understanding the Director Group on page 11](#)
- [Understanding Routing Engines in the QFabric System on page 12](#)
- [Understanding Interconnect Devices on page 14](#)
- [Understanding Node Devices on page 17](#)
- [Understanding Node Groups on page 19](#)

## QFabric System Overview

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The architecture of legacy data centers contrasts significantly with the revolutionary Juniper Networks data center solution.

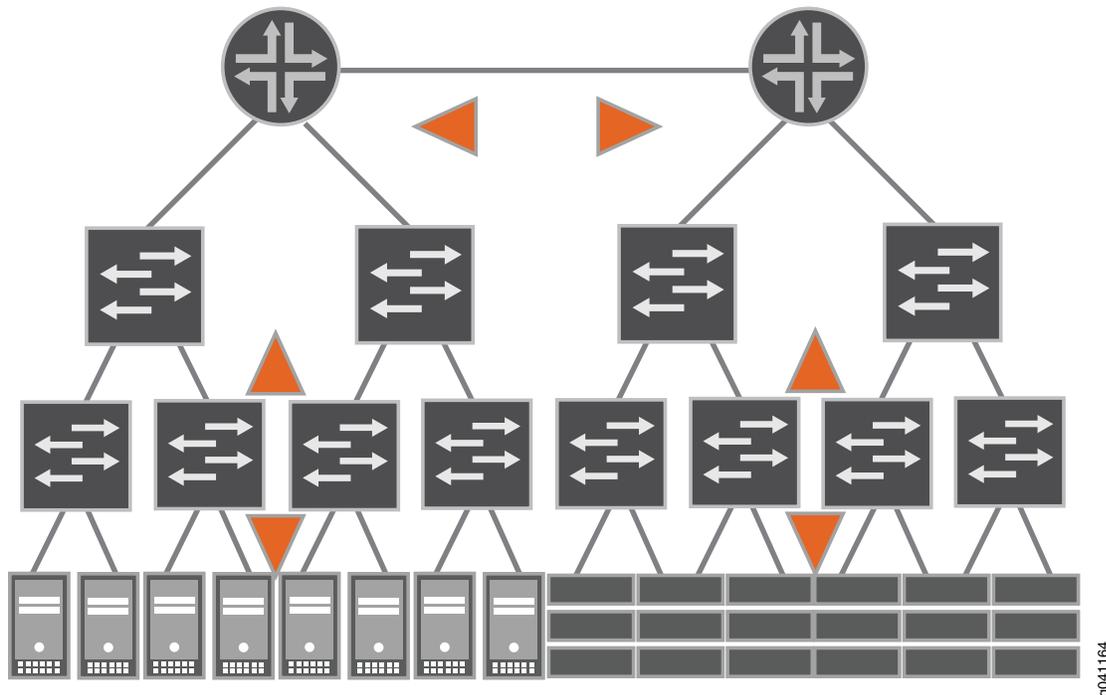
This topic covers:

- [Legacy Data Center Architecture on page 3](#)
- [QFX Series QFabric System Architecture on page 5](#)

## Legacy Data Center Architecture

Service providers and companies that support data centers are familiar with legacy multi-tiered architectures, as seen in [Figure 1 on page 4](#).

Figure 1: Legacy Data Center Architecture



The *access layer* connects servers and other devices to a Layer 2 switch and provides an entry point into the data center. Several access switches are in turn connected to intermediate Layer 2 switches at the *aggregation layer* (sometimes referred to as the *distribution layer*) to consolidate traffic. A *core layer* interconnects the aggregation layer switches. Finally, the core switches are connected to Layer 3 routers in the *routing layer* to send the aggregated data center traffic to other data centers or a wide-area network (WAN), receive external traffic destined for the data center, and interconnect different Layer 2 broadcast domains within the data center.

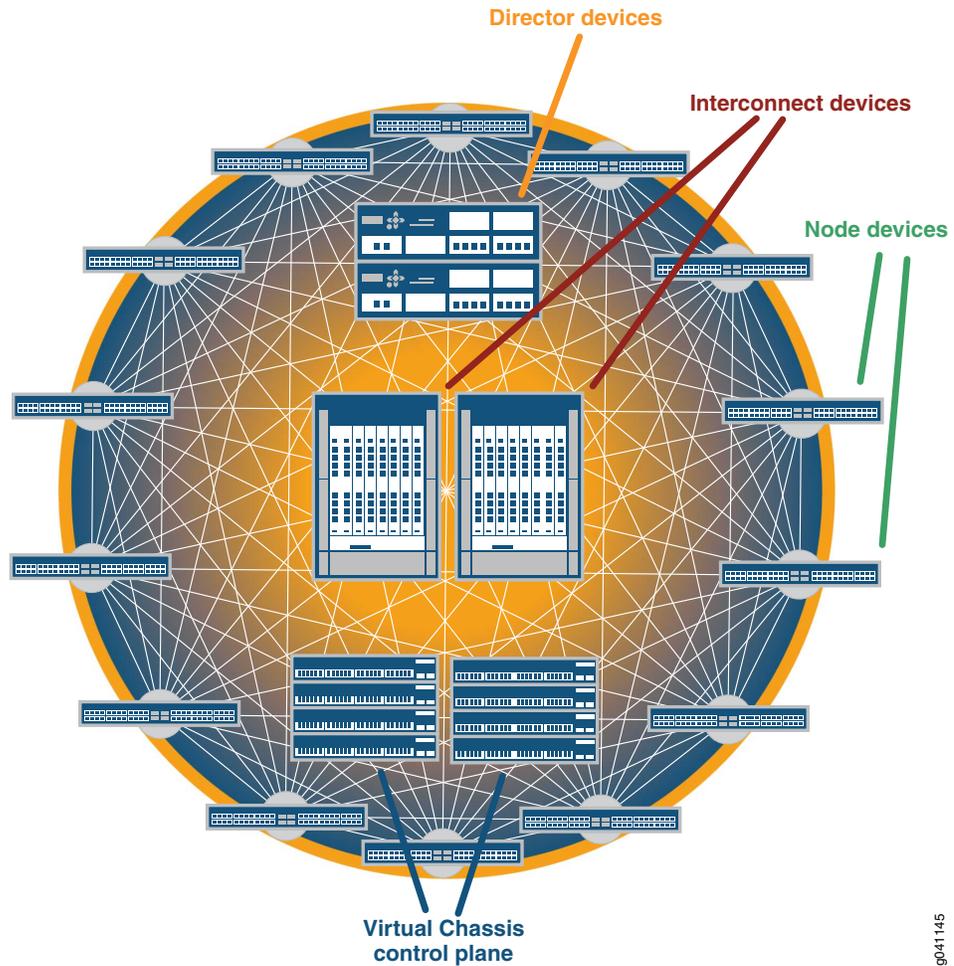
The problems that exist with the multi-tier data center architecture include:

- Limited scalability—The demands for electrical power, cooling, cabling, rack space, and port density increase exponentially as the traditional data center expands, which prohibits growth after minimal thresholds are met.
- Inefficient resource usage—Up to 50 percent of switch ports in a legacy data center are used to interconnect different tiers rather than support server and storage connections. In addition, traffic that ideally should move horizontally between servers within a data center often must also be sent vertically up through the tiers to reach a router and down through the tiers to reach the required destination server.
- Increased latency—By requiring the devices at each tier level to perform multiple iterations of packet and frame processing, the data plane traffic takes significantly longer to reach its destination than if the sending and receiving devices were directly connected. This processing overhead results in potentially poor performance for time-sensitive applications, such as voice, video, or financial transactions.

## QFX Series QFabric System Architecture

In contrast to legacy multi-tiered data center architectures, the Juniper Networks QFX Series QFabric System architecture provides a simplified networking environment that solves the most challenging issues faced by data center operators. A fabric is a set of devices that act in concert to behave as a single switch. It is a highly scalable, distributed, Layer 2 and Layer 3 networking environment that provides a high-performance, low-latency, and unified interconnect solution for next-generation data centers as seen in Figure 2 on page 5.

Figure 2: QFX Series QFabric System Architecture



A QFabric system collapses the traditional multi-tier data center model into a single tier where all access layer devices (known in the QFabric system model as *Node devices*) are essentially directly connected to all other access layer devices across a very large scale fabric backplane (known in the QFabric system model as the *Interconnect device*). Such an architecture enables the consolidation of data center endpoints (such as servers, storage devices, memory, appliances, and routers) and provides better scaling and network virtualization capabilities than traditional data centers.

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Essentially, a QFabric system can be viewed as a single, nonblocking, low-latency switch that supports thousands of 10-Gigabit Ethernet ports or 2-Gbps, 4-Gbps, or 8-Gbps Fibre Channel ports to interconnect servers, storage, and the Internet across a high-speed, high-performance fabric. The entire QFabric system is managed as a single entity through a *Director group*, containing redundant hardware and software components that can be expanded and scaled as the QFabric system grows in size. In addition, the Director group automatically senses when devices are added or removed from the QFabric system and dynamically adjusts the amount of processing resources required to support the system. Such intelligence helps the QFabric system use the minimum amount of power to run the system efficiently, but not waste energy on unused components.

As a result of the QFabric system architecture, data center operators are now realizing the benefits of this next-generation architecture, including:

- **Low latency**—Because of its inherent advantages in this area, the QFabric system provides an excellent foundation for mission-critical applications such as financial transactions and stock trades, as well as time-sensitive applications such as voice and video.
- **Enhanced scalability**—The QFabric system can be managed as a single entity and provides support for thousands of data center devices. As Internet traffic continues to grow exponentially with the increase in high-quality video transmissions and rise in the number of mobile devices used worldwide, the QFabric system can keep pace with the demands for bandwidth, applications, and services offered by the data center.
- **Virtualization-enabled**—The QFabric system was designed to work seamlessly with virtual servers, virtual appliances, and other virtual devices, allowing for even greater scalability, expandability, and rapid deployment of new services than ever before. Migrating to virtual devices also results in significant costs savings, fueled by reduced space requirements, decreased needs for power and cooling, and increased processing capabilities.
- **Simplicity**—Although the QFabric system can scale to hundreds of devices and thousands of ports, you can still manage the QFabric system as a single system.
- **Flexibility**—You can deploy the QFabric system as an entire system or in stages.
- **Convergence**—Because the congestion-free fabric is lossless, all traffic in a QFabric system can be converged onto a single network. As a result, the QFabric system supports Ethernet, Fibre Channel over Ethernet, and native Fibre Channel packets and frames.

Flat, nonblocking, and lossless, the network fabric offered by the QFabric system has the scale and flexibility to meet the needs of small, medium, and large-sized data centers for years to come.

**Related Documentation**

- Understanding QFabric Switch Terminology
- [Understanding the QFabric System Hardware Architecture on page 7](#)
- Understanding the QFabric Switch Software Architecture

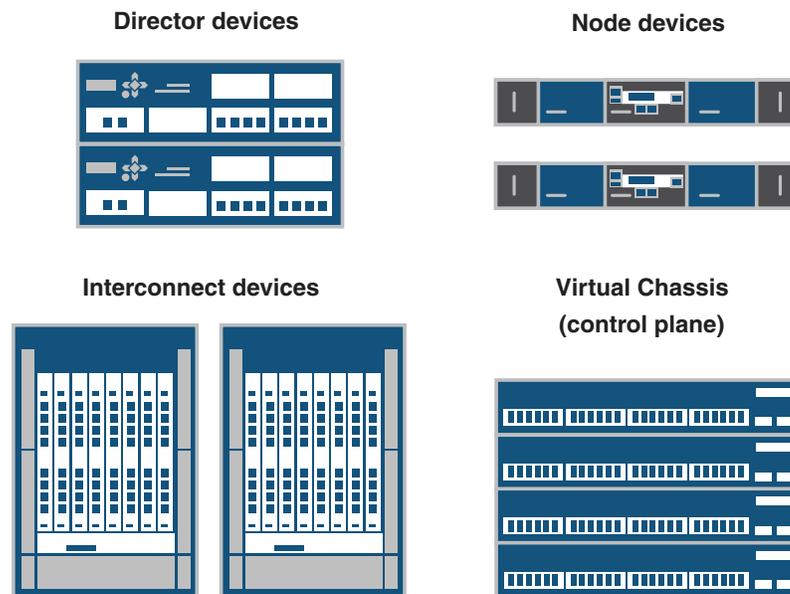
## Understanding the QFabric System Hardware Architecture

- [QFabric System Hardware Architecture Overview on page 7](#)
- [QFabric System Features on page 9](#)

### QFabric System Hardware Architecture Overview

The QFabric system is a single layer networking tier that connects servers and storage devices to one another across a high-speed, unified core fabric. You can view the QFabric system as a single, extremely large, nonblocking, high-performance Layer 2 and Layer 3 switching system. The reason you can consider the QFabric system as a single system is that the Director software running on the Director group allows the main QFabric system administrator to access and configure every device and port in the QFabric system from a single location. Although you configure the system as a single entity, the fabric contains four major hardware components. The hardware components can be chassis-based, group-based, or a hybrid of the two. As a result, it is important to understand the four types of generic QFabric system components and their functions, regardless of which hardware environment you decide to implement. A representation of these components is shown in [Figure 3 on page 7](#).

Figure 3: QFabric System Hardware Architecture



The four major QFabric system components include the following:

- **Director group**—The *Director group* is a management platform that establishes, monitors, and maintains all components in the QFabric system. It is a set of Director devices that run the Junos operating system (Junos OS) on top of a CentOS foundation. The Director group handles tasks such as QFabric system network topology discovery, Node and Interconnect device configuration and startup, and Domain Name System (DNS), Dynamic Host Configuration Protocol (DHCP), and Network File System (NFS) services. The Director group also runs the software for management applications, hosts and load balances internal processes for the QFabric system, and starts additional QFabric system processes as requested.

A Director group must contain a set of enhanced Director devices with hard drives that run dual processes in active and standby mode for maximum redundancy. Enhanced Director devices in the Director group provide full processing services, whereas other Director devices without hard drives provide auxiliary support to the Director group.

- **Node devices**—A *Node device* is a hardware system located on the ingress of the QFabric system that connects to endpoints (such as servers or storage devices) or external networks, and is connected to the heart of the QFabric system through an Interconnect device. A Node device can be used in a manner similar to how a top-of-rack switch is implemented. By default, Node devices connect to servers or storage devices. However, when you group Node devices together to connect to a network that is external to the QFabric system, the formation is known as a *network Node group*.
- **Interconnect devices**—An *Interconnect device* acts as the primary fabric for data plane traffic traversing the QFabric system between Node devices. To reduce latency to a minimum, the Interconnect device implements multistage Clos switching to provide nonblocking interconnections between any of the Node devices in the system.
- **Control plane network**—The *control plane network* is an out-of-band Gigabit Ethernet management network that connects all QFabric system components. For example, you can use a group of EX4200 Ethernet switches configured as a Virtual Chassis to enable the control plane network. The control plane network connects the Director group to the management ports of the Node and Interconnect devices. By keeping the control plane network separate from the data plane, the QFabric system can scale to support thousands of servers and storage devices.

The four major QFabric system components can be assembled from a variety of hardware options. Currently supported hardware configurations are shown in [Table 3 on page 9](#).

Table 3: Supported QFabric System Hardware Configurations

QFabric System Configuration	Director Group	Node Device	Interconnect Device
QFX3000 QFabric system	QFX3100 Director group <ul style="list-style-type: none"> <li>Three interfaces on each enhanced Director device provide Gigabit Ethernet access from the Director group to the management network.</li> <li>Requires an out-of-band Gigabit Ethernet management network that connects all QFabric system devices through a group of EX4200 Ethernet switches configured as a Virtual Chassis. The control plane network connects the Director group to the management ports of the Node and Interconnect devices.</li> </ul>	QFX3500 Node device <ul style="list-style-type: none"> <li>48 10-Gigabit Ethernet ports connect to servers, storage, or external networks. Twelve of these interfaces (0–5, 42–47) can be configured as 2-Gbps, 4-Gbps, or 8-Gbps Fibre Channel over Ethernet ports, and 36 of these interfaces (6–41) can be configured as Gigabit Ethernet ports.</li> <li>Four 40-Gbps quad small form-factor pluggable plus (QSFP+) uplink ports to connect to the data plane network and the QFX3008-I Interconnect Devices.</li> <li>Two interfaces provide Gigabit Ethernet access to the management network.</li> </ul> <p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>There can be only one network Node group (containing a maximum of eight Node devices) to connect the QFabric system to external networks.</li> <li>A redundant server Node group in the QFabric system can contain up to 2 Node devices.</li> <li>There can be a maximum of 128 Node devices in the QFabric system to connect to servers and storage devices.</li> </ul>	QFX3008-I Interconnect Device <ul style="list-style-type: none"> <li>Sixteen to 128 40-Gbps QSFP+ ports per device to interconnect the Node devices to the data plane network across fiber optic cables and a high-speed backplane.</li> <li>Four interfaces (two per Control Board) provide Gigabit Ethernet access to the management network.</li> <li>There can be a maximum of 4 Interconnect devices in the QFabric system.</li> </ul>

To complete the system, external Routing Engines running on the Director group implement QFabric system control plane functions, such as the fabric manager Routing Engines, network Node group Routing Engines, and fabric control Routing Engines. The control plane network Virtual Chassis enables the control plane connections between the Node devices, the Interconnect devices, and the Routing Engines running on the Director group.

## QFabric System Features

A QFabric system provides the following key features:

- Support for up to 128 Node devices and 4 Interconnect devices, which provides a maximum of 6144 10-Gigabit Ethernet ports at 3:1 oversubscription (each Node device, which supports 48 10-Gigabit Ethernet ports, provides up to 160 Gbps of bandwidth into the QFabric system Interconnect backplane).
- Low port-to-port latencies that scale as the system size grows from 48 to 6144 10-Gigabit Ethernet ports.

- Support for up to 384K total ingress queues at each Node device to the QFabric system Interconnect backplane.
- Support for Converged Enhanced Ethernet (CEE) traffic.

**Related Documentation**

- Understanding QFabric Switch Terminology
- Understanding the QFabric Switch Software Architecture
- [Understanding the Director Group on page 11](#)
- [Understanding Routing Engines in the QFabric System on page 12](#)
- [Understanding Interconnect Devices on page 14](#)
- [Understanding Node Devices on page 17](#)
- [Understanding Node Groups on page 19](#)
- Understanding Partitions

## Understanding QFX3000-G QFabric System Hardware Configurations

The QFX3000-G QFabric system is made up of multiple hardware components:

- EX4200 switches—Eight EX4200 switches are required for a QFX3000 QFabric system. The EX4200 switches are divided into two Virtual Chassis configurations with four switches each.
  - Up to 192 Gigabit Ethernet RJ-45 ports on each Virtual Chassis provide control plane and management network interconnection.
  - Four 10-Gigabit Ethernet uplink ports on each Virtual Chassis interconnect the two Virtual Chassis configurations.
- QFX3100 Director devices—Two QFX3100 Director devices are required for a QFX3000 QFabric system. Together, the two Director devices are called a *Director group*.
  - Six Gigabit Ethernet RJ-45 ports on each QFX3100 Director device provide connection to the control plane and management network through the Virtual Chassis.
  - Two Gigabit Ethernet RJ-45 ports on each QFX3100 Director device interconnect two Director devices in a Director group.
  - One Gigabit Ethernet RJ-45 management port on each QFX3100 Director device provides connection to the management network through your out-of-band management network.
- QFX3500 Node devices—Up to 128 QFX3500 Node devices can be connected to the QFX3000 QFabric system.
  - 48 10-Gbps SFP+ ports on each QFX3500 Node device connect to servers, storage, or external networks. Twelve of these ports (0 through 5 and 42 through 47) can be configured as 2-Gbps, 4-Gbps, or 8-Gbps Fibre Channel ports, and 36 of these ports (6 through 41) can be configured as Gigabit Ethernet ports. There are no limitations on which ports can be configured as 10-Gigabit Ethernet ports. However, if you are

using a Fibre Channel transceiver in either ports 0 through 5 or 42 through 47, all of the ports in each group must be configured as Fibre Channel. For example, even if you are using a Fibre Channel transceiver only in port 0, ports 0 through 5 must be configured as Fibre Channel, and cannot be used for 10-Gigabit Ethernet transceivers.



**NOTE:** Up to eight QFX3500 Node devices can be configured as a *network Node group* to connect to external networks. See “[Understanding Node Groups](#)” on page 19.

- Four 40-Gbps quad small form-factor pluggable plus (QSFP+) uplink ports on each QFX3500 Node device connect to the data plane network through the QFX3008-I Interconnect Devices.
- Two Gigabit Ethernet RJ-45 interfaces on each QFX3500 Node device provide connection to the control plane and management network through the Virtual Chassis.
- QFX3008-I Interconnect devices—Two QFX3008-I Interconnect devices are required for a QFX3000-G QFabric system. Up to four QFX3008-I Interconnect devices can be used in a QFX3000-G QFabric system.
  - Up to 128 40-Gbps QSFP+ ports on each QFX3008-I Interconnect device connect the QFX3500 Node devices to the data plane network across fiber-optic cables and a high-speed backplane.
  - Up to eight Gigabit Ethernet SFP+ interfaces (four per Control Board) connect each QFX3008-I Interconnect device to the control plane and management network through the Virtual Chassis.

**Related Documentation**

- [QFX3000-G QFabric System Installation Overview on page 209](#)

## Understanding the Director Group

Because the Director group provides management services for the QFabric system, it is important to understand the components of the cluster and how the Director group supports the needs of the greater fabric.

- [Director Group Components on page 11](#)
- [Director Group Services on page 12](#)

### Director Group Components

When you build a Director group, consider the following elements and concepts.

- **Director device**—A single management device for the QFabric system. There are two varieties of Director devices: ones that contain a hard drive and ones that do not. *Enhanced Director devices* with a hard drive provide full processing services, while Director devices without a hard drive provide auxiliary support. Therefore, use enhanced

Director devices to build the Director group, and supplement the processing power of the Director group by adding Director devices without hard drives to the Director group.

- **Director group**—A set of Director devices. The Director group is an essential element to the QFabric system, which cannot operate properly without it. The Director group shares and load-balances processing tasks for the QFabric system, performs topology discovery, assigns identifiers to QFabric system components, and manages interfabric communication. The primary devices in a Director group are enhanced Director devices that contain hard drives. The enhanced Director devices run dual processes in active or standby mode for maximum redundancy.

When you add additional Director devices to the group, the Director group coordinates their activities and distributes processing loads across all available Director devices. The additional Director devices (either with or without hard drives) provide the Director group with additional memory and processing power. Supplementing the Director group with extra Director devices allows the group to scale efficiently and serve the needs of the entire QFabric system as it grows.

## Director Group Services

The Director group is a management platform that establishes, monitors, and maintains all components in the QFabric system. It is a set of Director devices that run the Junos operating system (Junos OS) on top of a CentOS foundation. The Director group handles tasks such as QFabric system network topology discovery, Node and Interconnect device configuration and startup, and Domain Name System (DNS), Dynamic Host Configuration Protocol (DHCP), and Network File System (NFS) services. The Director group also runs the software for management applications, hosts and load-balances internal processes for the QFabric system, maintains configuration and topology databases, and starts additional QFabric system processes as requested.

Another critical role provided by the Director group is the hosting of the virtual Junos Routing Engines. These Routing Engines provide services for the QFabric system to keep it operating smoothly.

### Related Documentation

- [Configuring the QFabric System Initial Setup on a QFX3100 Director Group on page 287](#)
- [Understanding Routing Engines in the QFabric System on page 12](#)
- [Understanding the QFabric System Hardware Architecture on page 7](#)

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## Understanding Routing Engines in the QFabric System

Routing Engines perform many important processing tasks in the QFabric system. Knowing where the Routing Engines are located and what services they provide, enables you to troubleshoot the QFabric system and ensure that it is running the way it should.

This topic covers:

- [Hardware-Based Routing Engines on page 13](#)
- [Software-Based External Routing Engines on page 13](#)

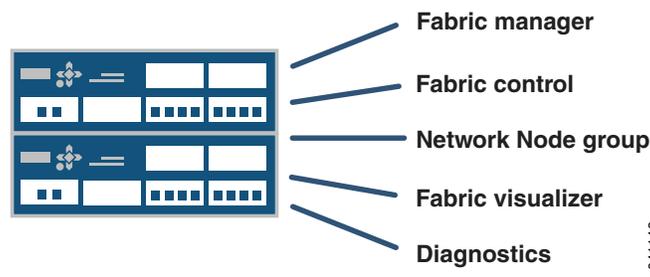
## Hardware-Based Routing Engines

A traditional Juniper Networks Routing Engine is a hardware field-replaceable unit that runs routing protocols, builds the routing and switching tables, sends routing information to the Packet Forwarding Engine, and handles several software processes for the device (such as interface control, chassis component monitoring, system management, and user access). Node devices that are part of server Node groups in the QFabric system that connect to servers or storage devices implement Routing Engine functions locally using this traditional hardware method.

## Software-Based External Routing Engines

The QFabric system also uses external Routing Engines that run in software on the Director group. In contrast with traditional Routing Engines, the functions and processes provided by software-based Routing Engines are segmented, specialized, and distributed across multiple Routing Engine instances running on the Director group. Such separation provides redundancy for these functions and allows the QFabric system to scale. [Figure 4 on page 13](#) shows the external Routing Engine types.

**Figure 4: External Routing Engine Types**



These special-purpose external Routing Engine instances running on the Director group provide the following major services for the QFabric system:

- **Fabric manager Routing Engine**—Provides services to all devices in the QFabric system, such as system initialization, topology discovery, internal IP address and ID assignment, and interdevice communication. The fabric manager Routing Engine authenticates Interconnect and Node devices, and maintains a database for system components. A single fabric manager Routing Engine instance is generated to manage the entire QFabric system.
- **Fabric control Routing Engine**—Runs the fabric control protocol to share route information between available devices in a partition. A pair of redundant route distribution Routing Engine instances are generated for every partition in the QFabric system, and both instances are active.
- **Diagnostics Routing Engine**—Gathers operational information which allows QFabric system administrators to monitor the health of the QFabric system. A single Routing Engine instance is generated for the entire QFabric system.
- **Network Node group Routing Engine**—Provides Routing Engine functionality for groups of Node devices bundled together as a single Layer 3 routing device, which is used to

connect to external networks. A pair of redundant Routing Engine instances are generated for every network Node group in the QFabric system.

- Related Documentation**
- [Understanding the Director Group on page 11](#)
  - [Understanding the QFabric Switch Control Plane](#)
  - [Understanding the QFabric System Hardware Architecture on page 7](#)

## Understanding Interconnect Devices

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Interconnect devices in a QFabric system provide a way for the Node devices to connect with one another over a high-speed backplane. By understanding the role of Interconnect devices, you can harness the benefits of low latency, superb scalability, and minimum packet processing offered by a single-tier data center architecture.

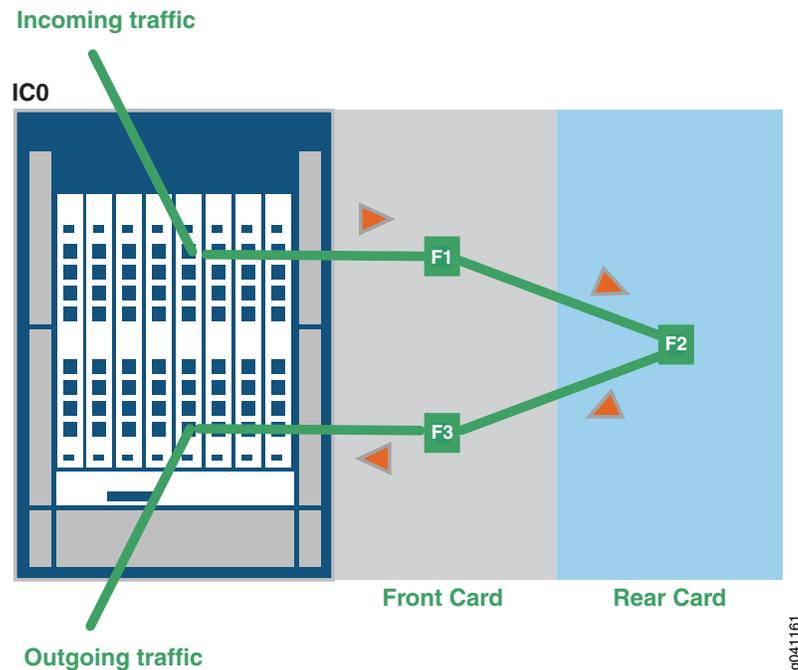
This topic covers:

- [Interconnect Device Introduction on page 14](#)
- [QFX3008-I Interconnect Devices on page 15](#)

### Interconnect Device Introduction

*Interconnect devices* act as the primary fabric for data plane traffic traversing the QFabric system between Node devices. The main task for the Interconnect devices is to transfer traffic between the Node devices as quickly as possible across a high-speed, available path backplane. To reduce latency to a minimum, the Interconnect device implements multistage Clos switching to provide nonblocking connections between any of the Node devices in the system. [Figure 5 on page 15](#) shows an example of how Clos switching works in an Interconnect device.

Figure 5: Clos Switching for Interconnect Devices

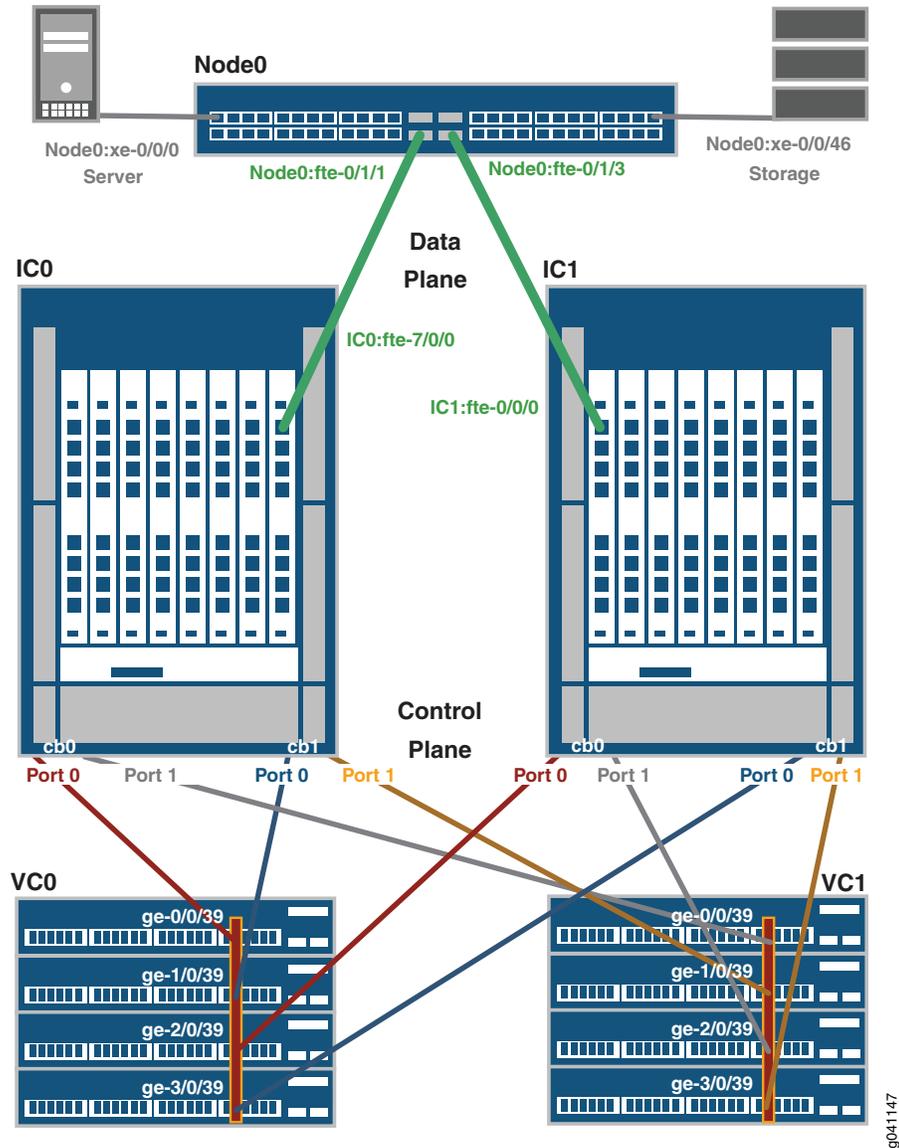


Traffic enters a QSFP+ port from a Node device, and an ingress chipset provides stage F1 processing. For the F2 stage, the frame is sent to a rear card and processed by a midplane chipset. Lastly, an egress chipset on the front card QSFP+ port handles processing tasks for the F3 stage. At each of the three Clos stages, a switching table chooses the best path and determines where to send the frame to reach the next stage. The F1 and F3 stages can be handled by the same front card or different front cards, depending on the best path selected by the fabric. After the frame traverses the Interconnect backplane, the Interconnect device sends the frame to the egress Node device.

### QFX3008-I Interconnect Devices

The QFX3008-I Interconnect device contains eight slots in the front of the chassis. In each slot, you can install a front card containing 16 40-Gbps quad, small-form factor pluggable plus (QSFP+) ports. A fully configured system offers a total capacity of 128 QSFP+ connections. These front card ports attach to the high-speed backplane to reach the eight slots in the rear of the chassis, which provide the heavy-duty interconnections for the entire QFabric system. In addition, four interfaces (two per Control Board) provide Gigabit Ethernet access to the control plane management network. [Figure 6 on page 16](#) shows an example of the data plane and control plane connections for a QFX3008-I Interconnect device.

Figure 6: QFX3008-I Data Plane and Control Plane Connections



**Related Documentation**

- [Understanding Node Devices on page 17](#)
- [Understanding the QFabric Switch Data Plane](#)
- [Understanding the QFabric Switch Control Plane](#)
- [Understanding the QFabric System Hardware Architecture on page 7](#)

## Understanding Node Devices

Node devices in a QFabric system provide a way for servers, storage devices, and external networks to connect to the QFabric system. By understanding the role of Node devices, you can design your QFabric system topology to take advantage of the unique benefits offered by a single-tier data center architecture.

This topic covers:

- [Node Device Introduction on page 17](#)
- [QFX3500 Node Devices on page 17](#)

### Node Device Introduction

A *Node device* in the QFabric system connects either endpoint systems (such as application servers and storage devices) or external networks to Interconnect devices. It can be used similarly to the way a top-of-rack switch is implemented in a data center. Node devices provide an access point to the QFabric system, allowing data to flow into and out of the QFabric system. Because all Node devices in the QFabric system connect through a backplane of Interconnect devices, in essence all Node devices are connected to one another. This directly connected design model eliminates multiple tiers of aggregation and core devices and provides minimum latency, maximum scalability, and rapid transport of server-to-server traffic and QFabric system-to-external network traffic.

Sets of Node devices can be bundled together into *Node groups*, in which each group operates as a single virtual entity. Node groups that connect to servers and storage devices are known as *server Node groups*, and Node groups that connect to external networks are known as *network Node groups*.

### QFX3500 Node Devices

The QFX3500 Node device works as part of a QFX3000 QFabric system. A QFX3500 chassis provides up to 48 10-Gigabit Ethernet interfaces to connect to endpoints or external networks. You can configure 12 of these 48 interfaces to support 2-Gbps, 4-Gbps, or 8-Gbps Fibre Channel. You can also configure the remaining 36 interfaces with Gigabit Ethernet.

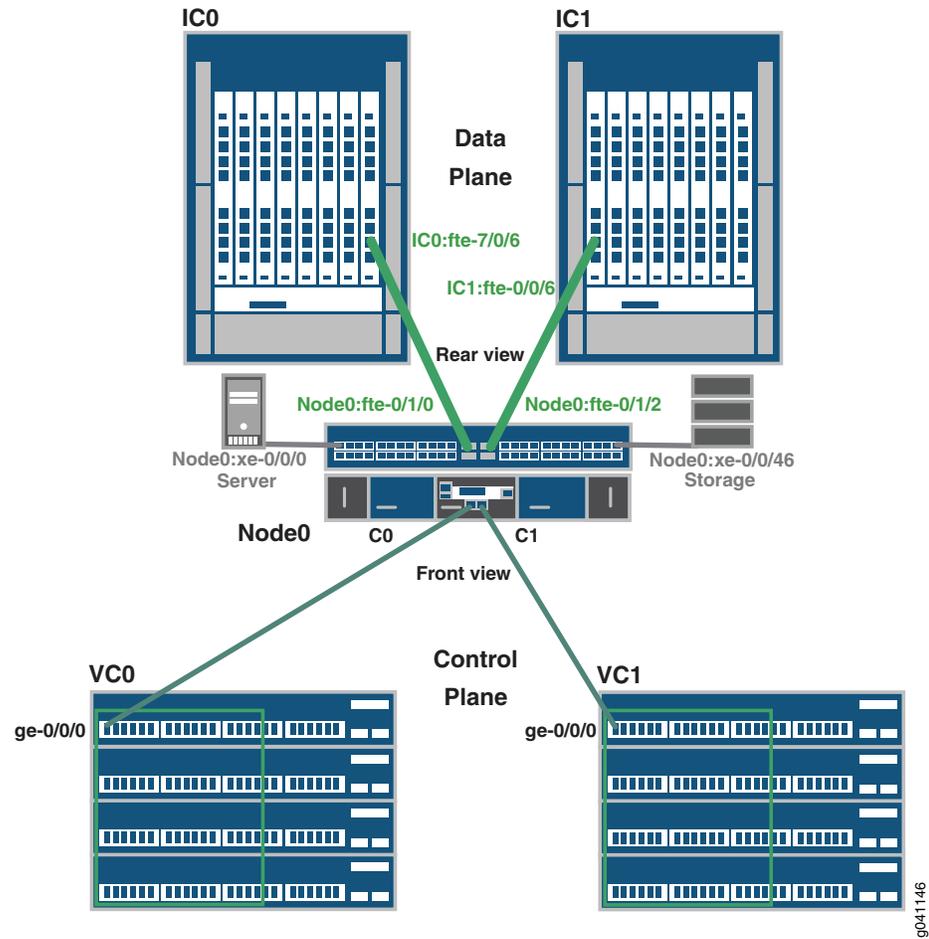


**NOTE:** You can configure interface ports 0 through 47 as 10-Gigabit Ethernet ports, 0 through 5 and 42 through 47 as Fibre Channel over Ethernet ports, and 6 through 41 as Gigabit Ethernet ports. However, you cannot configure any Fibre Channel over Ethernet ports as Gigabit Ethernet ports or vice versa.

In addition to these server and network interfaces, there are four uplink interfaces to connect the QFX3500 Node device to Interconnect devices in a QFabric system. These uplinks use 40-Gbps quad small form-factor pluggable plus (QSFP+) interfaces.

The control plane requires two management ports on the QFX3500 chassis to connect the Node device to the control plane network. [Figure 7 on page 18](#) shows an example of the data plane and control plane connections for a QFX3500 Node device.

Figure 7: QFX3500 Data Plane and Control Plane Connections



**Related Documentation**

- [Configuring Aliases for the QFabric Switch](#)
- [Configuring Node Groups for the QFabric Switch](#)
- [Understanding Node Groups on page 19](#)
- [Understanding Interconnect Devices on page 14](#)
- [Understanding the QFabric Switch Data Plane](#)
- [Understanding the QFabric Switch Control Plane](#)
- [Understanding the QFabric System Hardware Architecture on page 7](#)

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## Understanding Node Groups

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Node groups help you combine multiple Node devices into a single virtual entity within the QFabric system to enable redundancy and scalability at the edge of the data center.

This topic covers:

- [Network Node Groups on page 19](#)
- [Server Node Groups on page 19](#)

### Network Node Groups

A set of one or more Node devices that connect to an external network is called a *network Node group*. When configured, the Node devices within a network Node group work together in tandem as a single entity. The network Node group also relies on an external Routing Engine running on the Director group. This *network Node group Routing Engine* runs the routing protocols required to support the connections from the network Node group to external networks. By default, Node devices do not connect to external networks, but instead connect to endpoints such as servers and storage devices. As a result, you must configure a network Node group explicitly so that this entity may launch the network Node group Routing Engine and connect to external networks.

In a QFabric system deployment that requires connectivity to external networks, you configure one network Node group in the default partition for the QFabric system. Within each network Node group, you can include a minimum of one Node device or a maximum of eight Node devices. By adding more Node devices to the group, you provide enhanced scalability and redundancy for your network Node group.



**NOTE:** The QFabric system allows you to configure a single network Node group called NW-NG-0 for the default partition. You cannot configure a second network Node group inside the default partition. The remaining Node devices within the default partition are reserved to connect to servers, storage, or other endpoints internal to the QFabric system. These Node devices either can be retained in the automatically generated server Node groups or can be configured as part of a redundant server Node group.

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### Server Node Groups

A *server Node group* is a set of one or more Node devices that connect to servers or storage devices. Unlike Node devices that are part of a network Node group and rely on an external Routing Engine, a Node device within a server Node group connects directly to endpoints and implements the Routing Engine functions locally, using the local CPU built into the Node device itself.

By default, each Node device is placed in its own self-named autogenerated server Node group to connect to servers and storage. You can override the default assignment by manually configuring a redundant server Node group that contains a maximum of two Node devices. You can use a redundant server Node group to provide multihoming services

to servers and storage, as well as configure aggregated LAG connections that span the two Node devices.

**Related  
Documentation**

- [Configuring Node Groups for the QFabric Switch](#)
- [Understanding Node Devices on page 17](#)
- [Understanding Routing Engines in the QFabric System on page 12](#)
- [Understanding the QFabric System Hardware Architecture on page 7](#)

## CHAPTER 2

# QFX3100 Overview

- [QFX3100 Director Device Overview on page 21](#)
- [Field-Replaceable Units in a QFX3100 Director Device on page 23](#)
- [Understanding Redundancy of QFX3100 Director Device Components and Functionality on page 24](#)
- [Chassis Physical Specifications for a QFX3100 Director Device on page 25](#)
- [Front Panel of a QFX3100 Director Device on page 26](#)
- [Rear Panel of a QFX3100 Director Device on page 26](#)
- [Cooling System and Airflow in a QFX3100 Director Device on page 27](#)
- [Network Modules in a QFX3100 Director Device on page 28](#)
- [HDD Modules in a QFX3100 Director Device on page 29](#)
- [Fan Modules in a QFX3100 Director Device on page 29](#)
- [AC Power Supply in a QFX3100 Director Device on page 30](#)

## QFX3100 Director Device Overview

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The Juniper Networks QFX3100 Director device is used to manage the Juniper Networks QFX3000-G QFabric system.

You connect Gigabit Ethernet ports on a QFX3100 Director device to Gigabit Ethernet ports on two Virtual Chassis composed of Juniper Networks EX4200 Ethernet switches to form the control plane and management network for the QFabric system. The Virtual Chassis interconnects the Juniper Networks QFX3500 Node devices, Juniper Networks QFX3008-I Interconnect devices, and QFX3100 Director devices.

A QFabric system requires two QFX3100 Director devices interconnected as a QFX3100 Director *group*. The second QFX3100 Director device provides redundancy for the control plane and management network.

This topic describes:

- [Software on page 22](#)
- [Physical Specifications on page 22](#)
- [Network Modules on page 22](#)
- [Hard Disk Drive Modules on page 23](#)

- [AC Power Supplies on page 23](#)
- [Fan Modules on page 23](#)

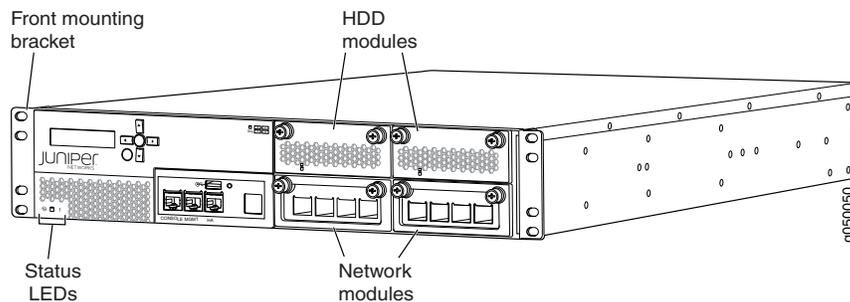
## Software

In a QFX3000 QFabric system, most Routing Engine tasks for all devices in the QFabric system run on the QFX3100 Director device. The internal Routing Engines on each device in the QFabric system continue to be responsible for functions local to their own devices, such as environmental monitoring, system loading, and power management. The internal Routing Engines communicate with the QFX3100 Director group through the control plane network.

## Physical Specifications

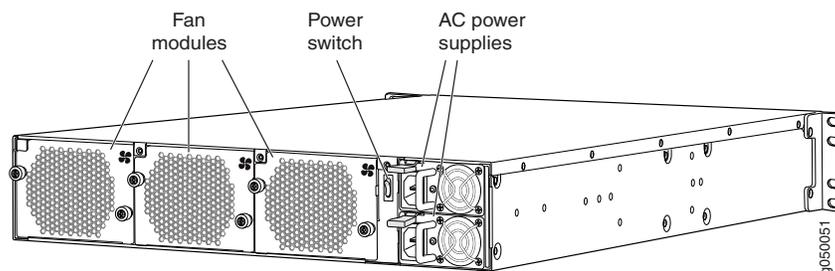
The QFX3100 Director device is two rack units (2 U) in size and designed to fit in industry-standard 19-inch rack mount enclosures. See [Figure 8 on page 22](#) and [Figure 9 on page 22](#).

**Figure 8: QFX3100 Director Device Front**



The QFX3100 Director device has an LCD panel that displays the device name.

**Figure 9: QFX3100 Director Device Rear**



## Network Modules

The QFX3100 Director device supports two network modules. Each network module contains four 1000BASE-T Gigabit Ethernet ports with RJ-45 connectors or four small form-factor pluggable (SFP) ports. The ports connect to the control plane and management network for the QFabric switch. The ports on the network modules are also used to connect QFX3100 Director devices together to form a QFX3100 Director group.

Network modules are installed in the bottom module slots on the QFX3100 Director devices. All QFX3100 Director devices are shipped with two network modules. The network modules are field-replaceable but not hot-swappable. See [“Installing a Network Module in a QFX3100 Director Device” on page 316](#).

## Hard Disk Drive Modules

The QFX3100 Director device ships with two 2-terabyte (TB) hard disk drive (HDD) modules that provide storage for the Director device. The four HDD modules in the two QFX3100 Director devices participating in a Director group operate in a redundant array of independent disks (RAID) system to synchronize directories or files across the HDD modules.

HDD modules are installed in the upper module slots on the QFX3100 Director devices. All QFX3100 Director devices are shipped with two HDD modules. The HDD modules are field-replaceable and hot-swappable. See [“Installing an HDD Module in a QFX3100 Director Device” on page 318](#).

## AC Power Supplies

The QFX3100 Director device ships with redundant AC power supplies that provide power for the device. The power supply slots are located on the far right side of the rear panel of the QFX3100 Director device.

AC power supplies are field-replaceable and hot-swappable. See [“Installing a Power Supply in a QFX3100 Director Device” on page 311](#).

## Fan Modules

The QFX3100 Director device ships with three fan modules. The fan modules provide cooling to the system and are installed in the fan module slots on the rear panel of the QFX3100 Director device.

Fan modules are field-replaceable and hot-swappable. See [“Installing a Fan Module in a QFX3100 Director Device” on page 314](#).

### Related Documentation

- [Chassis Physical Specifications for a QFX3100 Director Device on page 25](#)
- [Network Modules in a QFX3100 Director Device on page 28](#)
- [AC Power Supply in a QFX3100 Director Device on page 30](#)
- [HDD Modules in a QFX3100 Director Device on page 29](#)

## Field-Replaceable Units in a QFX3100 Director Device

Field-replaceable units (FRUs) are components that you can replace at your site. The QFX3100 Director device FRUs except the network modules are hot-insertable and hot-removable: You can remove and replace them without powering off the device or disrupting the switching function of the QFX3000-G QFabric system.

[Table 4 on page 24](#) lists the FRUs for the QFX3100 Director device and actions to take before removing them.

Table 4: FRUs in a QFX3100 Director Device

FRU	Action to Take Before Removing the Component
Network modules	You must power off the QFX3100 Director device offline before replacing a network module. See <a href="#">“Removing a Network Module from a QFX3100 Director Device”</a> on page 315.
Hard disk drive (HDD) modules	None.
Power supplies	None.
Fan modules	None.



**NOTE:** If you have a Juniper Networks J-Care service contract, register any addition, change, or upgrade of hardware components at <https://www.juniper.net/customers/csc/management/updateinstallbase.jsp>. Failure to do so can result in significant delays if you need replacement parts. This note does not apply if you replace existing components with the same type of component.

#### Related Documentation

- [Installing and Removing QFX3100 Director Device Hardware Components on page 309](#)

## Understanding Redundancy of QFX3100 Director Device Components and Functionality

The QFX3100 Director device is designed to provide redundancy in platforms and components to minimize the possibility that a single point of failure can cause an entire QFX3000 QFabric system to fail.

Two QFX3100 Director devices are connected together in a QFX3100 Director group to provide control plane and management network redundancy for a QFX3000 QFabric system.

The hardware components of a single QFX3100 Director device are also designed for redundancy to minimize the possibility that a single point of failure causes a Director device to fail.

This topic describes:

- [QFX3100 Director Device Redundancy on page 24](#)
- [QFX3100 Director Device Component Redundancy on page 25](#)

### QFX3100 Director Device Redundancy

Two QFX3100 Director devices are connected together in a QFX3100 Director group to provide control plane and management network redundancy for a QFX3000 QFabric system. When one QFX3100 Director device fails, the second QFX3100 Director device in the QFX3100 Director group continues to operate with minimal network disruption.

The HDD modules in the two QFX3100 Director devices operate in a redundant array of independent disks (RAID) system to synchronize directories or files across the two Director devices in a QFX3100 Director group. The QFX3100 Director devices are connected together through two ports on each Director device.

### QFX3100 Director Device Component Redundancy

The following hardware components provide redundancy on a QFX3100 Director device:

- **Power supplies**—There are two power supplies in a QFX3100 Director device. Each power supply provides power to all components in the device. The two power supplies provide full power redundancy to the device. If one power supply fails or is removed, the second power supply balances the electrical load without interruption.
- **Cooling system**—There are three fan modules in a QFX3100 Director device. If a fan module fails and is unable to keep the QFX3100 Director device within the desired temperature limits, chassis alarms are triggered and the QFX3100 Director device may shut down.
- **Hard disk drive (HDD) modules**—There are two HDD modules in a QFX3100 Director device. The HDD modules are fully redundant storage units; each time a directory or file is stored on one HDD module, the same directory or file is stored on the other HDD module.

#### Related Documentation

- [AC Power Supply in a QFX3100 Director Device on page 30](#)
- [Cooling System and Airflow in a QFX3100 Director Device on page 27](#)
- [HDD Modules in a QFX3100 Director Device on page 29](#)

### Chassis Physical Specifications for a QFX3100 Director Device

The QFX3100 Director device provides Routing Engine functionality for the QFX3000 QFabric system. [Table 5 on page 25](#) summarizes the physical specifications of the QFX3100 Director device.

**Table 5: Physical Specifications of the QFX3100 Director Device**

Description	Value
Height	3.5 in. (8.9 cm)
Chassis width	17.26 in. (43.7 cm)
Chassis depth	23.5 in. (59.7 cm)
Weight	Chassis with FRUs installed: 41.2 lb (18.7 kg)

#### Related Documentation

- [Cabinet Requirements for a QFX3100 Director Device on page 97](#)
- [Mounting a QFX3100 Director Device on Two Posts in a Rack or Cabinet on page 215](#)

- [Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet on page 217](#)
- [Installing and Connecting a QFX3100 Director Device on page 213](#)

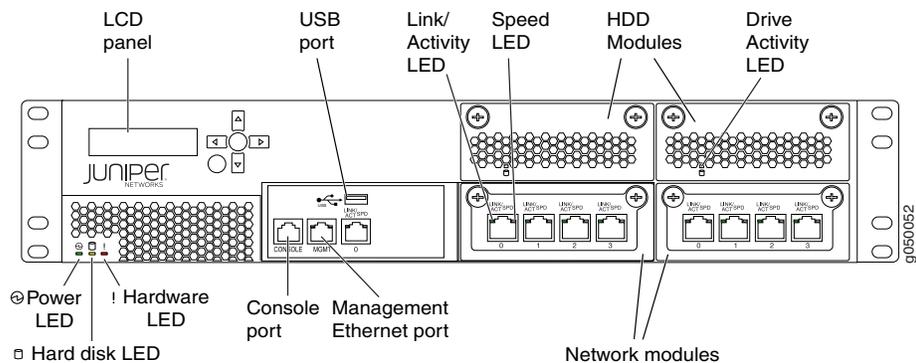
## Front Panel of a QFX3100 Director Device

The front panel of a QFX3100 Director device consists of the following components:

- Chassis LEDs—Power LED, Hard disk LED, and Alarm LED
- LCD panel
- Console port
- Management port
- USB port
- Four RJ-45 or SFP ports on each network module
- Gigabit Ethernet port LEDs
- Hard drive activity LED

[Figure 10 on page 26](#) shows the front panel of a QFX3100 Director device.

**Figure 10: QFX3100 Director Device Front Panel View**



### Related Documentation

- [Rear Panel of a QFX3100 Director Device on page 26](#)
- [Chassis Status LEDs on a QFX3100 Director Device on page 381](#)
- [Network Module Port LEDs on a QFX3100 Director Device on page 383](#)
- [Management Port LEDs on a QFX3100 Director Device on page 382](#)
- [Installing and Removing QFX3100 Director Device Hardware Components on page 309](#)

## Rear Panel of a QFX3100 Director Device

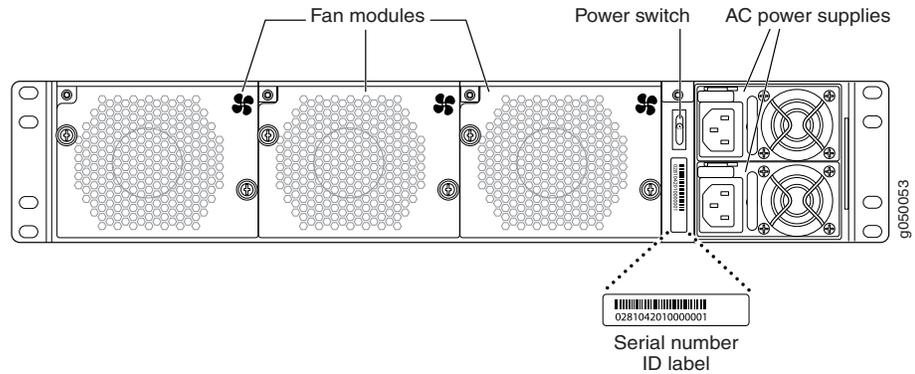
The rear panel of a QFX3100 Director device consists of the following components:

- Fan modules

- Power switch
- Power supplies

Figure 11 on page 27 shows the rear panel of a QFX3100 Director device with dual AC power supplies.

Figure 11: QFX3100 Director Device Rear Panel View



**Related Documentation**

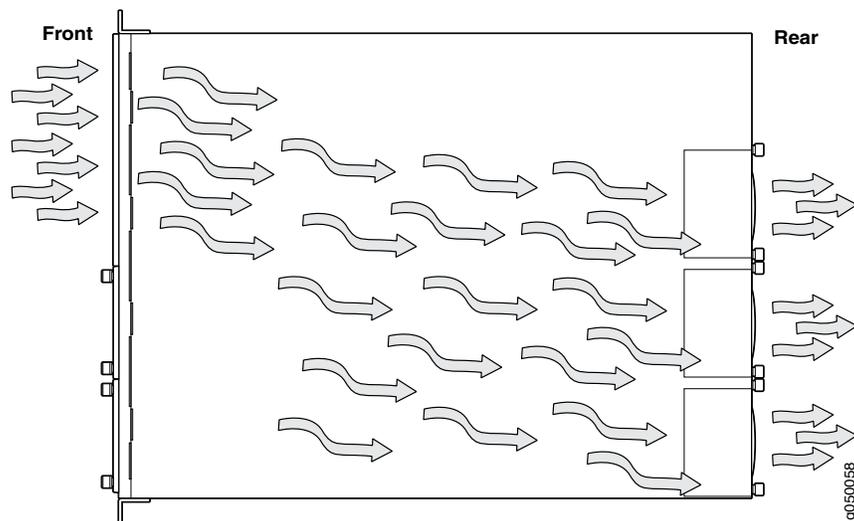
- [Front Panel of a QFX3100 Director Device on page 26](#)
- [Cooling System and Airflow in a QFX3100 Director Device on page 27](#)
- [AC Power Supply in a QFX3100 Director Device on page 30](#)
- [Installing and Removing QFX3100 Director Device Hardware Components on page 309](#)

## Cooling System and Airflow in a QFX3100 Director Device

The cooling system in a QFX3100 Director device consists of three fan modules as well as a single fan in each AC power supply. The fan modules are located in the fan module slots on the rear of the QFX3100 Director device.

The QFX3100 Director device provides front to back airflow. See [Figure 12 on page 28](#).

Figure 12: Airflow Through the QFX3100 Director Device



Temperature sensors in the chassis monitor the temperature within the chassis. The system raises an alarm if the fan fails or if the temperature inside the chassis rises above permitted levels. If the temperature inside the chassis rises above the threshold, the system shuts down automatically.

#### Related Documentation

- [Installing a Fan Module in a QFX3100 Director Device on page 314](#)
- [Removing a Fan Module from a QFX3100 Director Device on page 312](#)
- [Rear Panel of a QFX3100 Director Device on page 26](#)
- [Prevention of Electrostatic Discharge Damage on page 192](#)

## Network Modules in a QFX3100 Director Device

The network module in a QFX3100 Director device (see [Figure 13 on page 29](#)) is a field-replaceable unit (FRU) that you install in one of the two bottom slots on the front panel. The QFX3100 Director device is shipped with two network modules. You must power down the QFX3100 Director device before replacing a network module.

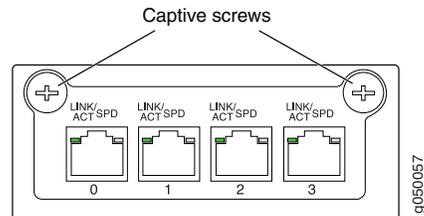
There are two types of network modules:

- RJ-45 network module—Provides four 1000BASE-T RJ-45 ports. See “[Cable Specifications for Control Plane Connections for the QFX Series](#)” on page 129 for information about the required cables.
- SFP network module—Provides four 1-Gbps small form-factor pluggable (SFP) ports. See “[Interface Specifications for Control Plane Connections for the QFabric System](#)” on page 124 for information about the supported transceivers and required cables.

Each network module provides four ports that connect the QFX3100 Director device to the QFX3000 QFabric switch control plane and management network and connect two QFX3100 Director devices to form a QFX3100 Director group.

Figure 13 on page 29 shows the network module.

**Figure 13: Network Module in a QFX3100 Director Device**



- Related Documentation**
- [Installing a Network Module in a QFX3100 Director Device on page 316](#)
  - [Network Module Port LEDs on a QFX3100 Director Device on page 383](#)

## HDD Modules in a QFX3100 Director Device

The two 2-terabyte (TB) hard disk drive (HDD) modules in each QFX3100 Director device provide storage for the Director device and the QFX3000 QFabric System. The four HDD modules in the two QFX3100 Director devices participating in a Director group operate in a redundant array of independent disks (RAID) system to synchronize directories or files across the HDD modules.

Each HDD module can be installed in one of the two top slots on the front panel of the QFX3100 Director device. The QFX3100 Director device is shipped with two HDD modules.

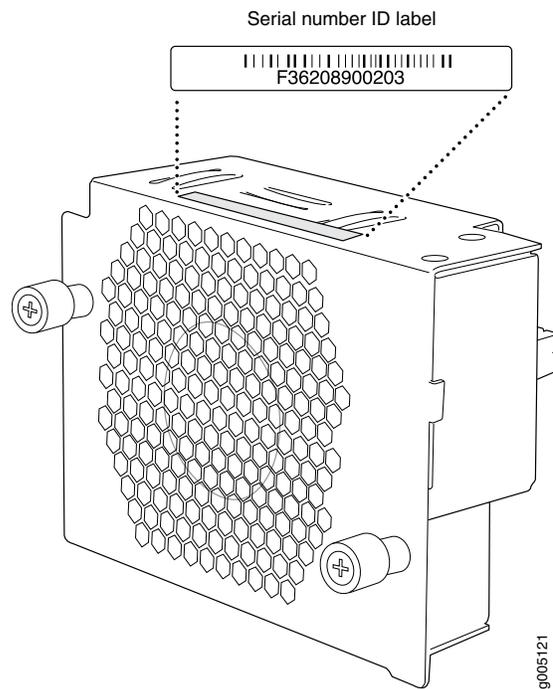
HDD modules are field-replaceable units (FRUs).

- Related Documentation**
- [Installing an HDD Module in a QFX3100 Director Device on page 318](#)

## Fan Modules in a QFX3100 Director Device

Fan modules provide cooling to a QFX3100 Director device. All QFX3100 Director devices are shipped with three fan modules installed in the fan module slots on the rear panel of the chassis. See [Figure 14 on page 30](#).

Figure 14: Fan Module



A QFX3100 Director device can operate for a short time with a fan module removed; however, the chassis might shut down when the high temperature threshold is exceeded if a fan module is not available to cool the QFX3100 Director device properly.

Fan modules are hot-swappable and field-replaceable units (FRUs).

**Related Documentation**

- [Cooling System and Airflow in a QFX3100 Director Device on page 27](#)
- [Installing a Fan Module in a QFX3100 Director Device on page 314](#)

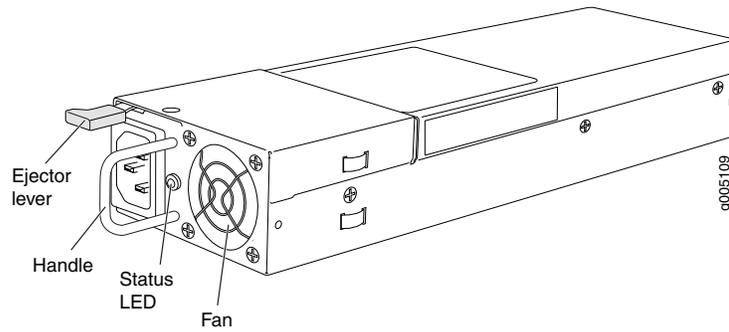
## AC Power Supply in a QFX3100 Director Device

The AC power supply in a QFX3100 Director Device is a hot-insertable and hot-removable field-replaceable unit (FRU).

You can install up to two AC power supplies in a QFX3100 Director device. Power supplies are installed in the power supply slots on the back of the chassis. All QFX3100 Director devices are shipped with two AC power supplies.

Each AC power supply weighs approximately 2.5 lb (1.1 kg). See [Figure 15 on page 31](#).

Figure 15: AC Power Supplies



Each power supply has its own fan and is cooled by its own internal cooling system. Hot air exhausts from the rear of the chassis.

A QFX3100 Director device supports two 560-W AC power supplies.

**Related  
Documentation**

- [Installing a Power Supply in a QFX3100 Director Device on page 311](#)
- [AC Power Specifications for a QFX3100 Director Device on page 135](#)
- [AC Power Supply LED on a QFX3100 Director Device on page 384](#)



## CHAPTER 3

# QFX3008-I Overview

- [QFX3008-I Interconnect Device Overview on page 33](#)
- [Field-Replaceable Units in a QFX3008-I Interconnect Device on page 38](#)
- [Understanding Redundancy of QFX3008-I Interconnect Device Components and Functionality on page 39](#)
- [Slot Numbering for a QFX3008-I Interconnect Device on page 40](#)
- [Chassis Physical Specifications for a QFX3008-I Interconnect Device on page 41](#)
- [Midplane in a QFX3008-I Interconnect Device on page 42](#)
- [Front Panel Display of the QFX3008-I Interconnect Device on page 43](#)
- [Cooling System and Airflow in a QFX3008-I Interconnect Device on page 44](#)
- [16-Port QSFP+ Front Cards in a QFX3008-I Interconnect Device on page 48](#)
- [Control Board in a QFX3008-I Interconnect Device on page 49](#)
- [Rear Cards in a QFX3008-I Interconnect Device on page 51](#)
- [AC Power Supply in a QFX3008-I Interconnect Device on page 52](#)
- [Wiring Tray in a QFX3008-I Interconnect Device on page 54](#)
- [Grounding Cable and Lug Specifications for a QFX3008-I Interconnect Device on page 57](#)

## QFX3008-I Interconnect Device Overview

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The QFX3008-I Interconnect device is a half-rack, modular, fully redundant chassis that provides the data plane switch fabric for Juniper Networks QFX3500 Node devices. Together the QFX3500 Node device and the QFX3008-I Interconnect device form a multistage, nonblocking switch fabric that provides a high-performance, low-latency, unified interconnect solution for next-generation data centers. See [Understanding the QFabric Switch Data Plane](#).

The QFX3500 Node devices and QFX3008-I Interconnect Devices are connected to Juniper Networks QFX3100 Director devices in an out-of-band management network through Juniper Networks EX4200 Ethernet Switches. The QFX3100 Director devices present the QFabric system devices as a single network entity, which enables simplified

management of your data center using the Junos OS command-line interface (CLI) or Junos Space. See [Understanding the QFabric Switch Control Plane](#).

- [Software on page 34](#)
- [Chassis Physical Specifications, Front Panel Display, and Midplane on page 34](#)
- [16-Port QSFP+ Front Card on page 36](#)
- [Control Board on page 37](#)
- [Rear Card on page 37](#)
- [Cooling System on page 37](#)
- [Power Supplies and Wiring Trays on page 37](#)

## Software

QFX Series devices run under the Juniper Networks Junos OS, which provides Layer 2 and Layer 3 switching, routing, and security services. The same Junos OS code base that runs on QFX Series devices also runs on all Juniper Networks EX Series switches, and J Series, M Series, MX Series, and T Series routers.

## Chassis Physical Specifications, Front Panel Display, and Midplane

The QFX3008-I Interconnect device is 21 rack units (21 U) in size (1/2 rack) and designed to fit in industry-standard 19-inch rack-mount enclosures. See [Figure 16 on page 35](#), [Figure 17 on page 36](#), and [“Chassis Physical Specifications for a QFX3008-I Interconnect Device” on page 41](#).

Figure 16: QFX3008-I Interconnect Device Front

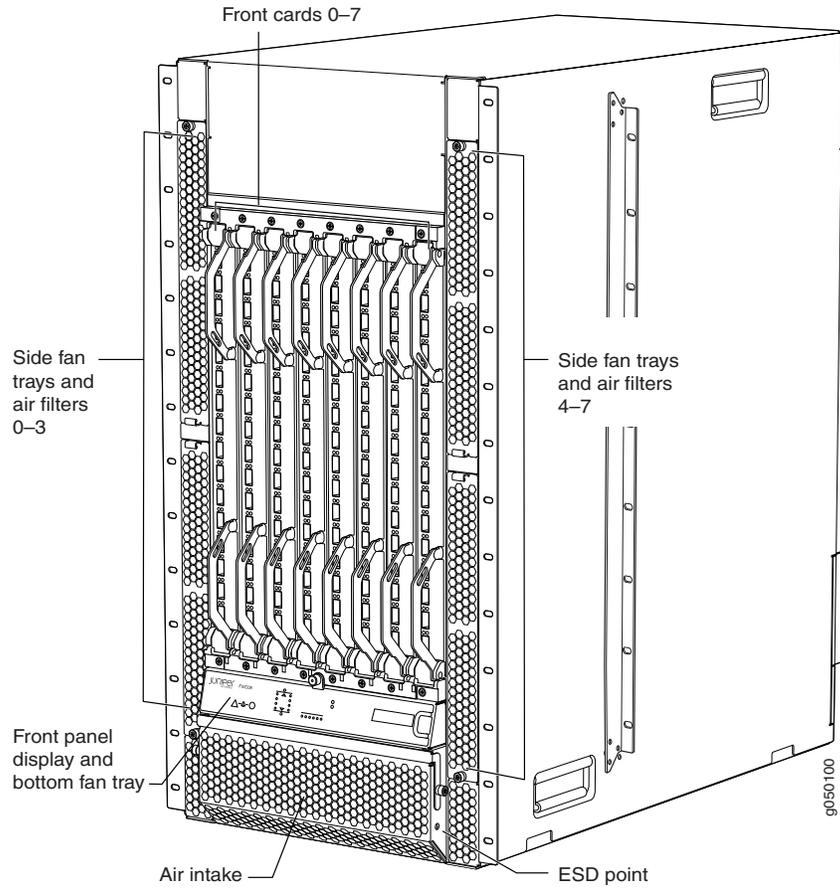
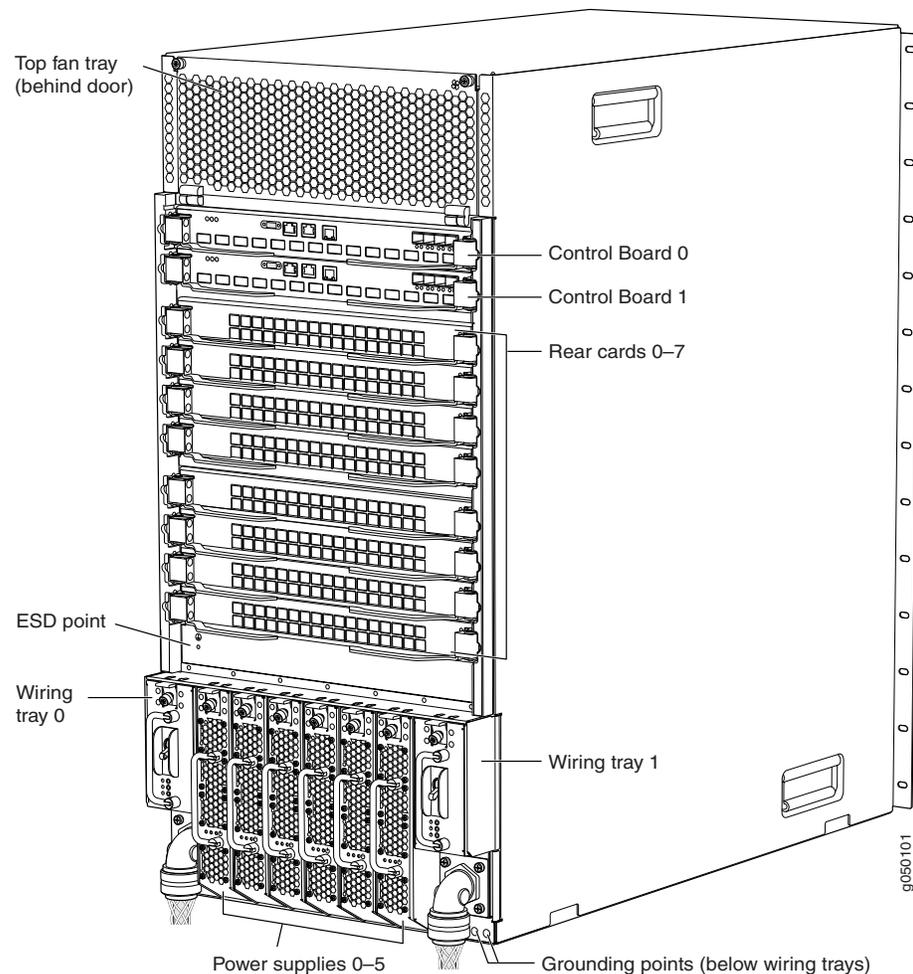


Figure 17: QFX3008-I Interconnect Device Rear



The QFX3008-I Interconnect device has a front panel display that displays chassis components' alarm information for rapid problem identification. See [“Front Panel Display of the QFX3008-I Interconnect Device”](#) on page 43.

The QFX3008-I Interconnect device midplane distributes the data, control, and management signals to system components and distributes power throughout the system. See [“Midplane in a QFX3008-I Interconnect Device”](#) on page 42.

### 16-Port QSFP+ Front Card

The 16-port quad small form-factor pluggable plus (QSFP+) front cards act as one stage in the multistage switch fabric data plane in the QFX3000 QFabric system. The front cards are hot-insertable and hot-removable field-replaceable units (FRUs). Up to eight front cards are installed in the front of the chassis in the slots labeled **0** through **7**. See [“16-Port QSFP+ Front Cards in a QFX3008-I Interconnect Device”](#) on page 48 and [“Understanding the QFabric System Hardware Architecture”](#) on page 7.

## Control Board

The QFX3008-I Interconnect device is connected to the QFabric system control plane through four Gigabit Ethernet small form-factor pluggable plus (SFP+) interfaces on each Control Board. The Control Boards are hot-insertable and hot-removable field-replaceable units (FRUs) that are installed in the rear of the chassis in the slots labeled **CB 0** and **CB 1**. See [“Control Board in a QFX3008-I Interconnect Device” on page 49](#).

## Rear Card

The rear cards act as one stage in the multistage switch fabric data plane in the QFabric system. The rear cards are hot-insertable and hot-removable field-replaceable units (FRUs). Eight rear cards are installed in the rear of the chassis in the slots labeled **0** through **7**. In a QFX3008-I Interconnect Device, all eight rear cards are active and must be installed in the switch for normal operation. If a single rear card fails, the input/output traffic for that card is load-balanced among the remaining rear cards to provide graceful degradation in switching performance. The impact of a rear card failure on the performance of a QFX3008-I Interconnect device varies based on the number of QFX3500 Node devices installed in the QFabric system and the traffic mix flowing through them. See [“Rear Cards in a QFX3008-I Interconnect Device” on page 51](#) and [“Understanding the QFabric System Hardware Architecture” on page 7](#).

## Cooling System

The cooling system in a QFX3008-I Interconnect device consists of ten hot-insertable and hot-removable field-replaceable unit (FRU) fan trays: a front fan tray, a rear fan tray, and eight side fan trays. The side fan trays are identical and interchangeable. There are field-replaceable filters on each side fan tray, and below the front fan tray. See [“Cooling System and Airflow in a QFX3008-I Interconnect Device” on page 44](#).

## Power Supplies and Wiring Trays

Power supplies for the QFX3008-I Interconnect device are fully redundant, load-sharing, and hot-insertable and hot-removable field-replaceable units (FRUs). Each QFX3008-I Interconnect device holds six power supplies. See [“AC Power Supply in a QFX3008-I Interconnect Device” on page 52](#).

Wiring trays distribute the input power to the power supplies. Wiring trays for the QFX3008-I Interconnect device are fully redundant, hot-insertable and hot-removable field-replaceable units (FRUs). Each QFX3008-I Interconnect device holds two wiring trays. See [“Wiring Tray in a QFX3008-I Interconnect Device” on page 54](#).



**CAUTION:** Mixing different types of wiring trays in the same chassis is not a supported configuration.

### Related Documentation

- [Understanding Redundancy of QFX3008-I Interconnect Device Components and Functionality on page 39](#)

- [Field-Replaceable Units in a QFX3008-I Interconnect Device on page 38](#)
- [Slot Numbering for a QFX3008-I Interconnect Device on page 40](#)

## Field-Replaceable Units in a QFX3008-I Interconnect Device

Field-replaceable units (FRUs) are device components that you can replace at your site. The QFX3008-I Interconnect device FRUs except the master Control Board are hot-insertable and hot-removable: you can remove and replace them without powering off the device or disrupting the switching function.



**NOTE:** We recommend that you take some of these components offline before removing them from the device. See [Table 6 on page 38](#) for details.

[Table 6 on page 38](#) lists the FRUs for the QFX3008-I Interconnect device and actions to take before removing them.

**Table 6: FRUs in a QFX3008-I Interconnect Device**

FRU	Action to Take Before Removing the Component
Power supplies	None.
Wiring trays	None.
Fan trays	None.
Air filters	None.
16-port QSFP+ front card	To avoid packet loss you must take the front card offline before removing it. See <a href="#">"Taking a 16-Port QSFP+ Front Card Offline in a QFX3008-I Interconnect Device" on page 351</a> .
Control Boards	<ul style="list-style-type: none"> <li>• Master Control Board—We recommend that you switch mastership to the backup Control Board, and then take the Control Board offline before removing it. Traffic through the QFX3008-I Interconnect device will be disrupted while the backup Control Board assumes mastership. See <a href="#">"Taking a Control Board Offline in a QFX3008-I Interconnect Device" on page 345</a>.</li> <li>• Backup Control Board—We recommend that you take the backup Control Board offline before removing it. See <a href="#">"Taking a Control Board Offline in a QFX3008-I Interconnect Device" on page 345</a>.</li> </ul>
Rear card	To avoid packet loss you must take the rear card offline before removing it. See <a href="#">"Taking the Rear Card Offline in a QFX3008-I Interconnect Device" on page 355</a> .
Optical transceivers	None. We recommend that you disable the interface using the <b>set interface-name disable</b> command. See <a href="#">"Disconnecting a Fiber-Optic Cable from a QFX Series Device" on page 376</a> .



**NOTE:** If you have a Juniper J-Care service contract, register any addition, change, or upgrade of hardware components at <https://www.juniper.net/customers/csc/management/updateinstallbase.jsp>. Failure to do so can result in significant delays if you need replacement parts. This note does not apply if you replace existing components with the same type of component.

- Related Documentation**
- [Installing and Removing QFX3008-I Interconnect Device Hardware Components on page 322](#)

## Understanding Redundancy of QFX3008-I Interconnect Device Components and Functionality

The QFX3008-I Interconnect device is a fully redundant system. A redundant QFX3008-I Interconnect device configuration is designed so that no single point of failure can cause the entire device to fail.

The following hardware components provide redundancy for a QFX3008-I Interconnect device:

- **Control Boards**—A QFX3008-I Interconnect device has two Control Boards. One Control Board functions as the master, and the other functions as the backup. If the master Control Board fails or is removed, the backup Control Board takes over as the master Control Board. In a QFX3000 QFabric system deployment with multiple QFX3008-I Interconnect devices, traffic halts on the QFX3008-I Interconnect device with a failed Control Board. It resumes once the backup Control Board takes over as the master Control Board. Traffic on other QFX3008-I Interconnect devices continues to be switched normally.
- **Rear cards**—The switch fabric circuitry in a QFX3008-I Interconnect device is distributed across eight rear cards. All eight rear cards must be installed in a QFX3008-I Interconnect Device.

All rear fabric cards are fully connected to all installed 16-port QSFP+ front cards. When the device is operational, all eight rear cards are simultaneously active. If a single rear fabric card fails, the input/output traffic for that card is load-balanced among the remaining rear fabric cards to provide graceful degradation in midplane performance. The impact of a rear fabric card failure on the performance of a QFX3008-I Interconnect device varies based on the traffic mix flowing through the QFX3008-I Interconnect Device.

- **Cooling system**—The cooling system in a QFX3008-I Interconnect device consists of ten fan trays. There are eight side fan trays, a front fan tray, and a rear fan tray. Each fan tray has multiple fans. Two fan controllers control the fan trays; each fan controller controls a different set of fan trays. If one fan controller fails, the second fan controller keeps the remaining fan trays working. This allows the device to continue to operate normally.

Additionally, each fan tray continues to operate indefinitely and provide sufficient cooling even when a fan on the fan tray fails, provided the room temperature is within the operating range. See [“Cooling System and Airflow in a QFX3008-I Interconnect Device” on page 44](#).

- Power supplies and wiring trays—There are six power supplies and two wiring trays in a QFX3008-I Interconnect device. Each wiring tray provides input power to three power supplies. Each power supply connects to the midplane of the chassis, which distributes the output power produced by the power supplies to different chassis components. (See [“Midplane in a QFX3008-I Interconnect Device” on page 42](#).) Each power supply provides power to a subset of components on the chassis. Together, one wiring tray and set of three power supplies can provide power to the entire system indefinitely. If one power supply fails or is removed, a power supply from the second set of power supplies that powers the same components continues to provide power to those components without interruption. The redundant wiring trays provide 1+1 power feed redundancy for the chassis. The two sets of three redundant power supplies provide 2N system power distribution redundancy for the chassis. See [“AC Power Supply in a QFX3008-I Interconnect Device” on page 52](#) and [“Wiring Tray in a QFX3008-I Interconnect Device” on page 54](#).

**Related Documentation**

- [Control Board in a QFX3008-I Interconnect Device on page 49](#)
- [Rear Cards in a QFX3008-I Interconnect Device on page 51](#)

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## Slot Numbering for a QFX3008-I Interconnect Device

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The QFX3008-I Interconnect device accepts eight 16-port QSFP+ front cards, two Control Boards, eight rear cards, ten fan trays, six power supplies, and two wiring trays.

The slots on the chassis are numbered, and except for the cooling system, labels on the chassis describe the slot numbers:

- Front card slots—All eight slots for the front cards run vertically across the front of the chassis. The label for the front cards is at the bottom of the card cage on the front of the chassis, above the front panel display. The front card slots are labeled **0** through **7**. In the command-line interface (CLI), the front cards are described as **fpc 0** through **fpc 7**.
- Control Board slots—The two slots for the Control Boards run horizontally on the rear of the chassis. The label for the Control Board slots and the rear card slots is attached to the rear of the chassis along the right side. The Control Board slots are labeled **CB 0** and **CB 1**.
- Rear card slots—All eight slots for the rear cards run horizontally in the rear of the chassis directly below the Control Board slots. The label for the Control Board slots and the rear card slots is attached to the rear of the chassis along the right side. The rear card slots are labeled **0** through **7** on the chassis. In the CLI, the rear card slots are described as **fpc 8** through **fpc 15**.
- Cooling system—Eight side fan tray slots run vertically on the sides of the front of the chassis; four on one side of the chassis behind two identical access panels, four on the

other side of the chassis behind two identical access panels. Each side fan tray has an air filter installed on it. The front fan tray and front panel display is installed at the bottom front of the chassis. The front air filter is installed directly below the front fan tray and front panel display, behind a hinged door. The rear fan tray is installed behind a hinged door at the top rear of the chassis. The fan tray and air filter slots are not numbered on the chassis.

- Power supply slots and wiring tray slots—The six power supply slots run vertically across the bottom rear of the chassis. The two wiring trays are installed on either side of the power supplies at the bottom rear of the chassis. The label for the power supplies and wiring trays is attached to the rear of the chassis directly above the power supplies and wiring trays. The power supply slots are labeled **0** through **5**. The wiring tray slots are labeled **Wiring Tray 0** and **Wiring Tray 1**.

**Related Documentation**

- [Installing and Removing QFX3008-I Interconnect Device Hardware Components on page 322](#)
- [QFX3008-I Interconnect Device Overview on page 33](#)

## Chassis Physical Specifications for a QFX3008-I Interconnect Device

The QFX3008-I Interconnect device is a rigid sheet-metal structure that houses the other switch components. [Table 7 on page 41](#) summarizes the physical specifications of the QFX3008-I Interconnect device.

**Table 7: Physical Specifications of a QFX3008-I Interconnect Device**

Description	Value
Chassis height	36.65 in. (93.09 cm)
Chassis width	<ul style="list-style-type: none"> <li>• 17.3 in. (43.9 cm) excluding mounting bracket width</li> <li>• 19.0 in. (48.3 cm) including mounting bracket width</li> </ul>
Chassis depth	<ul style="list-style-type: none"> <li>• Minimum depth required for installation is 39.52 in. (100.38 cm)</li> <li>• Chassis depth without any field-replaceable units (FRUs) installed is 32.38 in. (82.25 cm)</li> <li>• Chassis depth from front-mounting brackets to rear of chassis is 35.10 in. (89.15 cm)</li> <li>• Chassis depth from mid-mounting brackets to rear of chassis is 23.73 in. (60.27 cm)</li> <li>• Maximum chassis depth with FRUs, including the optional cable manager and lockable front doors installed, is 40.37 in. (102.54 cm)</li> </ul>

Table 7: Physical Specifications of a QFX3008-I Interconnect Device (*continued*)

Description	Value
Weight	<ul style="list-style-type: none"> <li>Chassis with midplane: Approximately 205 lb (93 kg)</li> <li>Chassis with all FRUs: Approximately 650 lb (295 kg)</li> </ul> <p><b>NOTE:</b> This represents the weight of the chassis including all required and optional FRUs. This does not include optical transceivers and cabling.</p> <ul style="list-style-type: none"> <li>16-port QSFP+ front card: 18.3 lb (8.3 kg)</li> <li>Control Board: 8.4 lb (3.8 kg)</li> <li>Rear card: 10.0 lb (4.5 kg)</li> <li>Side fan tray: 2.7 lb (1.2 kg)</li> <li>Front fan tray and front panel display: 16.7 lb (7.6 kg)</li> <li>Rear fan tray: 19.4 lb (8.8 kg)</li> <li>Power supply: 11.2 lb (5.1 kg)</li> <li>Wiring tray: 8.0 lb (3.6 kg)</li> </ul>

**Related Documentation**

- [Rack Requirements for a QFX3008-I Interconnect Device on page 95](#)
- [Cabinet Requirements for a QFX3008-I Interconnect Device on page 98](#)
- [Installing and Connecting a QFX3008-I Interconnect Device on page 223](#)

## Midplane in a QFX3008-I Interconnect Device

The midplane is located in the center of the chassis and forms the rear of the front card cage. The side fan trays, front fan tray and front panel display, and 16-port QSFP+ front cards plug into the midplane from the front of the chassis. The rear fan tray, Control Boards, rear cards, power supplies, and wiring trays plug into the midplane from the rear of the chassis. The midplane contains an EEPROM that stores the serial number and revision level of the midplane.

The midplane performs the following functions:

- Power distribution—The midplane distributes power to all the device components from the power supplies that plug into it.
- Control-signal connectivity—The midplane transports the control signals exchanged by system components for monitoring, control, and management purposes.
- Transfer of data between 16-port QSFP+ front cards and rear cards—The midplane provides connectivity for data traffic to and from the front cards and the rear cards.



**WARNING:** High levels of electrical energy are distributed across the device midplane. Do not touch the midplane connectors or any component connected to the midplane with any metallic object while you are servicing components installed in the device.

- Related Documentation**
- [Field-Replaceable Units in a QFX3008-I Interconnect Device on page 38](#)
  - [QFX3008-I Interconnect Device Overview on page 33](#)

## Front Panel Display of the QFX3008-I Interconnect Device

The front panel display of the QFX3008-I Interconnect device consists of the following components:

- **Alarm LEDs**—Indicate major or minor alarms. See “[Chassis Status LEDs on a QFX3008-I Interconnect Device](#)” on page 387 and “[Understanding Alarms](#)” on page 437.
- **Status LEDs**—Indicate system status. See “[Chassis Status LEDs on a QFX3008-I Interconnect Device](#)” on page 387.
- **LCD panel**—The LCD panel displays the device hostname and the number of active alarms.

[Figure 18 on page 43](#) shows the front panel display of a QFX3008-I Interconnect device. [Figure 19 on page 44](#) shows the location of the front panel display on the chassis.

**Figure 18: Chassis Status LEDs**

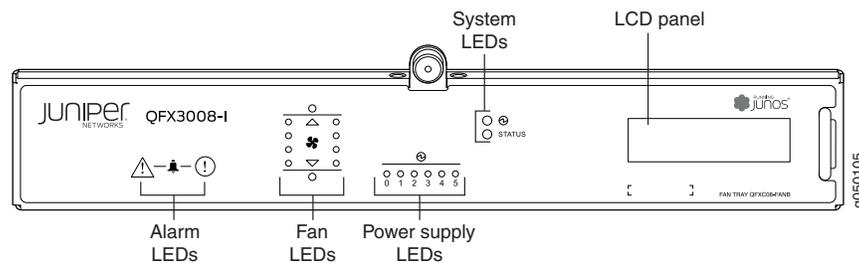
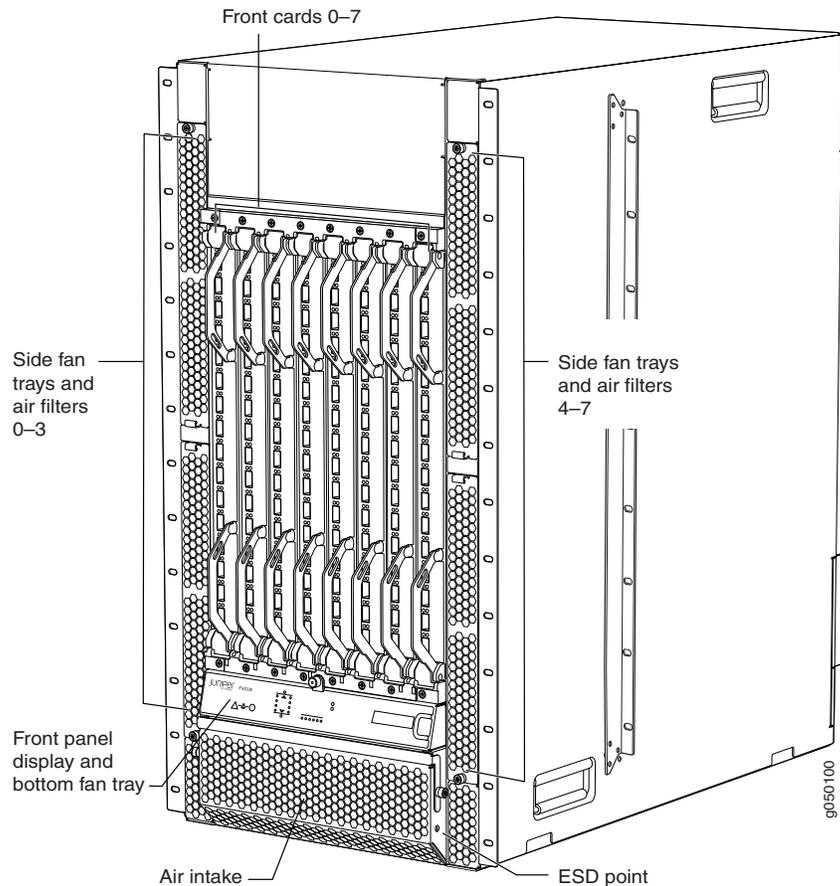


Figure 19: QFX3008-I Interconnect Device Front



#### Related Documentation

- [Field-Replaceable Units in a QFX3008-I Interconnect Device on page 38](#)

## Cooling System and Airflow in a QFX3008-I Interconnect Device

The cooling system in a QFX3008-I Interconnect device consists of ten fan trays and nine air filters. The fan trays and air filters are hot-insertable and hot-removable field-replaceable units (FRUs).

Eight fan trays install vertically on the front sides of the chassis, one fan tray installs directly below the front card cage, and one in the rear of the chassis at the top. See [Figure 20 on page 45](#) and [Figure 21 on page 46](#).

Figure 20: Location of Bottom and Side Fan Trays

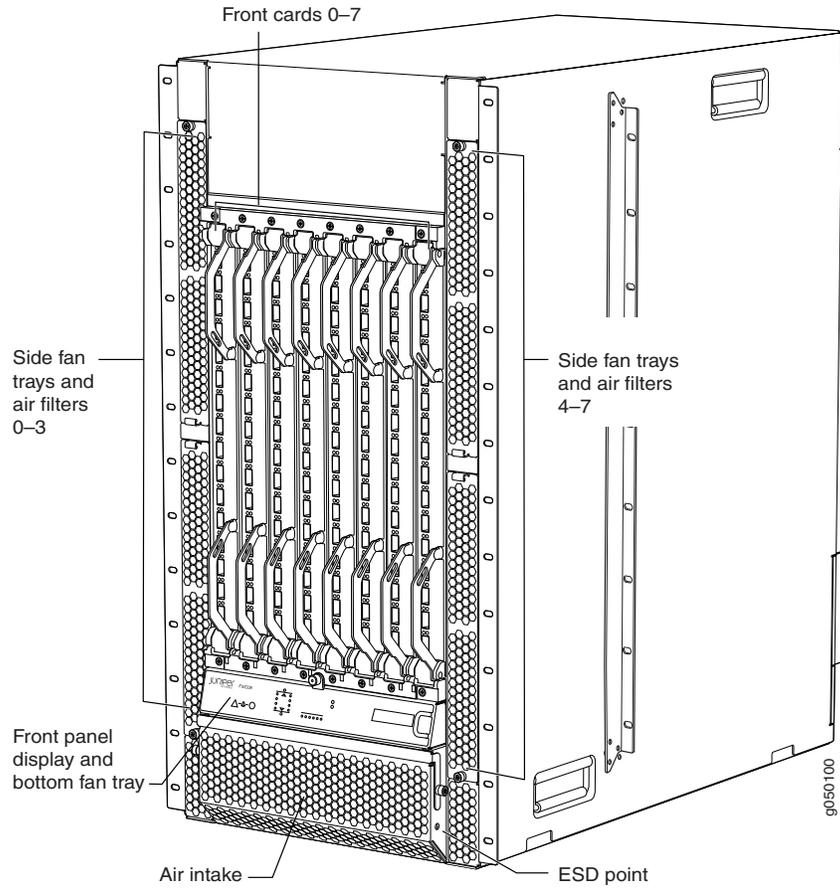
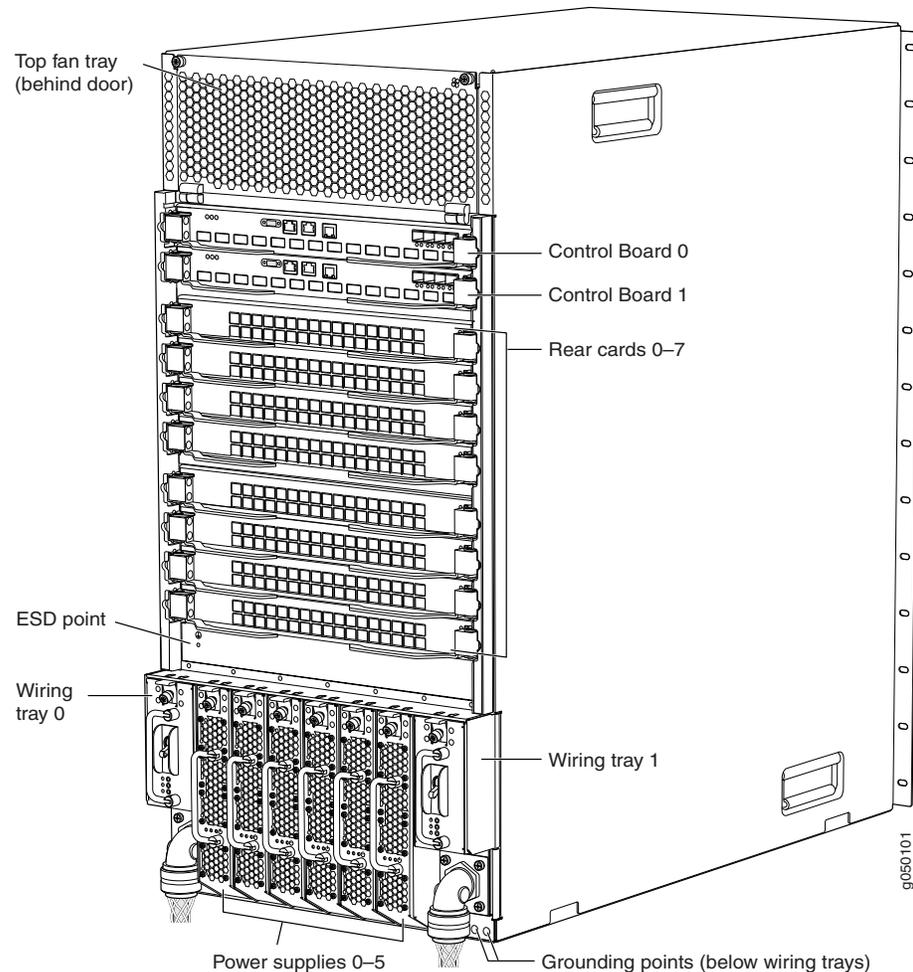


Figure 21: Location of Top Fan Tray



The chassis continues to operate for a limited time (2 minutes) after a fan tray has been removed.

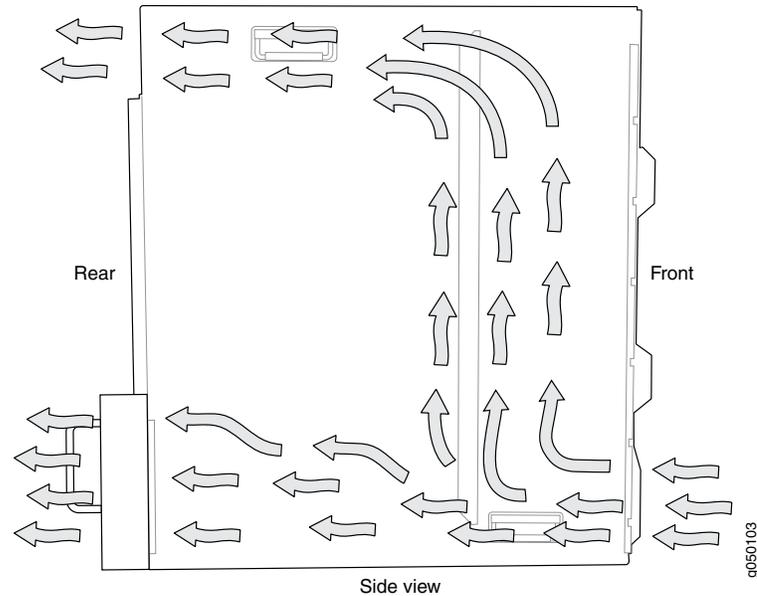


**CAUTION:** You must replace a fan tray within 2 minutes of removing it.

The chassis has front-to-back airflow. The air intake to cool the front card cage and power supplies is located on the front bottom of the chassis. Cool air is pulled into the chassis and is pushed through the front card cage toward the rear fan tray. Hot air exhausts from the upper rear of the chassis. See the side view in [Figure 22 on page 47](#) for this airflow.

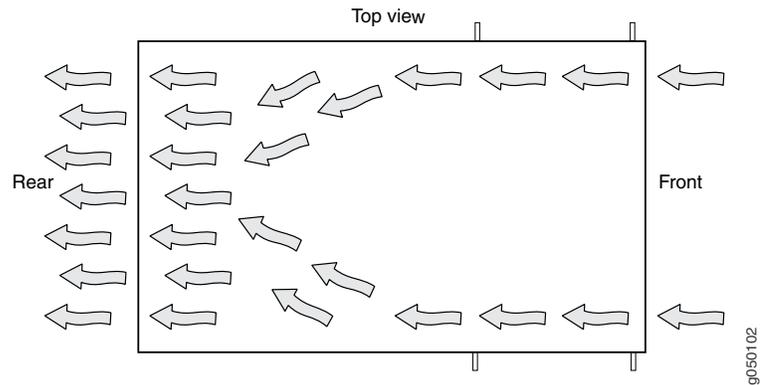
The same air intake directs cool air to the power supplies and wiring trays. The hot air passes through the power supplies and wiring trays and exhausts on the rear of the chassis at the bottom. See the side view in [Figure 22 on page 47](#) for this airflow.

Figure 22: Airflow Through the Front Card Cage and Powerhouse



Cooling for the rear card cage is also front to back. The air intake to cool the rear card cage is located on the front sides of the chassis. Cool air is pulled in through the side fan trays. The hot air exhausts through the rear card cage. See [Figure 23 on page 47](#) for this airflow.

Figure 23: Airflow Through the Rear Card Cage



**NOTE:** Do not block the air intake at the bottom front of the chassis, or the side fan trays.

The Control Board monitors the temperature of device components. Under normal operating conditions, the fans in the fan trays run at less than full speed.

If the chassis temperature rises above the acceptable threshold the speed of the working fans is automatically adjusted to keep the temperature within the acceptable range. If

the ambient maximum temperature specification (104° F or 40° C) is exceeded and the system cannot be adequately cooled, the device shuts down within 4 minutes of the alarm being generated if the problem is not fixed.

The fan trays continue to operate indefinitely and provide sufficient cooling even when a single fan fails, provided the room temperature is within the operating range. You can check the status of the fan trays on the front panel display. See [“Chassis Status LEDs on a QFX3008-I Interconnect Device” on page 387](#).

You cannot replace a single fan in a fan tray. If one or more fans fail, you must replace the entire fan tray.



**WARNING:** There is no fan guard on the fans. Be careful to keep your fingers clear of moving fan blades when you are removing the fan trays.

#### Related Documentation

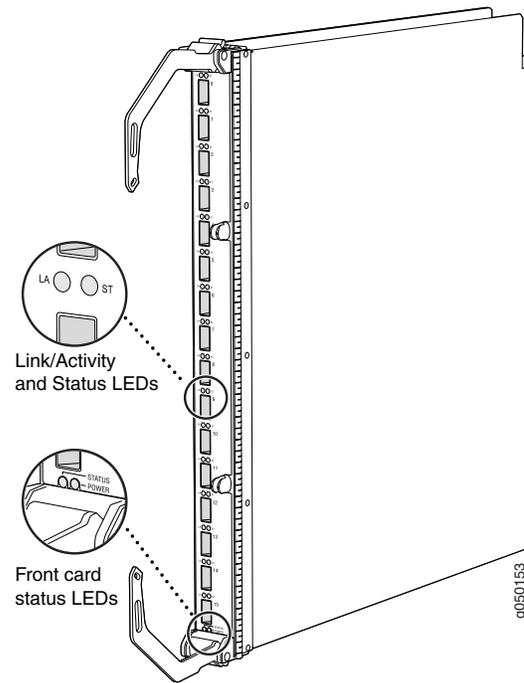
- [Field-Replaceable Units in a QFX3008-I Interconnect Device on page 38](#)
- [Installing a Bottom Fan Tray and Front Panel Display in a QFX3008-I Interconnect Device on page 331](#)
- [Removing a Bottom Fan Tray and Front Panel Display from a QFX3008-I Interconnect Device on page 329](#)
- [Installing a Side Fan Tray in a QFX3008-I Interconnect Device on page 334](#)
- [Removing a Side Fan Tray from a QFX3008-I Interconnect Device on page 332](#)
- [Installing a Top Fan Tray in a QFX3008-I Interconnect Device on page 337](#)
- [Removing a Top Fan Tray from a QFX3008-I Interconnect Device on page 336](#)
- [Installing a Bottom Air Filter in a QFX3008-I Interconnect Device on page 340](#)
- [Removing a Bottom Air Filter from a QFX3008-I Interconnect Device on page 338](#)
- [Installing a Side Air Filter in a QFX3008-I Interconnect Device on page 343](#)
- [Removing a Side Air Filter from a QFX3008-I Interconnect Device on page 341](#)

## 16-Port QSFP+ Front Cards in a QFX3008-I Interconnect Device

The 16-port QSFP+ front cards installed in the QFX3008-I Interconnect device provide the first and last stage of switch fabric functionality in a QFX3000 QFabric system. See [Figure 24 on page 49](#).

A QFX3008-I Interconnect device can have up to eight front cards. All eight front cards are fully connected to all eight rear cards. The impact of a front card failure on the performance of an QFX3000 QFabric system varies based on how your QFX3500 Node devices are connected to the QFX3008-I Interconnect device and the traffic mix flowing through them. See [“Understanding Redundancy of QFX3008-I Interconnect Device Components and Functionality” on page 39](#).

Figure 24: 16-Port QSFP+ Front Card



The 16-port QSFP+ front cards are installed in the front of the chassis in the slots labeled **0** through **7**. See [“Slot Numbering for a QFX3008-I Interconnect Device”](#) on page 40.

The 16-port QSFP+ front cards are hot-insertable and hot-removable field-replaceable units (FRUs). However, you must take the front cards offline before removing them. See [“Taking a 16-Port QSFP+ Front Card Offline in a QFX3008-I Interconnect Device”](#) on page 351.

Each 16-port QSFP+ front card has these components:

- LEDs—Indicate port and system status. See [“16-Port QSFP+ Front Card LEDs on a QFX3008-I Interconnect Device”](#) on page 391.
- 16 40-Gbps QSFP+ ports—Connect to the QFX3500 Node devices in your QFX3000 QFabric system for data path connectivity.
- Ejector levers—Used for installing and removing the front card.

**Related Documentation**

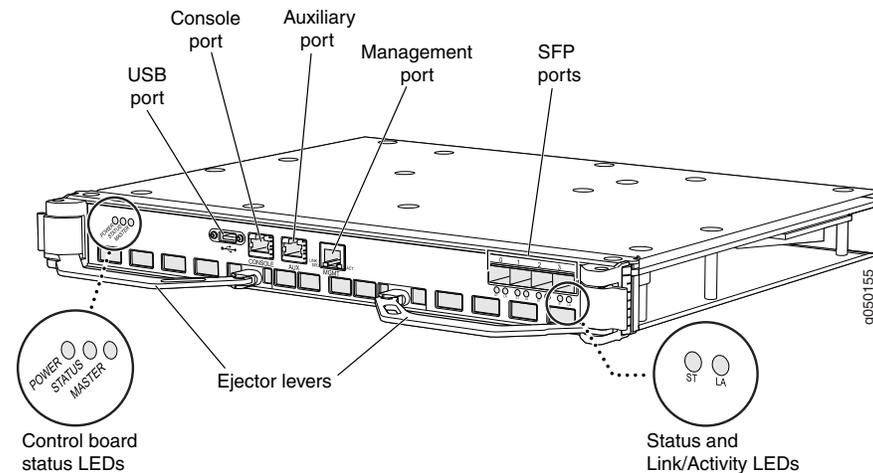
- [Removing a 16-Port QSFP+ Front Card from a QFX3008-I Interconnect Device](#) on page 352
- [Installing a 16-Port QSFP+ Front Card in a QFX3008-I Interconnect Device](#) on page 353

## Control Board in a QFX3008-I Interconnect Device

The Control Board performs Routing Engine functions in a QFX3008 Interconnect device. See [Figure 25](#) on page 50.

The Control Boards install horizontally into the top rear of the chassis in slots labeled **CB 0** and **CB 1**.

**Figure 25: Control Board in a QFXC08 Chassis**



One Control Board functions as the master, and the other acts as the backup. If the master Control Board fails or is removed, the backup Control Board takes over as the master Control Board. When the Control Boards are configured for graceful switchover, the backup Control Board automatically synchronizes its configuration and state with those of the master Control Board. Any update to the master Control Board is replicated on the backup Control Board. If the master Control Board fails, or mastership is switched to the backup Control Board, packet forwarding stops on the QFXC08 chassis. When the backup Control Board assumes mastership, packet forwarding continues through the device.

If you need to replace the master Control Board, we recommend that you switch mastership to the backup Control Board. We recommend that you always take a Control Board offline before removing it. See [“Taking a Control Board Offline in a QFX3008-I Interconnect Device” on page 345](#).

The Control Board provides these functions:

- Powers the 16-port QSFP+ front cards on and off
- Powers the rear cards on and off
- Performs routing functions for the device
- Controls system resets and the boot sequence for the device
- Monitors and controls the speed of the fans in the fan trays
- Monitors and controls the LCD panel and chassis status LEDs
- Monitors the communication of the 16-port QSFP+ front cards with the rear cards
- Monitors the status of the power supplies

The Control Board has these components:

- Control Board LEDs—Indicate system status. See [“Control Board LEDs on a QFX3008-I Interconnect Device”](#) on page 389.
- USB port—Provides an interface through which you can recover the device by reinstalling Junos OS software. See [“USB Port Specifications for the QFX Series”](#) on page 105 and [“Performing a Recovery Installation on a QFX3500 Device and QFX3008-I Interconnect Device”](#) on page 409.
- Console port—Connects the Control Board to a management console through a serial connection using a cable with an RJ-45 connector. See [“Connecting a QFX Series Device to a Management Console”](#) on page 285.
- Auxiliary port—This port is not enabled. It is reserved for future use.
- Management port—This port is not enabled. It is reserved for future use.
- Four Gigabit Ethernet SFP+ ports—Connect the Control Board to the QFX3000-G QFabric system control plane network. See [“Connecting a QFX3008-I Interconnect Device to the Control Plane Network”](#) on page 278.
- Ejector levers—Used for installing and removing the Control Board.

**Related Documentation**

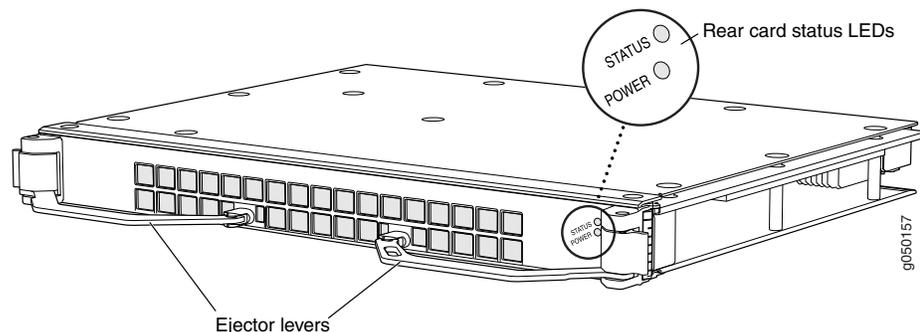
- [Installing a Control Board in a QFX3008-I Interconnect Device](#) on page 349
- [Removing a Control Board from a QFX3008-I Interconnect Device](#) on page 347

## Rear Cards in a QFX3008-I Interconnect Device

The rear cards provide the intermediate stage of switch fabric functionality in a QFX3008-I Interconnect Device. See [Figure 26](#) on page 51.

A QFX3008-I Interconnect Device has eight rear cards. In the QFX3008-I Interconnect Device, all eight rear cards are simultaneously active when the device is operational. All rear cards are fully connected to all installed 16-port QSFP+ front cards. If a single rear card fails, the input/output traffic for that card is load-balanced among the remaining rear cards, providing graceful degradation in switching performance. The impact of a rear card failure on the performance of a QFX3008-I Interconnect Device varies based on the number of 16-port QSFP+ front cards installed in the device and the traffic mix flowing through them.

**Figure 26: Rear Card in a QFX3008-I Interconnect Device**



The rear cards are installed at the rear of the chassis in the slots labeled **0** through **7**. See [“Slot Numbering for a QFX3008-I Interconnect Device” on page 40](#).

The rear cards are hot-insertable and hot-removable field-replaceable units (FRUs). However, you must take the rear cards offline before removing them. See [“Taking the Rear Card Offline in a QFX3008-I Interconnect Device” on page 355](#).

The rear cards provide these functions:

- Provide data path connectivity for the QFabric (switch data between QFX3500 Node devices)

The rear cards have these components:

- Rear card LEDs—Indicate system status. See [“Rear Card LEDs on a QFX3008-I Interconnect Device” on page 393](#).
- Ejector levers—Used for installing and removing the rear card.

#### Related Documentation

- [Removing a Rear Card from a QFX3008-I Interconnect Device on page 356](#)
- [Installing a Rear Card in a QFX3008-I Interconnect Device on page 358](#)

## AC Power Supply in a QFX3008-I Interconnect Device

The AC power supply in a QFX3008-I Interconnect device is a hot-insertable and hot-removable field-replaceable unit (FRU).

The QFX3008-I Interconnect device has six power supplies and two wiring trays. Power supplies are installed at the rear bottom of the chassis in slots **0** through **5** (left to right when viewed from the rear of the chassis). Wiring trays are installed at the rear bottom of the chassis on either side of the power supplies. The wiring tray in slot **Wiring Tray 0** provides input power to the power supplies in slots **0** through **2**. The wiring tray in slot **Wiring Tray 1** provides input power to the power supplies in slots **3** through **5**.



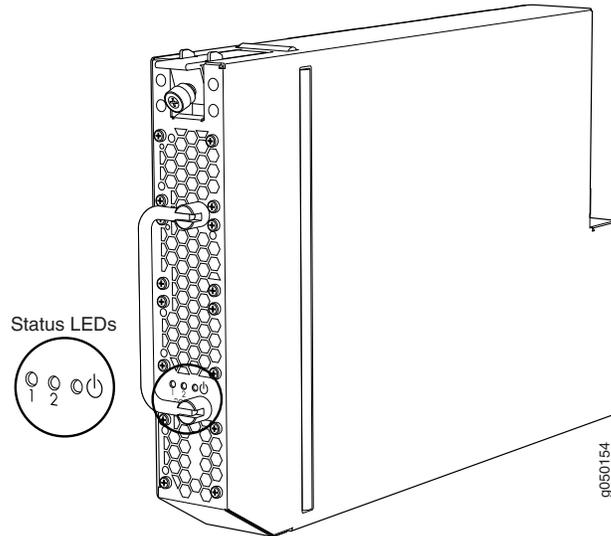
**WARNING:** The chassis is pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal provided on the chassis. This separate protective earthing terminal must be permanently connected to earth ground.



**NOTE:** The QFX3008-I Interconnect device has two protective earthing terminals provided on the rear of the chassis. Only one of these protective earthing terminals needs to be permanently connected to earth ground. The first pair is sized for M6 screws and is located below the wiring tray on the bottom left corner at the rear of the chassis. The second pair is sized for UNC ¼-20 screws and is located below the second wiring tray on the bottom right corner at the rear of the chassis. The grounding points are spaced at 0.625 in. (15.86 mm).

Each power supply is cooled by its own fans. The airflow is from the front of the power supply to the back. Hot air exhausts from the rear of the chassis. Three LEDs on the faceplate indicate the status of the power supply. See [Figure 27 on page 53](#).

**Figure 27: AC Power Supply**



Each power supply contains two isolated 2000-W channels that produce 54 VDC. The midplane distributes the output power produced by the power supplies to different system components.

The distribution of power to the QFX3008-I Interconnect device is divided between components, and each power supply provides power to different components. Together, the three power supplies in slots 0 through 2 provide power for the entire system. Likewise, the power supplies in slots 3 through 5 also provide power to the entire system. In standard power redundancy terminology, the two sets of three power supplies provide  $2N$  redundancy for the QFX3008-I Interconnect device, where  $N$  is the number of power supplies.

Because each power supply provides power to a subset of components, a second power supply that provides power to the same components must be installed for redundancy. For example, during normal operation the power supplies in slot 1 and slot 4 provide power to the same components on a load-sharing basis. If the power supply in slot 1 fails, the power supply in slot 4 can provide full power to the components indefinitely.

[Table 8 on page 54](#) lists the pairs of power supplies and the components they power in a QFX3008-I Interconnect device.

Table 8: Power Supply Distribution Pairings for a QFX3008-I Interconnect Device

Power Supplies	Components Powered
Power supply slots 0 and 5	<ul style="list-style-type: none"> <li>• Front card slots 6–7</li> <li>• Rear card slots 0–3</li> <li>• Control Board slot 1</li> <li>• Top front fan tray and side fan trays 0–3</li> </ul>
Power supply slots 1 and 4	<ul style="list-style-type: none"> <li>• Front card slots 0–1</li> <li>• Rear card slots 4–7</li> <li>• Control Board slot 0</li> <li>• Bottom front fan tray and side fan trays 4–7</li> </ul>
Power supply slots 2 and 3	Front card slots 2–5

- Related Documentation**
- [AC Power Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 137](#)
  - [AC Power Supply LEDs on a QFX3008-I Interconnect Device on page 394](#)
  - [Power Requirements for a QFX3008-I Interconnect Device on page 139](#)
  - [Installing an AC Power Supply in a QFX3008-I Interconnect Device on page 324](#)
  - [Removing an AC Power Supply from a QFX3008-I Interconnect Device on page 323](#)
  - [Installing a Wiring Tray in a QFX3008-I Interconnect Device on page 328](#)
  - [Removing a Wiring Tray from a QFX3008-I Interconnect Device on page 326](#)

## Wiring Tray in a QFX3008-I Interconnect Device

The wiring tray in a QFX3008-I Interconnect device is a hot-insertable and hot-removable field-replaceable unit (FRU).

The QFX3008-I Interconnect device has six power supplies and two wiring trays in a QFX3008-I Interconnect device. Power supplies are installed at the rear bottom of the chassis in slots 0 through 5 (left to right when viewed from the rear of the chassis). Wiring trays are installed at the rear bottom of the chassis on either side of the power supplies. The wiring tray in slot **Wiring Tray 0** provides input power to the power supplies in slots 0 through 2. The wiring tray in slot **Wiring Tray 1** provides input power to the power supplies in slots 3 through 5.



**WARNING:** The chassis is pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal provided on the chassis. This separate protective earthing terminal must be permanently connected to earth ground.



**CAUTION:** Mixing different types of wiring trays in the same chassis is not a supported configuration.

The single-phase wiring tray has three appliance inlets. See [“AC Power Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays”](#) on page 137.



**NOTE:** To provide power feed redundancy, all three appliance inlets on the single-phase wiring tray in slot **Wiring Tray 0** must be powered by dedicated power feeds derived from feed A, and all appliance inlets on the wiring tray in slot **Wiring Tray 1** must be powered by dedicated power feeds derived from feed B. This configuration provides the commonly deployed A/B feed redundancy for the system.

The three-phase wiring trays have a terminal block specific to either standard delta or standard wye wiring configurations. The power cords that you provide for the three-phase wiring trays must be installed before you install the wiring trays. See [“AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays”](#) on page 138 and [“AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays”](#) on page 138.



**NOTE:** To provide power feed redundancy, the three-phase wiring tray in slot **Wiring Tray 0** must be powered by a dedicated power feed derived from feed A, and the wiring tray in slot **Wiring Tray 1** must be powered by a dedicated power feed derived from feed B. This configuration provides the commonly deployed A/B feed redundancy for the system.

You must install two wiring trays in a QFX3008-I Interconnect device. Wiring trays are installed at the bottom of the chassis in slots labeled **Wiring Tray 0** and **Wiring Tray 1** (left to right). See [“Slot Numbering for a QFX3008-I Interconnect Device”](#) on page 40.



**NOTE:** A QFX3008-I Interconnect device has two protective earthing terminals provided on the rear of the chassis. The first pair is sized for M6 screws and is located below the wiring tray on the bottom left corner at the rear of the chassis. The second pair is sized for UNC ¼-20 screws and is located below the second wiring tray on the bottom right corner at the rear of the chassis. The grounding points are spaced at 0.625 in. (15.86 mm). Only one of the two protective earthing terminals needs to be permanently connected to earth ground.

Three LEDs on the faceplate indicate the status of each power channel. Each wiring tray also has a power switch on the faceplate. See [Figure 28 on page 56](#) and [Figure 29 on page 56](#).

Figure 28: Single-Phase Wiring Tray

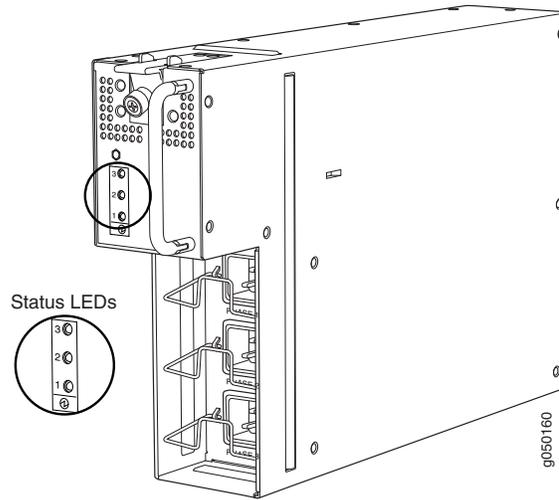
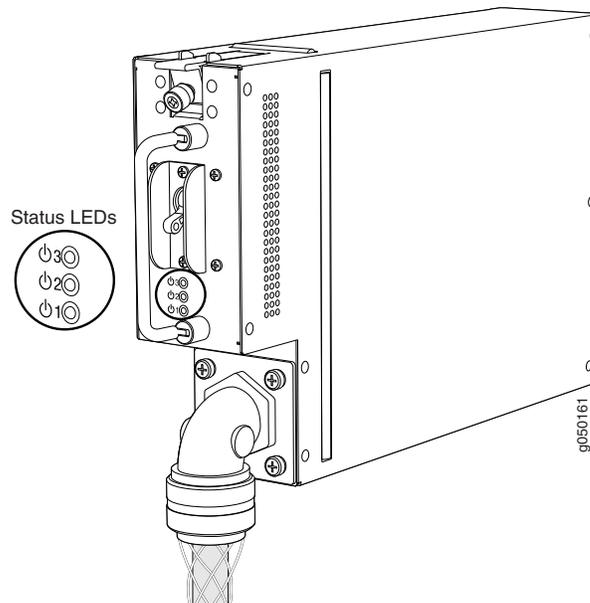


Figure 29: Three-Phase Wiring Tray



**Related Documentation**

- [Wiring Tray LEDs on a QFX3008-I Interconnect Device on page 395](#)
- [Calculating Power Requirements for a QFX3008-I Interconnect Device on page 143](#)
- [Installing a Wiring Tray in a QFX3008-I Interconnect Device on page 328](#)
- [Removing a Wiring Tray from a QFX3008-I Interconnect Device on page 326](#)
- [Preparing Delta and Wye Three-Phase Power Cords on page 241](#)

## Grounding Cable and Lug Specifications for a QFX3008-I Interconnect Device

The QFX3008-I Interconnect device must be adequately grounded before power is connected to ensure proper operation and to meet safety and electromagnetic interference (EMI) requirements. To ground a QFX3008-I Interconnect device, connect a grounding cable to earth ground and then attach it to the chassis grounding points.



**WARNING:** The device is pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal provided on the chassis in addition to the grounding pin of the power supply cord. This separate protective earthing terminal must be permanently connected to earth ground for installations that require a separate grounding conductor to the chassis.



**CAUTION:** Before device installation begins, a licensed electrician must attach a cable lug to the grounding cables that you supply. A cable with an incorrectly attached lug can damage the device.

Before connecting the device to earth ground, review the following information:

- Two pairs of threaded inserts (PEM nuts) are provided on the QFX3008-I Interconnect device for connecting the device to earth ground. The first pair is sized for M6 screws and is located below the wiring tray on the bottom left corner at the rear of the chassis. The second pair is sized for UNC ¼-20 screws and is located below the second wiring tray on the bottom right corner at the rear of the chassis. The grounding points are spaced at 0.625 in. (15.86 mm). UNC ¼-20 screws with washers are provided in the accessory kit.
- The grounding lug required is a Panduit LCD2-14A-Q or equivalent. This grounding lug is provided in the accessory kit.
- The grounding cable that you provide for a QFX3008-I Interconnect device must be 2 AWG (33.6 mm<sup>2</sup>), minimum 60° C wire, or as permitted by the local code.



**NOTE:** Only one of the two protective earthing terminals needs to be permanently connected to earth ground.

### Related Documentation

- [Connecting Earth Ground to a QFX3008-I Interconnect Device on page 237](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 239](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays on page 246](#)

- [Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays on page 250](#)

## CHAPTER 4

# QFX3500 Overview

- [QFX3500 Device Overview on page 59](#)
- [Field-Replaceable Units in a QFX3500 Device on page 63](#)
- [Understanding Redundancy of QFX3500 Device Components and Functionality on page 64](#)
- [Chassis Physical Specifications for a QFX3500 Chassis on page 64](#)
- [Front Panel of a QFX3500 Device on page 65](#)
- [Rear Panel of a QFX3500 Device on page 66](#)
- [Cooling System and Airflow for a QFX3500 Device on page 68](#)
- [Management Board for a QFX3500 Device on page 71](#)
- [AC Power Supply for a QFX3500 Device on page 73](#)
- [DC Power Supply for a QFX3500 Device on page 75](#)
- [Grounding Cable and Lug Specifications for a QFX3500 Device on page 77](#)

## QFX3500 Device Overview

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The Juniper Networks QFX3500 device is a high-speed, multipurpose switch especially designed for next-generation data centers. It provides a total switching capacity and throughput of 640 Gbps. Forty-eight 10-Gbps access ports in the device use small form-factor pluggable plus (SFP+) transceivers and operate by default as 10-Gigabit Ethernet interfaces. Optionally, you can choose to configure up to 12 of the ports as 2-Gbps, 4-Gbps, or 8-Gbps Fibre Channel (FC) interfaces, and up to 36 of the ports as 1-Gigabit Ethernet interfaces. Four 40-Gbps uplink ports in the device use quad small form-factor pluggable plus (QSFP+) to four SFP+ copper breakout cables to support an additional 15 10-Gigabit Ethernet interfaces.

QFX3500 devices can function as a Fibre Channel over Ethernet (FCoE)-FC gateway or as an FCoE transit switch. FCoE is a method of supporting converged FC and Ethernet traffic on a data center bridging (DCB) network by encapsulating unmodified FC frames in Ethernet to transport the FC frames over the physical Ethernet network.

In a QFX3000 QFabric system, a QFX3500 device functions as a Node device, connected to the QFabric system through 40-Gbps uplink ports to a Juniper Networks QFX3008-I Interconnect Device. Together, the QFX3500 devices and QFX3008-I Interconnect

Devices form a multistage, nonblocking switch fabric that provides a high-performance, low-latency, unified interconnect solution for next-generation data centers.

In a QFX3000 QFabric system, the QFX3500 Node devices and QFX3008-I Interconnect Devices are connected to Juniper Networks QFX3100 Director devices in an out-of-band management network through Juniper Networks EX4200 Ethernet Switches configured as a Virtual Chassis. The QFX3100 Director devices present the QFX3000 QFabric devices as a single network entity, which enables simplified management of your data center using the Junos OS command-line interface (CLI).

- [Software on page 60](#)
- [Hardware on page 60](#)

## Software

QFX3500 devices use the Junos operating system (OS), which provides Layer 2 and Layer 3 switching, routing, and security services. The same Junos OS code base that runs on QFX3500 devices also runs on all Juniper Networks EX Series switches, and J Series, M Series, MX Series, and T Series routers.

For more information about which features are supported on QFX3500 devices, see QFX Series Software Features Overview.

When the QFX3500 device is operating as a standalone switch, you manage the switch using the Junos OS command-line interface (CLI), accessible through the console and out-of-band management ports on the device.

When the QFX3500 device is operating as a Node device in a QFX3000 QFabric system, all the devices in the data center fabric are managed through the Administrator software installed on the QFX3100 Director devices.

## Hardware

The compact QFX3500 device is 1 rack unit (1 U) in size and designed to fit in industry-standard 19-inch rack-mount enclosures. See [Figure 30 on page 60](#) and [Figure 31 on page 61](#) and “Chassis Physical Specifications for a QFX3500 Chassis” on page 64.

**Figure 30: QFX3500 Device Front**

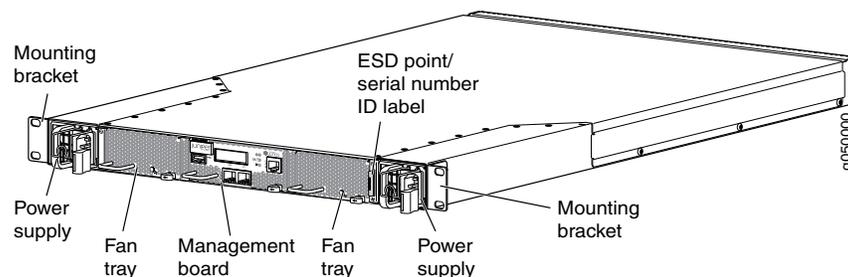
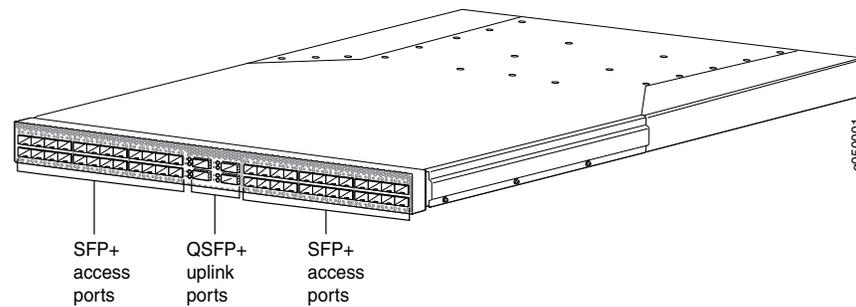


Figure 31: QFX3500 Device Rear



The QFX3500 device has an LCD panel that displays the device hostname and the number of active alarms. See [“Front Panel of a QFX3500 Device” on page 65](#). The rear panel has 48 10-Gbps access ports and 4 40-Gbps uplink ports. See [“Rear Panel of a QFX3500 Device” on page 66](#).

### SFP+ Access Ports

The QFX3500 device has 48 access ports (0 through 47) that support small form-factor pluggable plus (SFP+) and small form-factor pluggable (SFP) transceivers, as well as SFP+ direct attach copper cables, also known as Twinax cables. See [“Interface Specifications for SFP+ Transceivers for QFX3500 Device Access Ports” on page 108](#) and [“Interface Specifications for SFP+ DAC Cables for QFX3500 Device Access Ports” on page 117](#).

- Up to 48 of the access ports can be used for SFP+ transceivers or SFP+ direct attach copper cables. You can use 10-Gigabit Ethernet SFP+ transceivers and SFP+ direct attach copper cables in any access port. You can use 2-Gbps, 4-Gbps, or 8-Gbps Fibre Channel SFP+ transceivers in ports 0 through 5 and ports 42 through 47.



**NOTE:** If you use Fibre Channel SFP+ transceivers in ports 0 through 5 or ports 42 through 47, you must configure the entire block of ports as Fibre Channel ports. For example, if you use a Fibre Channel SFP+ transceiver in any of the ports 0 through 5, then ports 0 through 5 must be configured as Fibre Channel ports. If you use a Fibre Channel SFP+ transceiver in any of the ports 42 through 47, then ports 42 through 47 must be configured as Fibre Channel ports. You then cannot use 10-Gigabit Ethernet SFP+ transceivers in these ports.

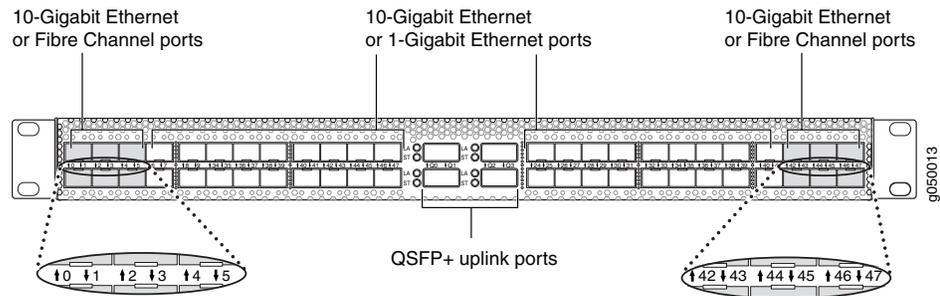
- Up to 36 of the access ports can be used for SFP transceivers. Gigabit Ethernet SFP transceivers can be used in ports 6 through 41.



**CAUTION:** Do not place a copper transceiver in an access port directly above or below another copper transceiver. Internal damage to the access ports and device can occur. Because of this limitation, a maximum of 18 copper transceivers can be installed in ports 6 through 41. We recommend using only the top row of access ports for copper transceivers.

Figure 32 on page 62 shows the location of the SFP+ access ports, including the ports that can be used with Fibre Channel SFP+ transceivers and Gigabit Ethernet SFP transceivers.

Figure 32: SFP+ Access Port Locations



### QSFP+ Uplink Ports

The QFX3500 device has four uplink ports (Q0 through Q3) that support up to four QSFP+ to four SFP+ copper breakout cables. See Interface Specifications for QSFP+ DAC Breakout Cables for QFX3500 Device Uplink Ports. Figure 33 on page 63 shows the location of the QSFP+ uplink ports, and the interfaces supported on each port. When the QFX3500 device is used as part of a QFX3000 QFabric system, these uplink ports are used to connect the QFX3500 Node device to QFX3008-I Interconnect Devices. See “Interface Specifications for Data Plane Connections for the QFabric System” on page 127 and “Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device” on page 284.

All four of the uplink ports can be used for QSFP+ transceivers to four SFP+ breakout copper cables.

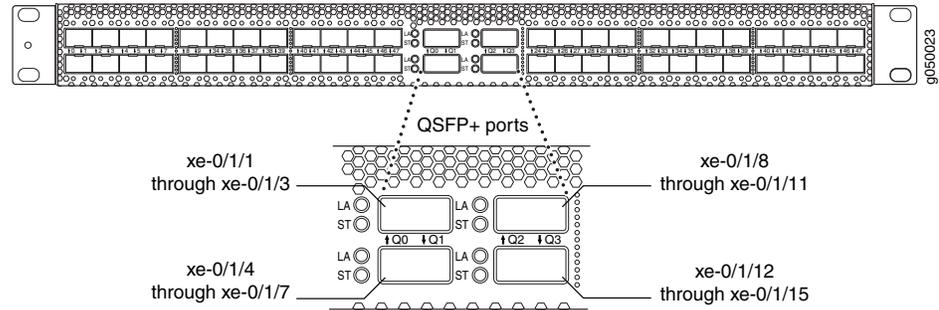


**NOTE:** Port Q0 of the QSFP+ uplink ports only supports three of the four QSFP+ to four SFP+ breakout cable divisions. Ports Q1 through Q3 support all four of the QSFP+ to four SFP+ breakout cable divisions. Together, the four QSFP+ ports provide 15 10-Gigabit Ethernet interfaces.



**NOTE:** The QSFP+ uplink ports are not supported in Junos OS Release 11.1. The QSFP+ uplink ports and QSFP+ to four SFP+ breakout cables are supported in Junos OS Release 11.2 and later.

Figure 33: QSFP+ Uplink Port Locations



#### Related Documentation

- [Field-Replaceable Units in a QFX3500 Device on page 63](#)
- [Site Preparation Checklist for a QFX3500 Device on page 86](#)
- [Access Port and Uplink Port LEDs on a QFX3500 Device on page 399](#)
- [Installing and Removing QFX3500 Device Hardware Components on page 361](#)

## Field-Replaceable Units in a QFX3500 Device

Field-replaceable units (FRUs) are components that you can replace at your site. The QFX3500 device FRUs except the management board are hot-insertable and hot-removable: you can remove and replace them without powering off the device or disrupting the switching function.



**CAUTION:** Replace a failed power supply with a blank panel or new power supply within 1 minute of removal to prevent chassis overheating. Replace a failed fan tray with a new fan tray within 1 minute of removal to prevent chassis overheating.

Table 9 on page 63 lists the FRUs for the QFX3500 device and actions to take before removing them.

Table 9: FRUs in a QFX3500 Device

FRU	Required Action
Power supplies	None.
Fan trays	None.
Management board	You must power off the QFX3500 device before replacing the management board. See <a href="#">“Removing a Management Board from a QFX3500 Device” on page 369</a> .
Optical transceivers	None. We recommend that you disable the interface using the <code>set interface-name disable</code> command. See <a href="#">“Disconnecting a Fiber-Optic Cable from a QFX Series Device” on page 376</a> .



**NOTE:** If you have a Juniper J-Care service contract, register any addition, change, or upgrade of hardware components at <https://www.juniper.net/customers/csc/management/updateinstallbase.jsp>. Failure to do so can result in significant delays if you need replacement parts. This note does not apply if you replace existing components with the same type of component.

**Related Documentation**

- [Installing and Removing QFX3500 Device Hardware Components on page 361](#)

## Understanding Redundancy of QFX3500 Device Components and Functionality

The following hardware components provide redundancy on a QFX3500 device:

- **Power supplies**—The QFX3500 device has one or two power supplies. Each power supply provides power to all components in the device. If two power supplies are installed, the two power supplies provide full power redundancy to the device. If one power supply fails or is removed, the second power supply balances the electrical load without interruption.
- **Cooling system**—The QFX3500 device has two fan trays. Additional cooling is provided by two fan modules on the management board. If a fan module on a fan tray or management board fails and is unable to keep the QFX3500 device within the desired temperature thresholds, chassis alarms occur and the QFX3500 device may shut down.

**Related Documentation**

- [AC Power Supply for a QFX3500 Device on page 73](#)
- [DC Power Supply for a QFX3500 Device on page 75](#)
- [Cooling System and Airflow for a QFX3500 Device on page 68](#)

## Chassis Physical Specifications for a QFX3500 Chassis

The QFX3500 device chassis is a rigid sheet-metal structure that houses the hardware components. [Table 10 on page 64](#) summarizes the physical specifications of the QFX3500 chassis.

**Table 10: Physical Specifications for the QFX3500 Device Chassis**

Description	Value
Chassis height	1.74 in. (4.4 cm)
Chassis width	<ul style="list-style-type: none"> <li>• Including mounting brackets: 19 in. (48.3 cm)</li> <li>• Excluding mounting brackets: 17.4 in. (44.2 cm)</li> </ul>
Chassis depth	<ul style="list-style-type: none"> <li>• Including FRU handles and locking levers: 29.2 in. (74.2 cm)</li> <li>• Excluding FRU handles and locking levers: 28 in. (71.1 cm)</li> </ul>

Table 10: Physical Specifications for the QFX3500 Device Chassis (*continued*)

Description	Value
Weight	<ul style="list-style-type: none"> <li>• With FRUs installed: 30.8 lb (14 kg)</li> <li>• Without FRUs installed: 23.8 lb (11 kg)</li> <li>• AC power supply: 2.2 lb (1 kg)</li> <li>• Fan tray: 0.9 lb (0.4 kg)</li> <li>• Management board: 1.3 lb (0.6 kg)</li> </ul>

- Related Documentation**
- [Rack Requirements for a QFX3500 Device on page 96](#)
  - [Cabinet Requirements for a QFX3500 Device on page 99](#)
  - [Mounting a QFX3500 Device in a Rack or Cabinet on page 261](#)
  - [Installing and Connecting a QFX3500 Device on page 259](#)
  - [Installing and Removing QFX3500 Device Hardware Components on page 361](#)

## Front Panel of a QFX3500 Device

The front panel of the QFX3500 device consists of the following components:

- Management board
- Chassis serial number label and ESD point



**NOTE:** The chassis serial number ID label is located on a sliding panel to the right of the fan tray on a QFX3500 device (see [Figure 35 on page 66](#)). To use the sliding panel as an ESD point, pull the sliding panel partway out of the chassis, and connect a clip-style or tape-style ESD grounding strap to the panel.

- Fan trays
- Power supplies

[Figure 34 on page 65](#) and [Figure 35 on page 66](#) show the front of a QFX3500 device.

**Figure 34: QFX3500 Device Front Panel**

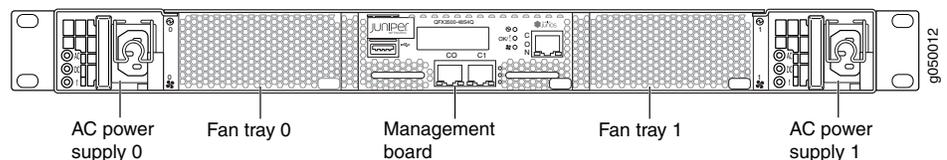
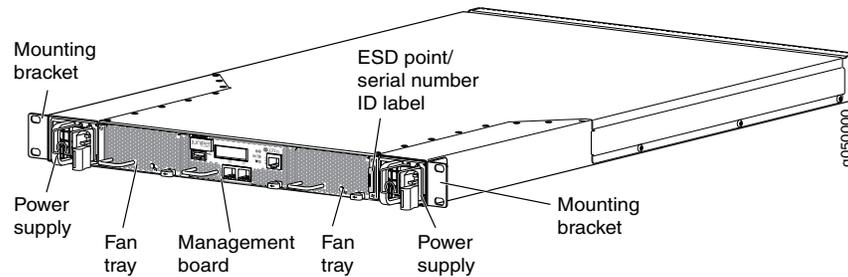


Figure 35: QFX3500 Device Front



#### Related Documentation

- [Field-Replaceable Units in a QFX3500 Device on page 63](#)
- [Rear Panel of a QFX3500 Device on page 66](#)
- [USB Port Specifications for the QFX Series on page 105](#)
- [Management Board for a QFX3500 Device on page 71](#)
- [Chassis Status LEDs on a QFX3500 Device on page 397](#)
- [Cooling System and Airflow for a QFX3500 Device on page 68](#)
- [AC Power Supply for a QFX3500 Device on page 73](#)
- [Prevention of Electrostatic Discharge Damage on page 192](#)
- [Installing and Removing QFX3500 Device Hardware Components on page 361](#)

## Rear Panel of a QFX3500 Device

The rear panel of the QFX3500 device consists of the following components:

- **Access ports**—The QFX3500 device has 48 access ports (**0** through **47**) that support small form-factor pluggable plus (SFP+) and small form-factor pluggable (SFP) transceivers, as well as SFP+ direct attach copper cables, also known as Twinax cables. See [“Interface Specifications for SFP+ Transceivers for QFX3500 Device Access Ports” on page 108](#) and [“Interface Specifications for SFP+ DAC Cables for QFX3500 Device Access Ports” on page 117](#).
- Up to 48 of the access ports can be used for SFP+ transceivers or SFP+ direct attach copper cables. You can use 10-Gigabit Ethernet SFP+ transceivers and SFP+ direct attach copper cables in any access port. You can use 2-Gbps, 4-Gbps, or 8-Gbps Fibre Channel SFP+ transceivers in ports **0** through **5** and ports **42** through **47**.



**NOTE:** If you use Fibre Channel SFP+ transceivers in ports 0 through 5 or ports 42 through 47, you must configure the entire block of ports as Fibre Channel ports. For example, if you use a Fibre Channel SFP+ transceiver in any of the ports 0 through 5, then ports 0 through 5 must be configured as Fibre Channel ports. If you use a Fibre Channel SFP+ transceiver in any of the ports 42 through 47, then ports 42 through 47 must be configured as Fibre Channel ports. You then cannot use 10-Gigabit Ethernet SFP+ transceivers in these ports.

- Up to 36 of the access ports can be used for SFP transceivers. Gigabit Ethernet SFP transceivers can be used in ports 6 through 41.



**CAUTION:** Do not place a copper transceiver in an access port directly above or below another copper transceiver. Internal damage to the access ports and device can occur. Because of this limitation, a maximum of 18 copper transceivers can be installed in ports 6 through 41. We recommend using only the top row of access ports for copper transceivers.

- Uplink ports—The QFX3500 device has four uplink ports (Q0 through Q3) that support up to four QSFP+ to four SFP+ copper breakout cables. See Interface Specifications for QSFP+ DAC Breakout Cables for QFX3500 Device Uplink Ports. When the QFX3500 is used as a Node device in a QFX3000 QFabric system, these uplink ports are used to connect the QFX3500 Node devices to Interconnect devices. See [“Interface Specifications for Data Plane Connections for the QFabric System” on page 127](#).

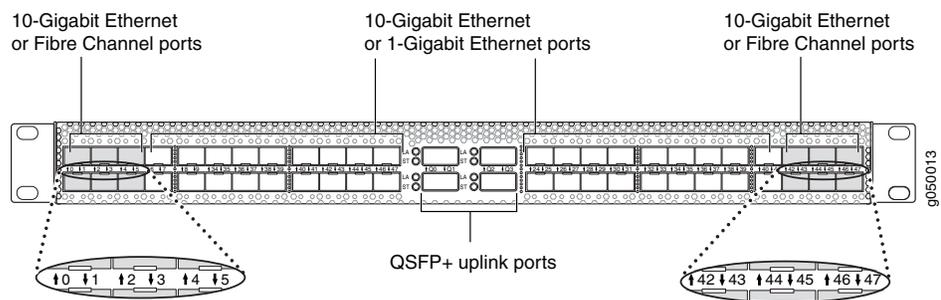


**NOTE:** The QSFP+ uplink ports are not supported in Junos OS Release 11.1. The QSFP+ uplink ports and QSFP+ to four SFP+ breakout cables are supported in Junos OS Release 11.2 and later.

- Access port and uplink port LEDs

Figure 36 on page 67 shows the rear panel of a QFX3500 device.

Figure 36: QFX3500 Device Rear Panel

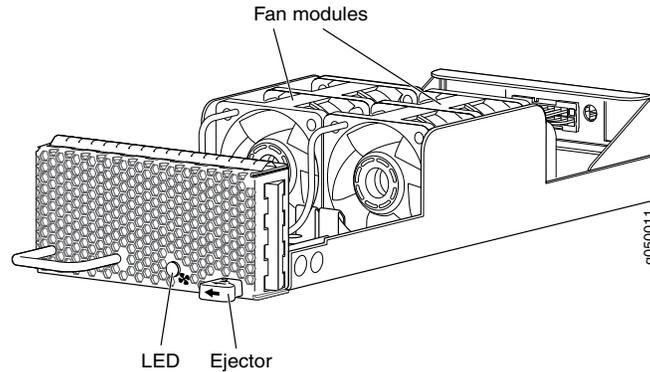


- Related Documentation**
- [Field-Replaceable Units in a QFX3500 Device on page 63](#)
  - [Front Panel of a QFX3500 Device on page 65](#)
  - [Access Port and Uplink Port LEDs on a QFX3500 Device on page 399](#)
  - [Installing and Removing QFX3500 Device Hardware Components on page 361](#)

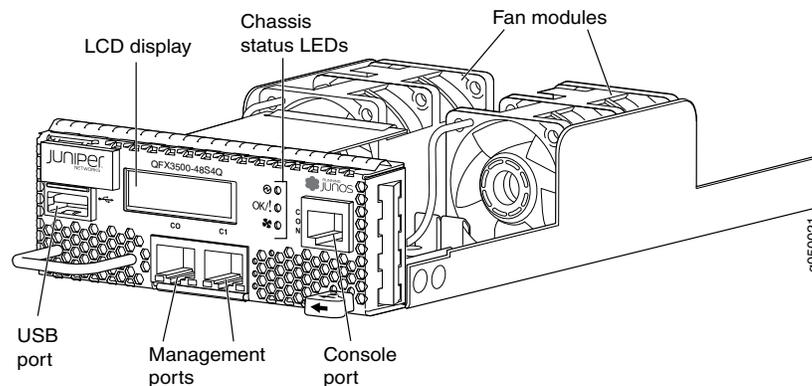
## Cooling System and Airflow for a QFX3500 Device

The cooling system in a QFX3500 device consists of two field-replaceable unit (FRU) fan trays with two fan modules each (see [Figure 37 on page 68](#)) and two fan modules on the management board FRU (see [Figure 38 on page 68](#)). In addition, the power supplies have internal fans to cool themselves.

**Figure 37: Fan Tray for a QFX3500 Device**



**Figure 38: Management Board for a QFX3500 Device**



The QFX3500 device provides FRU-side-to-port-side or port-side-to-FRU-side airflow depending on the device model you purchase. [Table 11 on page 69](#) lists the different QFX3500 device models and their direction of airflow.



**NOTE:** In QFX Series device model names, *AFI*, or *airflow in*, describes FRU-side-to-port-side airflow. *AFO*, or *airflow out*, describes port-side-to-FRU-side airflow.



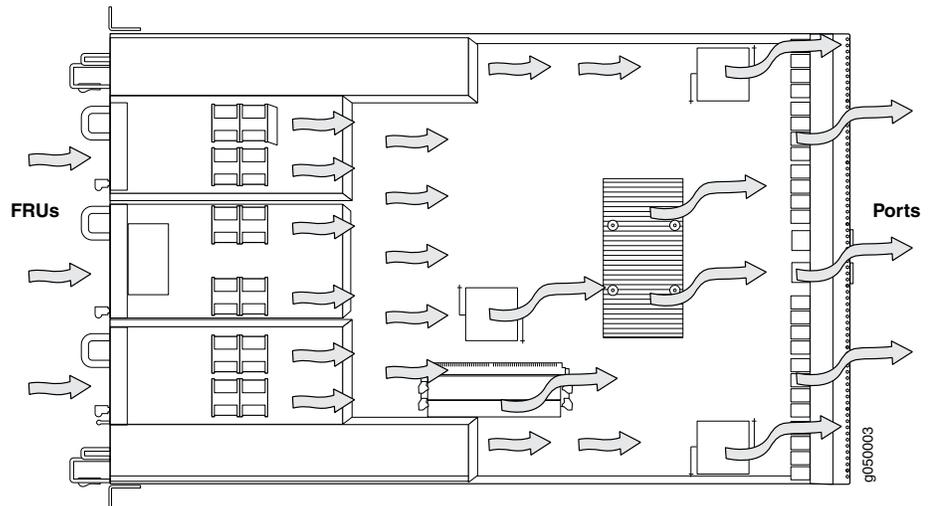
**NOTE:** The front panel of the device where the power supplies, fan trays, and management boards are located is the FRU -side of the device.

**Table 11: Airflow Direction in QFX3500 Device Models**

Model	Direction of Airflow
QFX3500-48S4Q-ACR	FRU-side-to-port-side
QFX3500-48S4Q-AFI	FRU-side-to-port-side
QFX3500-48S4Q-AFO	Port-side-to-FRU-side

In the QFX3500 device models that have FRU-side-to-port-side airflow, the air intake to cool the chassis is located on the front panel of the chassis, where the FRUs are installed. Air is pulled into the chassis and pushed away from the fan trays and management board. Hot air exhausts from the rear of the chassis, where the ports are located. See [Figure 39 on page 69](#).

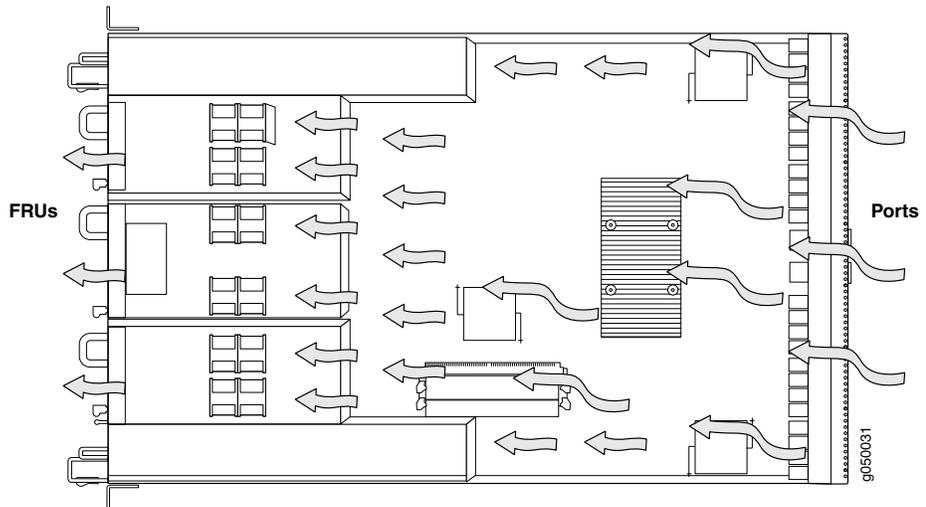
**Figure 39: FRU-Side-to-Port-Side Airflow Through the QFX3500 Chassis**



In the QFX3500 device models that have port-side-to-FRU-side airflow, the air intake to cool the chassis is located on the rear panel of the chassis, the side with access and uplink ports. Air is pulled into the chassis and pulled through the fan trays and

management boards. Hot air exhausts from the front of the chassis, where the FRUs are installed. See [Figure 40 on page 70](#).

**Figure 40: Port-Side-to-FRU-Side Airflow Through the QFX3500 Chassis**

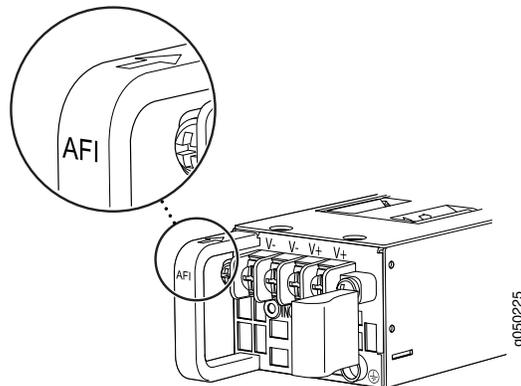


Each airflow type requires specific fan trays, management boards, and power supplies, that have fan modules oriented in the proper direction. The fan trays and management boards are designed so that they can only be inserted into the QFX3500 device model that supports the same airflow type. The power supplies have labels and arrows on the handles that depict the direction of airflow (see [Figure 41 on page 70](#)). The label **AFI** denotes FRU-side-to-port-side airflow, **AFO** denotes port-side-to-FRU-side airflow.



**CAUTION:** Verify that the direction of the arrow on the power supply handle matches the direction of airflow in the chassis. See [Table 11 on page 69](#) to determine your model's airflow direction.

**Figure 41: Label Identifying Airflow Direction on Power Supply Handle**



[Table 12 on page 71](#) lists the QFX3500 device FRUs and their direction of airflow.

Table 12: Airflow Direction in QFX3500 Device FRUs

FRU	Model	Direction of Airflow
RJ-45 management board	QFX3500-MB	FRU-side-to-port-side
	QFX3500-MB-RJ45-AFO	Port-side-to-FRU-side
SFP management board	QFX3500-MB-SFP-AFI	FRU-side-to-port-side
	QFX3500-MB-SFP-AFO	Port-side-to-FRU-side
Fan tray	QFX3500-FANAI	FRU-side-to-port-side
	QFX3500-FAN-AFO	Port-side-to-FRU-side
AC power supply	QFXC01-PWRACI-650A	FRU-side-to-port-side
	JPSU-650W-AC-AFO	Port-side-to-FRU-side
DC power supply	JPSU-650W-DC-AFI	FRU-side-to-port-side
	JPSU-650W-DC-AFO	Port-side-to-FRU-side

The chassis includes a fan speed-control system. Under normal operating conditions, fans operate at reduced speed to reduce noise and power consumption.

Temperature sensors in the chassis monitor the temperature within the chassis. The system raises an alarm if a fan fails or if the temperature inside the chassis rises above permitted levels. If the temperature inside the chassis rises above the threshold, the device shuts down automatically. You can see the status of fans and the temperature remotely through the CLI by issuing the operational mode command **show chassis environment**.

You cannot replace a single fan module. If one or more fan modules fail, you must replace the entire fan tray or management board.

#### Related Documentation

- [Field-Replaceable Units in a QFX3500 Device on page 63](#)
- [Installing a Fan Tray in a QFX3500 Device on page 365](#)
- [Removing a Fan Tray from a QFX3500 Device on page 367](#)
- [Installing a Management Board in a QFX3500 Device on page 368](#)
- [Removing a Management Board from a QFX3500 Device on page 369](#)

## Management Board for a QFX3500 Device

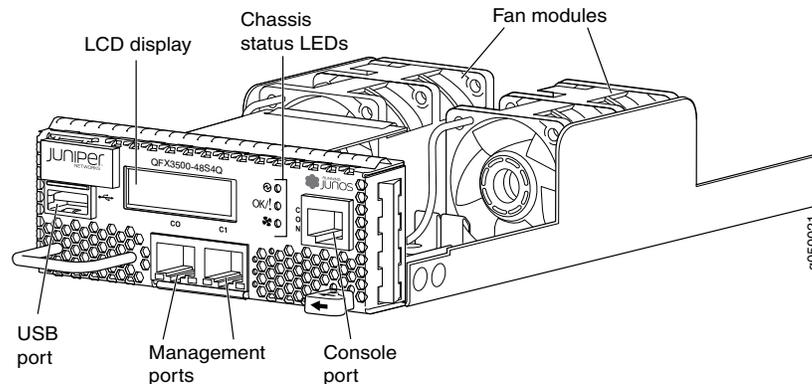
The management board for a QFX3500 device (see [Figure 42 on page 72](#)) is a field-replaceable unit (FRU) that you install on the front panel.



**CAUTION:** You must power off the QFX3500 device before replacing the management board.

Figure 42 on page 72 shows the management board.

**Figure 42: Management Board for a QFX3500 Device**



The management board contains the following components on the faceplate:

- LCD panel—The LCD panel displays the device hostname and the number of active alarms.



**TIP:** Alternatively, you can use the `show chassis lcd` CLI command to view what is currently displayed on the LCD panel.

- Chassis status LEDs
- USB port
- Console (**CON**) port (RJ-45)
- Management (**CO** and **C1**) ports

There are two types of management boards:

- RJ-45 management board—Provides two 1000BASE-T RJ-45 management ports.
  - If you are using the QFX3500 device as a Node device in a QFabric system, see [“Cable Specifications for Control Plane Connections for the QFX Series”](#) on page 129 for information about the required cables.
  - If you are using the QFX3500 device as a standalone switch, see [“Cable Specifications for Console and Management Connections for the QFX Series”](#) on page 130 for information about the required cables.
- SFP management board—Provides two 1-Gbps small form-factor pluggable (SFP) management ports.

- If you are using the QFX3500 device as a Node device in a QFabric system, see [“Interface Specifications for Control Plane Connections for the QFabric System” on page 124](#) for information about the supported transceivers and required cables.
- If you are using the QFX3500 device as a standalone switch, see [Interface Specifications for SFP Transceivers for QFX3500 Device Management Ports](#) for information about the supported transceivers and required cables.

In addition to the fan trays, two fan modules on the management board provide airflow to cool the chassis. The management board provides FRU-side-to-port-side or port-side-to-FRU-side airflow depending on the device model you purchase. [Table 13 on page 73](#) lists the different management boards and their direction of airflow. The management boards are designed so that they can only be inserted into the QFX3500 model that supports the same airflow type.



**NOTE:** The front panel of the device where the power supplies, fan trays, and management boards are located is the FRU side of the device.

**Table 13: Airflow Direction in QFX3500 Management Boards**

FRU	Model	Direction of Airflow
RJ-45 management board	QFX3500-MB	FRU-side-to-port-side
	QFX3500-MB-RJ45-AFO	Port-side-to-FRU-side
SFP management board	QFX3500-MB-SFP-AFI	FRU-side-to-port-side
	QFX3500-MB-SFP-AFO	Port-side-to-FRU-side

**Related Documentation**

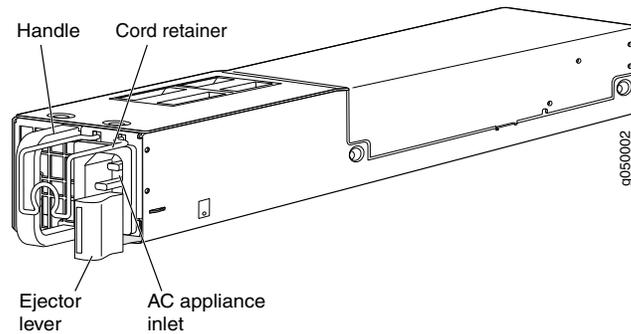
- [Chassis Status LEDs on a QFX3500 Device on page 397](#)
- [USB Port Specifications for the QFX Series on page 105](#)
- [Connecting a QFX Series Device to a Management Console on page 285](#)
- [Connecting a QFX3500 Node Device to the Control Plane Network on page 282](#)
- [Connecting a QFX3500 Device to a Network for Out-of-Band Management](#)
- [Cooling System and Airflow for a QFX3500 Device on page 68](#)

## AC Power Supply for a QFX3500 Device

The power supplies in QFX3500 devices (see [Figure 43 on page 74](#)) are hot-removable and hot-insertable field-replaceable units (FRUs) that you can install on the front panel without powering off the device or disrupting the switching function.

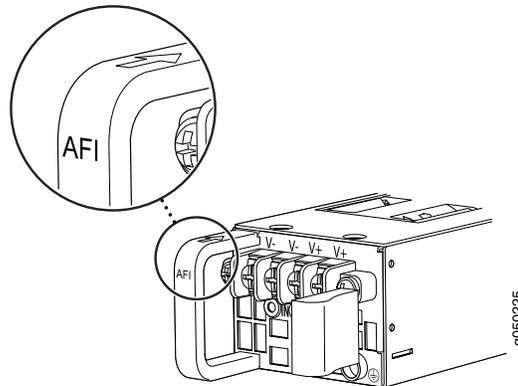
The AC power supply in QFX3500 devices is 650 W.

Figure 43: AC Power Supply in QFX3500 Devices



The power supply provides FRU-side-to-port-side or port-side-to-FRU-side airflow depending on the model you purchase. The power supplies have labels and arrows on the handles that depict the direction of airflow (see Figure 44 on page 74). The label **AFI** denotes FRU-side-to-port-side airflow, **AFO** denotes port-side-to FRU-side airflow.

Figure 44: Label Identifying Airflow Direction on Power Supply Handle



**CAUTION:** Verify that the direction of the arrow on the power supply handle matches the direction of airflow in the chassis. Ensure that each power supply you install in the chassis has the same airflow direction. If you install power supplies with two different airflow directions, Junos OS will raise an alarm and the status (OK/!) LED will blink amber.

Table 14 on page 74 shows the different power supplies and their direction of airflow.

Table 14: Airflow Direction in QFX3500 Power Supplies

Model	Direction of Airflow
JPSU-650W-AC-AFO	Port-side-to-FRU-side
QFXC01-PWRACI-650A	FRU-side-to-port-side

To avoid electrical injury, carefully follow instructions in “Installing a Power Supply in a QFX3500 Device” on page 362 and “Removing a Power Supply from a QFX3500 Device” on page 364.

**Related Documentation**

- [AC Power Cord Specifications for a QFX3500 Device on page 147](#)
- [AC Power Supply LEDs on a QFX3500 Device on page 402](#)
- [Front Panel of a QFX3500 Device on page 65](#)
- [Field-Replaceable Units in a QFX3500 Device on page 63](#)
- [AC Power Specifications for a QFX3500 Device on page 147](#)
- [Prevention of Electrostatic Discharge Damage on page 192](#)
- [Connecting AC Power to a QFX3500 Device on page 265](#)

## DC Power Supply for a QFX3500 Device

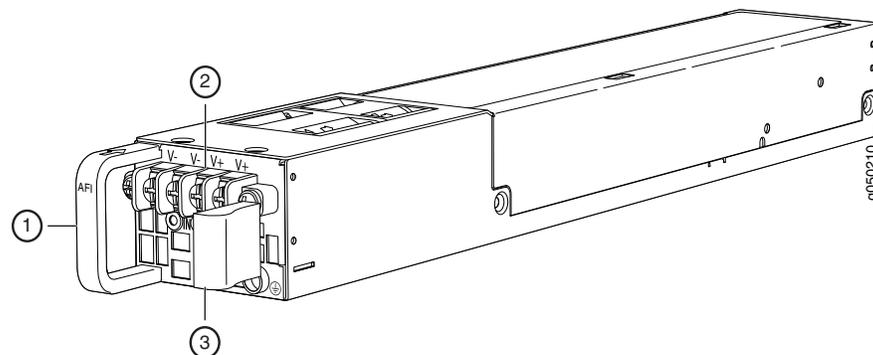
The power supplies in a QFX3500 device (see [Figure 45 on page 75](#)) are hot-removable and hot-insertable field-replaceable units (FRUs) that you can install on the front panel without powering off the device or disrupting the switching function.

The DC power supply in a QFX3500 device is 650 W.



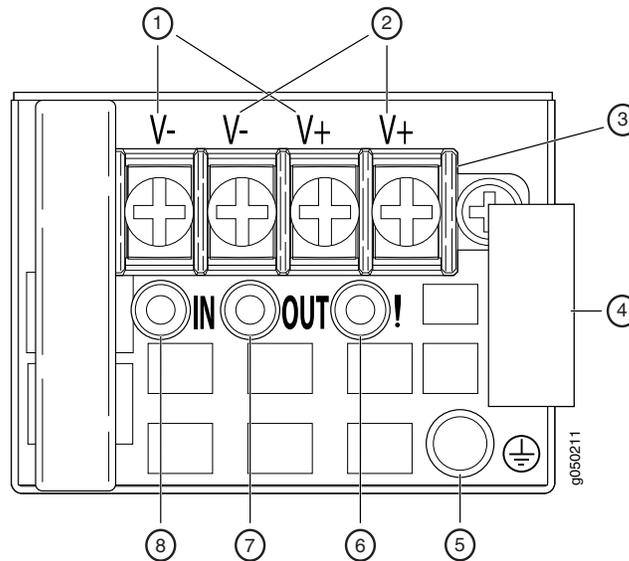
**NOTE:** The V+ terminals are referred to as +RTN and V– terminals are referred to as –48 V in “[DC Power Wiring Sequence Warning](#)” on page 201 and “[DC Power Electrical Safety Guidelines](#)” on page 197.

**Figure 45: DC Power Supply for a QFX3500 Device**



1— Handle	3— Ejector lever
2— Terminal block	

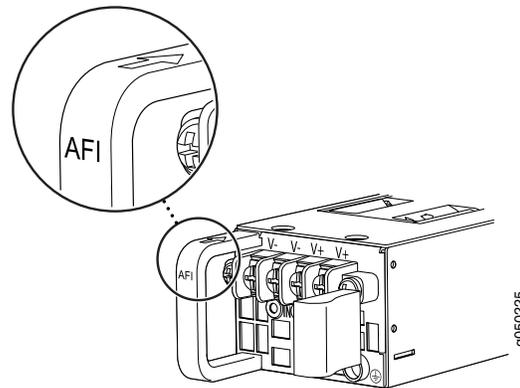
Figure 46: DC Power Supply Faceplate for a QFX3500 Device



1— Feed A input terminals	5—ESD grounding point
2— Feed B input terminals	6— Fault LED
3— Terminal block	7— Output LED
4— Ejector lever	8— Input LED

The power supply provides FRU-side-to-port-side or port-side-to-FRU-side airflow depending on the model you purchase. The power supplies have labels and arrows on the handles that depict the direction of airflow (see Figure 47 on page 76). The label **AFI** denotes FRU-side-to-port-side airflow, **AFO** denotes port-side-to-FRU-side airflow.

Figure 47: Label Identifying Airflow Direction on Power Supply Handle



**CAUTION:** Verify that the direction of the arrow on the power supply handle matches the direction of airflow in the chassis. Ensure that each power supply you install in the chassis has the same airflow direction. If you install power supplies with two different airflow directions, Junos OS raises an alarm, and the status (OK/!) LED blinks amber.

Table 15 on page 77 shows the different power supplies and their direction of airflow.

**Table 15: Airflow Direction in QFX3500 Device Power Supplies**

Model	Direction of Airflow
JPSU-650W-DC-AFO	Port-side-to-FRU-side
JPSU-650W-DC-AFI	FRU-side-to-port-side

To avoid electrical injury, carefully follow instructions in “Installing a Power Supply in a QFX3500 Device” on page 362 and “Removing a Power Supply from a QFX3500 Device” on page 364.

**Related Documentation**

- DC Power Supply LEDs on a QFX3500 Device on page 403
- DC Power Specifications for a QFX3500 Device on page 149

## Grounding Cable and Lug Specifications for a QFX3500 Device

For installations that require a separate grounding conductor to the chassis, the device must be adequately grounded before power is connected to ensure proper operation and to meet safety and electromagnetic interference (EMI) requirements. To ground a QFX3500 device, connect a grounding cable to earth ground and then attach it to the chassis grounding points.



**WARNING:** The device is pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal provided on the chassis in addition to the grounding pin of the power supply cord. This separate protective earthing terminal must be permanently connected to earth ground for installations that require a separate grounding conductor to the chassis.



**CAUTION:** Before device installation begins, a licensed electrician must attach a cable lug to the grounding cables that you supply. See “Connecting Earth Ground to a QFX3500 Device” on page 264. A cable with an incorrectly attached lug can damage the device.

Before connecting the device to earth ground, review the following information:

- A protective earthing terminal bracket is provided in the accessory kit for connecting the device to earth ground. This L-shaped bracket attaches to a post on the QFX3500 device left front mounting bracket, providing a protective earthing terminal for the device. The grounding points are studs sized for M4 hex nuts. The grounding points are spaced at 0.625 in. (15.86 mm). M4 hex nuts with integrated washers are provided in the accessory kit.

- The grounding lug required is a Panduit LCD10-10A-L or equivalent. This grounding lug is provided in the accessory kit. The grounding lug provided accommodates 14–10 AWG (2–5.3 mm<sup>2</sup>) stranded wire.
- The grounding cable that you provide for a QFX3500 edge device must be 14 AWG (2 mm<sup>2</sup>), minimum 60° C wire, or as permitted by the local code.

**Related  
Documentation**

- [AC Power Supply for a QFX3500 Device on page 73](#)
- [Connecting AC Power to a QFX3500 Device on page 265](#)

## PART 2

# Planning

- [Site Preparation on page 81](#)
- [Rack and Cabinet Requirements on page 93](#)
- [Port and Interface Specifications on page 105](#)
- [Cable Specifications on page 129](#)
- [Planning QFX3100 Power Requirements on page 135](#)
- [Planning QFX3008-I Power Requirements on page 137](#)
- [Planning QFX35000 Power Requirements on page 147](#)
- [Compliance on page 151](#)



## CHAPTER 5

# Site Preparation

- [Planning a QFX3000-G QFabric System Deployment on page 81](#)
- [Site Preparation Checklist for a QFX3100 Director Device on page 83](#)
- [Site Preparation Checklist for a QFX3008-I Interconnect Device on page 84](#)
- [Site Preparation Checklist for a QFX3500 Device on page 86](#)
- [General Site Guidelines on page 87](#)
- [Site Electrical Wiring Guidelines on page 87](#)
- [Environmental Requirements and Specifications for the QFX3100 Director Device on page 89](#)
- [Environmental Requirements and Specifications for a QFX3008-I Interconnect Device on page 90](#)
- [Environmental Requirements and Specifications for the QFX3500 Device on page 91](#)

### Planning a QFX3000-G QFabric System Deployment

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A QFX3000 QFabric system is formed by interconnecting QFX3500 Node devices, QFX3008-I Interconnect Devices, and QFX3100 Director devices. Two Virtual Chassis, composed of four EX4200 switches each, are used to interconnect the control plane and management network.

Before installing a QFabric system, you must consider the following factors:

- The number of devices in the QFabric system and location—You can interconnect up to 128 QFX3500 Node devices and 4 QFX3008-I Interconnect Devices; each QFabric system must have 2 QFX3100 Director devices operating in a Director group. For information about the size and strength of racks for the devices, see the following topics:
  - [Rack Requirements for a QFX3100 Director Device on page 93](#)
  - [Rack Requirements for a QFX3008-I Interconnect Device on page 95](#)
  - [Rack Requirements for a QFX3500 Device on page 96](#)
  - [Rack Requirements for EX4200 Switches](#)

For the dimensions and weights of the devices, see the following topics:

- [Chassis Physical Specifications for a QFX3100 Director Device on page 25](#)
- [Chassis Physical Specifications for a QFX3008-I Interconnect Device on page 41](#)
- [Chassis Physical Specifications for a QFX3500 Chassis on page 64](#)
- [Chassis Physical Specifications for EX4200 Switches](#)
- **Cabling requirements for the control plane and management network**—The control plane and management network are interconnected using standard 1000BASE-T Ethernet over copper wiring. Each network segment can be a maximum length of 100 m (328 ft). See [“Cable Specifications for Control Plane Connections for the QFX Series” on page 129](#).
- **Cabling requirements for the data plane**—The data plane is interconnected using standard 40GBASE-SR 40-Gigabit Ethernet QSFP+ optical transceivers over fiber-optic wiring. If you use OM3 optical fiber, each network segment can be a maximum of 100 m (328 ft). If you use OM4 optical fiber, each network segment can be a maximum of 150 m (492 ft). However, keep in mind that each network segment in the control plane and management network is limited to a maximum length of 100 m (328 ft). See [“Interface Specifications for Data Plane Connections for the QFabric System” on page 127](#).
- **Power supply**—You must plan the installation site to meet the power requirements of all the devices in the QFX3000 QFabric system. For information on power requirements and configuration options for each device, see the following topics:
  - [AC Power Specifications for a QFX3100 Director Device on page 135](#)
  - [AC Power Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 137](#)
  - [AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays on page 138](#)
  - [AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays on page 138](#)
  - [AC Power Specifications for a QFX3500 Device on page 147](#)
  - [Power Specifications for EX4200 Switches](#)
- **For more information about the site preparation requirements for each device, see the following topics:**
  - [Site Preparation Checklist for a QFX3100 Director Device on page 83](#)
  - [Site Preparation Checklist for a QFX3008-I Interconnect Device on page 84](#)
  - [Site Preparation Checklist for a QFX3500 Device on page 86](#)
  - [Site Preparation Checklist for EX4200 Switches](#)

**Related Documentation**

- [QFX3000-G QFabric System Installation Overview on page 209](#)

- [Understanding QFX3000-G QFabric System Hardware Configurations](#) on page 10
- [Clearance Requirements for Airflow and Hardware Maintenance for a QFX3100 Director Device](#) on page 99
- [Clearance Requirements for Airflow and Hardware Maintenance for a QFX3008-I Interconnect Device](#) on page 100
- [Clearance Requirements for Airflow and Hardware Maintenance for a QFX3500 Device](#) on page 102
- [Clearance Requirements for Airflow and Hardware Maintenance for EX4200 Switches](#)

## Site Preparation Checklist for a QFX3100 Director Device

The checklist in [Table 16 on page 83](#) summarizes the tasks you need to perform when preparing a site for a QFX3100 Director device installation.

**Table 16: Site Preparation Checklist**

Item or Task	For More Information	Performed By	Date
<b>Environment</b>			
Verify that environmental factors such as temperature and humidity do not exceed QFX3100 Director device tolerances.	<a href="#">“Environmental Requirements and Specifications for the QFX3100 Director Device”</a> on page 89		
<b>Power</b>			
Measure the distance between external power sources and QFX3100 Director device installation site.			
Calculate power consumption and requirements.			
<b>Hardware Configuration</b>			
Choose the number and types of QFX3100 Director devices you want to install.	<a href="#">“QFX3100 Director Device Overview”</a> on page 21		
<b>Rack or Cabinet</b>			
Verify that your rack or cabinet meets the minimum requirements for the installation of the QFX3100 Director device.	<a href="#">“Rack Requirements for a QFX3100 Director Device”</a> on page 93		
Plan the rack or cabinet location, including required space clearances.	<a href="#">“Clearance Requirements for Airflow and Hardware Maintenance for a QFX3100 Director Device”</a> on page 99		
Secure the rack or cabinet to the floor and building structure.			
<b>Cables</b>			

Table 16: Site Preparation Checklist (*continued*)

Item or Task	For More Information	Performed By	Date
Acquire cables and connectors:			
<ul style="list-style-type: none"> <li>Determine the number of cables needed based on your planned configuration.</li> <li>Review the maximum distance allowed for each cable. Choose the length of cable based on the distance between the hardware components being connected.</li> </ul>			
Plan cable routing and management.			
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li><a href="#">General Safety Guidelines and Warnings on page 161</a></li> <li><a href="#">General Site Guidelines on page 87</a></li> <li><a href="#">Installing and Connecting a QFX3100 Director Device on page 213</a></li> <li><a href="#">Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet on page 217</a></li> <li><a href="#">Mounting a QFX3100 Director Device on Two Posts in a Rack or Cabinet on page 215</a></li> </ul>		

## Site Preparation Checklist for a QFX3008-I Interconnect Device

The checklist in [Table 17 on page 84](#) summarizes the tasks you need to perform to prepare a site for installing a QFX3008-I Interconnect device.

Table 17: Site Preparation Checklist for a QFX3008-I Interconnect Device

Item or Task	For More Information	Performed By	Date
<b>Environment</b>			
Verify that environmental factors such as temperature and humidity do not exceed switch tolerances.	<a href="#">“Environmental Requirements and Specifications for a QFX3008-I Interconnect Device” on page 90</a>		
<b>Power</b>			
Measure the distance between the external power sources and the chassis installation site.			

Table 17: Site Preparation Checklist for a QFX3008-I Interconnect Device (*continued*)

Item or Task	For More Information	Performed By	Date
Calculate power consumption and requirements.	<p>“AC Power Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays” on page 137</p> <p>“Power Requirements for a QFX3008-I Interconnect Device” on page 139</p> <p>“Calculating Power Requirements for a QFX3008-I Interconnect Device” on page 143</p> <p>“Calculating the Fiber-Optic Cable Power Budget for a QFX Series Device” on page 132</p> <p>“Calculating the Fiber-Optic Cable Power Margin for a QFX Series Device” on page 132</p>		
<b>Rack or Cabinet</b>			
Select the type of rack or cabinet and verify that it meets the minimum requirements for the installation of the switch.	<p>“Rack Requirements for a QFX3008-I Interconnect Device” on page 95</p> <p>“Cabinet Requirements for a QFX3008-I Interconnect Device” on page 98</p>		
Plan rack or cabinet location, ensuring the required space clearances.	<p>“Clearance Requirements for Airflow and Hardware Maintenance for a QFX3008-I Interconnect Device” on page 100</p>		
Secure the rack or cabinet to the floor and building structure.	<p>“Rack Requirements for a QFX3008-I Interconnect Device” on page 95</p> <p>“Cabinet Requirements for a QFX3008-I Interconnect Device” on page 98</p>		
<b>Cables</b>			
<p>Plan the cable routing and management.</p> <p>Acquire cables and connectors:</p> <ul style="list-style-type: none"> <li>• Determine the number of cables needed based on your planned configuration.</li> <li>• Ensure that the distance between hardware components to be connected allows for cable lengths to be within the specified maximum limits.</li> </ul>			
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">General Safety Guidelines and Warnings on page 161</a></li> <li>• <a href="#">Installing and Connecting a QFX3008-I Interconnect Device on page 223</a></li> </ul>		

## Site Preparation Checklist for a QFX3500 Device

The checklist in [Table 18 on page 86](#) summarizes the tasks you need to perform when preparing a site for QFX3500 device installation.

**Table 18: Site Preparation Checklist**

Item or Task	For More Information	Performed By	Date
<b>Environment</b>			
Verify that environmental factors such as temperature and humidity do not exceed device tolerances.	"Environmental Requirements and Specifications for the QFX3500 Device" on page 91		
<b>Power</b>			
Measure distance between external power sources and device installation site.			
Calculate the power consumption and requirements.	"AC Power Specifications for a QFX3500 Device" on page 147		
<b>Rack or Cabinet</b>			
Verify that your rack or cabinet meets the minimum requirements for the installation of the device.	"Rack Requirements for a QFX3500 Device" on page 96 "Cabinet Requirements for a QFX3500 Device" on page 99		
Plan rack or cabinet location, including required space clearances.	"Clearance Requirements for Airflow and Hardware Maintenance for a QFX3500 Device" on page 102		
Secure the rack or cabinet to the floor and building structure.			
<b>Cables</b>			
Acquire cables and connectors:	"Interface Specifications for SFP+ Transceivers for QFX3500 Device Access Ports" on page 108		
<ul style="list-style-type: none"> <li>Determine the number of cables needed based on your planned configuration.</li> <li>Review the maximum distance allowed for each cable. Choose the length of cable based on the distance between the hardware components being connected.</li> </ul>	"Interface Specifications for SFP+ DAC Cables for QFX3500 Device Access Ports" on page 117		
Plan the cable routing and management.			

**Related Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [General Site Guidelines on page 87](#)
- [Installing and Connecting a QFX3500 Device on page 259](#)

- [Mounting a QFX3500 Device in a Rack or Cabinet on page 261](#)

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## General Site Guidelines

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This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.

Efficient device operation requires proper site planning and maintenance and proper layout of the equipment, rack or cabinet (if used), and wiring closet.

To plan and create an acceptable operating environment for your device and prevent environmentally caused equipment failures:

- Keep the area around the chassis free from dust and conductive material, such as metal flakes.
- Follow prescribed airflow guidelines to ensure that the cooling system functions properly and that exhaust from other equipment does not blow into the intake vents of the device.
- Follow the prescribed ESD prevention procedures to avoid damaging the equipment. Static discharge can cause components to fail completely or intermittently over time.
- Install the device in a secure area, so that only authorized personnel can access the device.

### Related Documentation

- [Prevention of Electrostatic Discharge Damage on page 192](#)
- [Environmental Requirements and Specifications for EX Series Switches](#)
- [Environmental Requirements and Specifications for the QFX3100 Director Device on page 89](#)
- [Environmental Requirements and Specifications for a QFX3008-I Interconnect Device on page 90](#)
- [Environmental Requirements and Specifications for the QFX3500 Device on page 91](#)

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## Site Electrical Wiring Guidelines

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This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.

[Table 19 on page 88](#) describes the factors you must consider while planning the electrical wiring at your site.



**WARNING:** It is particularly important to provide a properly grounded and shielded environment and to use electrical surge-suppression devices.

**Table 19: Site Electrical Wiring Guidelines**

Site Wiring Factor	Guidelines
Signaling limitations	<p>If your site experiences any of the following problems, consult experts in electrical surge suppression and shielding:</p> <ul style="list-style-type: none"> <li>• Improperly installed wires cause radio frequency interference (RFI).</li> <li>• Damage from lightning strikes occurs when wires exceed recommended distances or pass between buildings.</li> <li>• Electromagnetic pulses (EMPs) caused by lightning damage unshielded conductors and electronic devices.</li> </ul>
Radio frequency interference	<p>To reduce or eliminate radio frequency interference (RFI) from your site wiring, do the following:</p> <ul style="list-style-type: none"> <li>• Use twisted-pair cable with a good distribution of grounding conductors.</li> <li>• If you must exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal when applicable.</li> </ul>
Electromagnetic compatibility	<p>If your site is susceptible to problems with electromagnetic compatibility (EMC), particularly from lightning or radio transmitters, seek expert advice.</p> <p>Some of the problems caused by strong sources of electromagnetic interference (EMI) are:</p> <ul style="list-style-type: none"> <li>• Destruction of the signal drivers and receivers in the switch</li> <li>• Electrical hazards as a result of power surges conducted over the lines into the equipment</li> </ul>

**Related Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [Prevention of Electrostatic Discharge Damage on page 192](#)
- Power Supply in EX2200 Switches
- Power Supply in EX3200 Switches
- Power Supply in EX3300 Switches
- Power Supply in EX4200 Switches
- AC Power Supply in EX4500 Switches
- DC Power Supply in EX4500 Switches
- AC Power Supplies in an EX6200 Switch
- DC Power Supply in an EX6200 Switch
- AC Power Supply in an EX8200 Switch
- DC Power Supply in an EX8200 Switch
- [AC Power Supply in a QFX3100 Director Device on page 30](#)

- [AC Power Supply in a QFX3008-I Interconnect Device on page 52](#)
- [Wiring Tray in a QFX3008-I Interconnect Device on page 54](#)
- [AC Power Supply for a QFX3500 Device on page 73](#)
- [DC Power Supply for a QFX3500 Device on page 75](#)

## Environmental Requirements and Specifications for the QFX3100 Director Device

The device must be installed in a rack or cabinet housed in a dry, clean, well-ventilated, and temperature-controlled environment.

Follow these environmental guidelines:

- The site must be as dust-free as possible, because dust can clog air intake vents and filters, reducing the efficiency of the device cooling system.
- Maintain ambient airflow for normal device operation. If the airflow is blocked or restricted, or if the intake air is too warm, the device might overheat, leading to the device temperature monitor shutting down the device to protect the hardware components.

[Table 20 on page 89](#) provides the required environmental conditions for normal device operation.

**Table 20: QFX3100 Director Device Environmental Tolerances**

Description	Tolerance
Altitude	No performance degradation to 10,000 feet (3048 meters)
Relative humidity	Normal operation ensured in relative humidity range of 5% through 85%, noncondensing
Temperature	<ul style="list-style-type: none"> <li>• Normal operation ensured in temperature range of 32° F through 104° F (0° C through 40° C)</li> <li>• Short-term operation ensured in temperature range of 23° F through 131° F (–5° C through 55° C)</li> </ul> <p><b>NOTE:</b> As defined in NEBS GR-63-CORE, Issue 3, short-term events can be up to 96 hours in duration but not more than 15 days per year.</p> <ul style="list-style-type: none"> <li>• Nonoperating storage temperature in shipping container: –40° F through 158° F (–40° C through 70° C)</li> </ul>



**NOTE:** Install QFX Series devices only in restricted areas, such as dedicated equipment rooms and equipment closets, in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA 70.

### Related Documentation

- [Clearance Requirements for Airflow and Hardware Maintenance for a QFX3100 Director Device on page 99](#)
- [Installing and Connecting a QFX3100 Director Device on page 213](#)

## Environmental Requirements and Specifications for a QFX3008-I Interconnect Device

The QFX3008-I Interconnect device chassis must be installed in a rack or cabinet housed in a dry, clean, well-ventilated, and temperature-controlled environment.

Follow these environmental guidelines:

- The site must be as dust-free as possible, because dust can clog air intake vents and filters, reducing the efficiency of the device cooling system.
- Maintain ambient airflow for normal device operation. If the airflow is blocked or restricted, or if the intake air is too warm, the device might overheat, leading to the device temperature monitor shutting down the device to protect the hardware components.

Table 21 on page 90 provides the required environmental conditions for normal device operation.

**Table 21: QFX3008-I Interconnect Device Environmental Tolerances**

Description	Tolerance
Altitude	No performance degradation to 10,000 feet (3048 meters)
Relative humidity	Normal operation ensured in relative humidity range of 5% through 85%, noncondensing
Temperature	<ul style="list-style-type: none"> <li>• Normal operation ensured in temperature range of 32° F through 104° F (0° C through 40° C)</li> <li>• Short-term operation ensured in temperature range of 23° F through 122° F (–5° C through 50° C)</li> </ul> <p><b>NOTE:</b> As defined in NEBS GR-63-CORE, Issue 3, short-term events can be up to 96 hours in duration but not more than 15 days per year.</p> <ul style="list-style-type: none"> <li>• Nonoperating storage temperature in shipping container: –40° F through 158° F (–40° C through 70° C)</li> </ul>
Seismic	Designed to comply with Zone 4 earthquake requirements per NEBS GR-63-CORE, Issue 3.



**NOTE:** Install QFX Series devices only in restricted areas, such as dedicated equipment rooms and equipment closets, in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA 70.

### Related Documentation

- [Clearance Requirements for Airflow and Hardware Maintenance for a QFX3008-I Interconnect Device on page 100](#)
- [Installing and Connecting a QFX3008-I Interconnect Device on page 223](#)

## Environmental Requirements and Specifications for the QFX3500 Device

The device must be installed in a rack or cabinet housed in a dry, clean, well-ventilated, and temperature-controlled environment.

Follow these environmental guidelines:

- The site must be as dust-free as possible, because dust can clog air intake vents and filters, reducing the efficiency of the device cooling system.
- Maintain ambient airflow for normal device operation. If the airflow is blocked or restricted, or if the intake air is too warm, the device might overheat, leading to the device temperature monitor shutting down the device to protect the hardware components.

Table 22 on page 91 provides the required environmental conditions for normal device operation.

**Table 22: QFX3500 Device Environmental Tolerances**

Description	Tolerance
Altitude	No performance degradation to 10,000 feet (3048 meters)
Relative humidity	Normal operation ensured in relative humidity range of 5% through 85%, noncondensing
Temperature	<ul style="list-style-type: none"> <li>• Normal operation ensured in temperature range of 32° F through 104° F (0° C through 40° C)</li> <li>• Short-term operation ensured in temperature range of 23° F through 131° F (–5° C through 55° C)</li> </ul> <p><b>NOTE:</b> As defined in NEBS GR-63-CORE, Issue 3, short-term events can be up to 96 hours in duration but not more than 15 days per year.</p> <ul style="list-style-type: none"> <li>• Nonoperating storage temperature in shipping container: –40° F through 158° F (–40° C through 70° C)</li> </ul>
Seismic	Designed to comply with Zone 4 earthquake requirements per NEBS GR-63-CORE, Issue 3.



**NOTE:** Install QFX Series devices only in restricted areas, such as dedicated equipment rooms and equipment closets, in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA 70.

### Related Documentation

- [Clearance Requirements for Airflow and Hardware Maintenance for a QFX3500 Device on page 102](#)
- [Installing and Connecting a QFX3500 Device on page 259](#)



## CHAPTER 6

# Rack and Cabinet Requirements

- [Rack Requirements for a QFX3100 Director Device on page 93](#)
- [Rack Requirements for a QFX3008-I Interconnect Device on page 95](#)
- [Rack Requirements for a QFX3500 Device on page 96](#)
- [Cabinet Requirements for a QFX3100 Director Device on page 97](#)
- [Cabinet Requirements for a QFX3008-I Interconnect Device on page 98](#)
- [Cabinet Requirements for a QFX3500 Device on page 99](#)
- [Clearance Requirements for Airflow and Hardware Maintenance for a QFX3100 Director Device on page 99](#)
- [Clearance Requirements for Airflow and Hardware Maintenance for a QFX3008-I Interconnect Device on page 100](#)
- [Clearance Requirements for Airflow and Hardware Maintenance for a QFX3500 Device on page 102](#)

## Rack Requirements for a QFX3100 Director Device

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You can mount the QFX3100 Director device on two-post racks or four-post racks.

Rack requirements consist of:

- Rack type
- Mounting bracket hole spacing
- Rack size and strength
- Rack connection to the building structure

[Table 23 on page 94](#) provides the rack requirements and specifications for the QFX3100 Director device.

Table 23: Rack Requirements and Specifications for the QFX3100 Director Device

Rack Requirement	Guidelines
Rack type	<p>Use a two-post rack or a four-post rack. You can mount the switch on any two-post or four-post rack that provides bracket holes or hole patterns spaced at 1 U (1.75 in. or 4.45 cm) increments and that meets the size and strength requirements to support the weight.</p> <p>A U is the standard rack unit defined in <i>Cabinets, Racks, Panels, and Associated Equipment</i> (document number EIA-310-D) published by the Electronics Industry Association.</p> <p>The rack must meet the strength requirements to support the weight of the chassis.</p>
Mounting bracket hole spacing	The holes in the mounting brackets are spaced at 1 U (1.75 in. or 4.45 cm), so that the QFX3100 Director device can be mounted in any rack that provides holes spaced at that distance.
Rack size and strength	<ul style="list-style-type: none"> <li>Ensure that the rack complies with one of these standards: <ul style="list-style-type: none"> <li>A 19-in. rack as defined in <i>Cabinets, Racks, Panels, and Associated Equipment</i> (document number EIA-310-D) published by the Electronics Industry Association.</li> <li>A 600-mm rack as defined in the four-part <i>Equipment Engineering (EE); European telecommunications standard for equipment practice</i> (document numbers ETS 300 119-1 through 119-4) published by the European Telecommunications Standards Institute (<a href="http://www.etsi.org">http://www.etsi.org</a>). The horizontal spacing between the rails in a rack that complies with this standard is usually wider than the QFX3100 Director device's mounting brackets, which measure 19 in. (48.2 cm) from outer edge to outer edge. Use approved wing devices to narrow the opening between the rails as required.</li> </ul> </li> <li>Ensure that the rack is one of the following standard lengths: <ul style="list-style-type: none"> <li>23.62 in. (600 mm)</li> <li>30 in. (762 mm)</li> <li>21.5 in. (546 mm)</li> </ul> </li> <li>Ensure that the rack rails are spaced widely enough to accommodate the QFX3100 Director device chassis' external dimensions. The outer edges of the front-mounting brackets extend the width of the chassis to 19 in. (48.2 cm).</li> <li>The rack must be strong enough to support the weight of the QFX3100 Director device.</li> <li>Ensure that the spacing of rails and adjacent racks allows for the proper clearance around the QFX3100 Director device and rack.</li> </ul>
Rack connection to building structure	<ul style="list-style-type: none"> <li>Secure the rack to the building structure.</li> <li>If earthquakes are a possibility in your geographical area, secure the rack to the floor.</li> <li>Secure the rack to the ceiling brackets as well as wall or floor brackets for maximum stability.</li> </ul>

One pair of mounting brackets for mounting the QFX3100 Director device on two or four posts of a rack is supplied with each QFX3100 Director device.

#### Related Documentation

- [Chassis Physical Specifications for a QFX3100 Director Device on page 25](#)
- [Cabinet Requirements for a QFX3100 Director Device on page 97](#)
- [Rack-Mounting and Cabinet-Mounting Warnings on page 179](#)
- [Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet on page 217](#)
- [Mounting a QFX3100 Director Device on Two Posts in a Rack or Cabinet on page 215](#)

## Rack Requirements for a QFX3008-I Interconnect Device

You can mount a QFX3008-I Interconnect device on two-post or four-post racks.

Rack requirements consist of:

- Rack type
- Mounting bracket hole spacing
- Rack size and strength
- Rack connection to the building structure

Table 24 on page 95 summarizes rack requirements and specifications for a QFX3008-I Interconnect device.

**Table 24: Rack Requirements and Specifications for a QFX3008-I Interconnect Device**

Rack Requirement	Guidelines
Rack type and mounting bracket hole spacing	<p>You can mount the device on any two-post or four-post rack that provides bracket holes or hole patterns spaced at 1 U (1.75 in. or 4.44 cm) increments and that meets the size and strength requirements specified in this table.</p> <p>A U is the standard rack unit defined in <i>Cabinets, Racks, Panels, and Associated Equipment</i> (document number EIA-310–D) published by the Electronics Industry Association.</p> <p>You can stack two QFX3008-I Interconnect devices in a rack that has at least 42 U. In all cases, the rack must meet the strength requirements to support the weight of the switch.</p>
Rack size and strength	<ul style="list-style-type: none"> <li>• Ensure that the rack is a 19-in. rack as defined in <i>Cabinets, Racks, Panels, and Associated Equipment</i> (document number EIA-310–D) published by the Electronics Industry Association.</li> <li>• Ensure that the rack rails are spaced widely enough to accommodate the QFX3008-I Interconnect device external dimensions of 17.3 in. (43.9 cm) width. The outer edges of the front-mounting brackets extend the width to 19 in. (48.3 cm).</li> <li>• The QFX3008-I Interconnect device height of 36.65 in. (93.09 cm) is approximately 21 U.</li> <li>• The rack must be strong enough to support the weight of the fully configured device. A fully configured QFX3008-I Interconnect device weighs approximately 650 lb (295 kg). If you stack two fully configured devices in one rack, that rack must support up to 1300 lb (590 kg).</li> <li>• Ensure that the spacing of rails and adjacent racks allows for the proper clearance around the switch and rack as specified in "<a href="#">Clearance Requirements for Airflow and Hardware Maintenance for a QFX3008-I Interconnect Device</a>" on page 100.</li> </ul>
Rack connection to the building structure	<ul style="list-style-type: none"> <li>• Secure the rack to the building structure.</li> <li>• If earthquakes are a possibility in your geographical area, secure the rack to the floor.</li> <li>• Secure the rack to the ceiling brackets as well as wall or floor brackets for maximum stability.</li> </ul>

- Related Documentation**
- [Rack-Mounting and Cabinet-Mounting Warnings on page 179](#)
  - [Cabinet Requirements for a QFX3008-I Interconnect Device on page 98](#)
  - [Chassis Physical Specifications for a QFX3008-I Interconnect Device on page 41](#)

## Rack Requirements for a QFX3500 Device

A QFX3500 device is designed to be installed on four-post racks.

Rack requirements consist of:

- Rack type
- Mounting bracket hole spacing
- Rack size and strength
- Rack connection to the building structure

[Table 25 on page 96](#) provides the rack requirements and specifications for the QFX3500 device.

**Table 25: Rack Requirements for the QFX3500 Device**

Rack Requirement	Guidelines
Rack type	<p>Use a four-post rack. You can mount the device on a four-post rack that provides bracket holes or hole patterns spaced at 1 U (1.75 in. or 4.45 cm) increments and that meets the size and strength requirements to support the weight.</p> <p>A U is the standard rack unit defined in <i>Cabinets, Racks, Panels, and Associated Equipment</i> (document number EIA-310–D) published by the Electronics Industry Association.</p>
Mounting bracket hole spacing	The holes in the mounting brackets are spaced at 1 U (1.75 in. or 4.45 cm), so that the device can be mounted in any rack that provides holes spaced at that distance.
Rack size and strength	<ul style="list-style-type: none"> <li>• Ensure that the rack complies with the standards for a 19-in. rack as defined in <i>Cabinets, Racks, Panels, and Associated Equipment</i> (document number EIA-310–D) published by the Electronics Industry Association.</li> <li>• Ensure that the rack rails are spaced widely enough to accommodate the device chassis' external dimensions. The outer edges of the front-mounting brackets extend the width to 19 in. (48.26 cm).</li> <li>• The front and rear rack rails must be spaced between 28 in. (71.1 cm) and 36 in. (91.4 cm) front-to-back.</li> <li>• The rack must be strong enough to support the weight of the device.</li> <li>• Ensure that the spacing of rails and adjacent racks allows for proper clearance around the device and rack.</li> </ul>
Rack connection to building structure	<ul style="list-style-type: none"> <li>• Secure the rack to the building structure.</li> <li>• If earthquakes are a possibility in your geographical area, secure the rack to the floor.</li> <li>• Secure the rack to the ceiling brackets as well as wall or floor brackets for maximum stability.</li> </ul>

- Related Documentation**
- [Chassis Physical Specifications for a QFX3500 Chassis on page 64](#)
  - [Rack-Mounting and Cabinet-Mounting Warnings on page 179](#)

- [Clearance Requirements for Airflow and Hardware Maintenance for a QFX3500 Device on page 102](#)
- [Mounting a QFX3500 Device in a Rack or Cabinet on page 261](#)

## Cabinet Requirements for a QFX3100 Director Device

You can mount the QFX3100 Director device in a cabinet that contains a 19-in. rack.

Cabinet requirements consist of:

- Cabinet size
- Clearance requirements
- Cabinet airflow requirements

[Table 26 on page 97](#) provides the cabinet requirements and specifications for the QFX3100 Director device.

**Table 26: Cabinet Requirements and Specifications for the QFX3100 Director Device**

Cabinet Requirement	Guidelines
Cabinet size	<ul style="list-style-type: none"> <li>• You can mount the QFX3100 Director device in a cabinet that contains a 19-in. rack as defined in <i>Cabinets, Racks, Panels, and Associated Equipment</i> (document number EIA-310-D) published by the Electronics Industry Association.</li> </ul> <p><b>NOTE:</b> The rack must meet the strength requirements to support the weight of the QFX3100 Director device.</p> <ul style="list-style-type: none"> <li>• The minimum cabinet size must be able to accommodate the maximum external dimensions of the QFX3100 Director device.</li> </ul>
Cabinet clearance	<ul style="list-style-type: none"> <li>• The outer edges of the mounting brackets extend the width of the chassis to 19 in. (48.3 cm).</li> <li>• The minimum total clearance inside the cabinet is 29.2 in. (74.17 cm) between the inside of the front door and the inside of the rear door.</li> </ul>
Cabinet airflow requirements	<p>When you mount the QFX3100 Director device in a cabinet, ensure that ventilation through the cabinet is sufficient to prevent overheating.</p> <ul style="list-style-type: none"> <li>• Ensure adequate cool air supply to dissipate the thermal output of the QFX3100 Director device or devices.</li> <li>• Ensure that the cabinet allows the chassis hot exhaust air to exit the cabinet without recirculating into the QFX3100 Director device. An open cabinet (without a top or doors) that employs hot air exhaust extraction from the top allows the best airflow through the chassis. If the cabinet contains a top or doors, perforations in these elements assist with removing the hot air exhaust.</li> <li>• Install the QFX3100 Director device in the cabinet in a way that maximizes the open space on the side of the chassis that has the hot air exhaust. This maximizes the clearance for critical airflow.</li> <li>• Route and dress all cables to minimize the blockage of airflow to and from the chassis.</li> <li>• Ensure that the spacing of rails and adjacent cabinets allows for the proper clearance around the QFX3100 Director device and cabinet.</li> <li>• A cabinet larger than the minimum required provides better airflow and reduces the chance of overheating.</li> </ul>

- Related Documentation**
- [Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet on page 217](#)
  - [Mounting a QFX3100 Director Device on Two Posts in a Rack or Cabinet on page 215](#)

## Cabinet Requirements for a QFX3008-I Interconnect Device

You can mount a QFX3008-I Interconnect device in a cabinet that contains a 19-in. rack as defined in *Cabinets, Racks, Panels, and Associated Equipment* (document number EIA-310-D) published by the Electronics Industry Association.

Cabinet requirements consist of:

- Cabinet size and clearance
- Cabinet airflow requirements

[Table 27 on page 98](#) summarizes cabinet requirements and specifications for a QFX3008-I Interconnect device.

**Table 27: Cabinet Requirements and Specifications for a QFX3008-I Interconnect Device**

Cabinet Requirement	Guidelines for the QFX3008-I Interconnect Device
Cabinet size and clearance	<ul style="list-style-type: none"> <li>• The minimum depth required to accommodate a QFX3008-I Interconnect device is 39.52 in. (100.38 cm). Large cabinets improve airflow and reduce the chance of overheating.</li> </ul> <p>A U is the standard rack unit defined in <i>Cabinets, Racks, Panels, and Associated Equipment</i> (document number EIA-310-D) published by the Electronics Industry Association.</p> <ul style="list-style-type: none"> <li>• With adequate cooling air and airflow clearance, you can stack two devices in a cabinet that has at least 42 U of usable vertical space. In all cases, the rack must meet the strength requirements to support the weight of the installed devices.</li> </ul>
Cabinet airflow requirements	<p>When you mount the device in a cabinet, ensure that ventilation through the cabinet is sufficient to prevent overheating. Consider the following requirements list when planning for chassis cooling:</p> <ul style="list-style-type: none"> <li>• Ensure that the cool air supply you provide through the cabinet adequately dissipates the thermal output of the device (or devices).</li> <li>• Ensure that the cabinet allows the chassis hot exhaust air to exit the cabinet without recirculating into the device. An open cabinet (without a top or doors) that employs hot air exhaust extraction from the top allows the best airflow through the chassis. If the cabinet contains a top or doors, perforations in these elements assist with removing the hot air exhaust. For an illustration of chassis airflow, see <a href="#">"Clearance Requirements for Airflow and Hardware Maintenance for a QFX3008-I Interconnect Device" on page 100</a>.</li> <li>• The device fans exhaust hot air through the rear of the chassis. Install the device in the cabinet in a way that maximizes the open space on the rear of the chassis. This maximizes the clearance for critical airflow.</li> <li>• Route and dress all cables to minimize the blockage of airflow to and from the chassis.</li> <li>• Ensure that the spacing of rails and adjacent racks allows for the proper clearance around the switch and rack as specified in <a href="#">"Clearance Requirements for Airflow and Hardware Maintenance for a QFX3008-I Interconnect Device" on page 100</a>.</li> </ul>

- Related Documentation**
- [Rack-Mounting and Cabinet-Mounting Warnings on page 179](#)
  - [Rack Requirements for a QFX3008-I Interconnect Device on page 95](#)

- [Chassis Physical Specifications for a QFX3008-I Interconnect Device on page 41](#)

## Cabinet Requirements for a QFX3500 Device

You can mount the QFX3500 device in a cabinet that contains a four-post 19-in. rack as defined in *Cabinets, Racks, Panels, and Associated Equipment* (document number EIA-310-D) published by the Electronics Industry Association.

Cabinet requirements consist of:

- Cabinet size and clearance
- Cabinet airflow requirements

[Table 28 on page 99](#) provides the cabinet requirements and specifications for the QFX3500 device.

**Table 28: Cabinet Requirements for the QFX3500 Device**

Cabinet Requirement	Guidelines
Cabinet size and clearance	The minimum cabinet size for accommodating a QFX3500 device is 36 in. (91.4 cm) deep. Large cabinets improve airflow and reduce the chance of overheating.
Cabinet airflow requirements	<p>When you mount the device in a cabinet, ensure that ventilation through the cabinet is sufficient to prevent overheating.</p> <ul style="list-style-type: none"> <li>• Ensure that the cool air supply you provide through the cabinet adequately dissipates the thermal output of the device (or devices).</li> <li>• Ensure that the cabinet allows the chassis hot exhaust air to exit the cabinet without recirculating into the device. An open cabinet (without a top or doors) that employs hot air exhaust extraction from the top allows the best airflow through the chassis. If the cabinet contains a top or doors, perforations in these elements assist with removing the hot air exhaust.</li> <li>• The device fans exhaust hot air through the rear of the chassis. Install the device in the cabinet in a way that maximizes the open space on the fan tray side of the chassis. This maximizes the clearance for critical airflow.</li> <li>• Route and dress all cables to minimize the blockage of airflow to and from the chassis.</li> <li>• Ensure that the spacing of rails and adjacent cabinets allows for the proper clearance around the device and cabinet.</li> </ul>

### Related Documentation

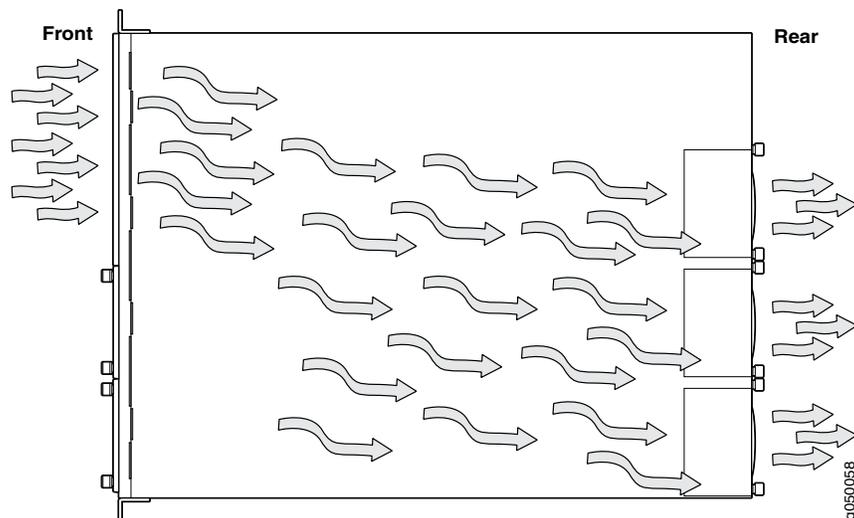
- [Clearance Requirements for Airflow and Hardware Maintenance for a QFX3500 Device on page 102](#)
- [Rack Requirements for a QFX3500 Device on page 96](#)
- [Mounting a QFX3500 Device in a Rack or Cabinet on page 261](#)

## Clearance Requirements for Airflow and Hardware Maintenance for a QFX3100 Director Device

When planning the site for installing a QFX3100 Director device, you must allow sufficient clearance around the device.

- Allow at least 6 in. (15.2 cm) of clearance on the side between devices that have fans or blowers installed. Allow 2.8 in. (7 cm) between the side of the chassis and any non-heat-producing surface such as a wall. For the cooling system to function properly, the airflow around the chassis must be unrestricted. [Figure 48 on page 100](#) shows the airflow through the QFX3100 Director device.
- If you are mounting a QFX3100 Director device on a rack or cabinet with other equipment, or if you are placing it on the desktop or floor near other equipment, ensure that the exhaust from other equipment does not blow into the intake vents of the chassis.
- Leave at least 24 in. (61 cm) both in front of and behind the QFX3100 Director device. For service personnel to remove and install hardware components, you must leave adequate space at the front and back of the QFX3100 Director device. NEBS GR-63 recommends that you allow at least 30 in. (76.2 cm) in front of the rack or cabinet and 24 in. (61 cm) behind the rack or cabinet.

**Figure 48: Airflow Through the QFX3100 Director Device**



**Related Documentation**

- [Cooling System and Airflow in a QFX3100 Director Device on page 27](#)

## Clearance Requirements for Airflow and Hardware Maintenance for a QFX3008-I Interconnect Device

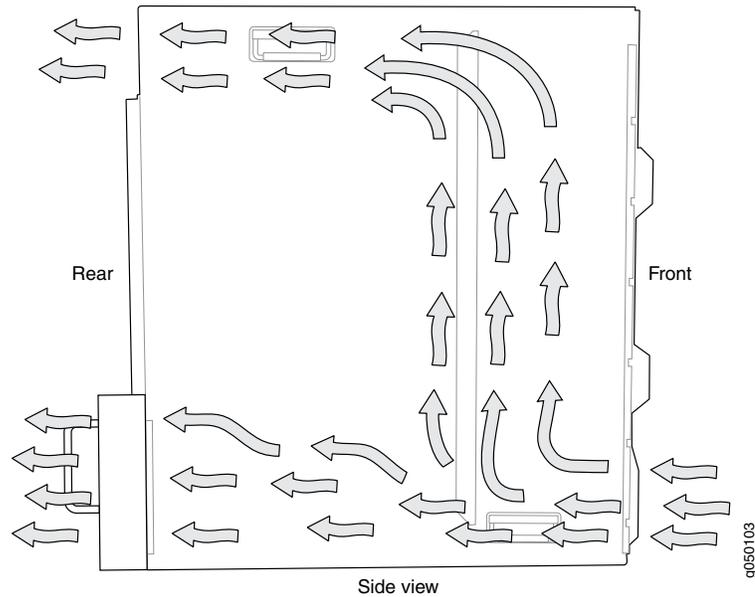
When planning the site for installing a QFX3008-I Interconnect device, you must allow sufficient clearance around the device.

Follow these clearance requirements:

- For the cooling system to function properly, the airflow around the chassis must be unrestricted. Do not block the air intake or exhaust areas shown in [Figure 49 on page 101](#) and [Figure 50 on page 101](#).

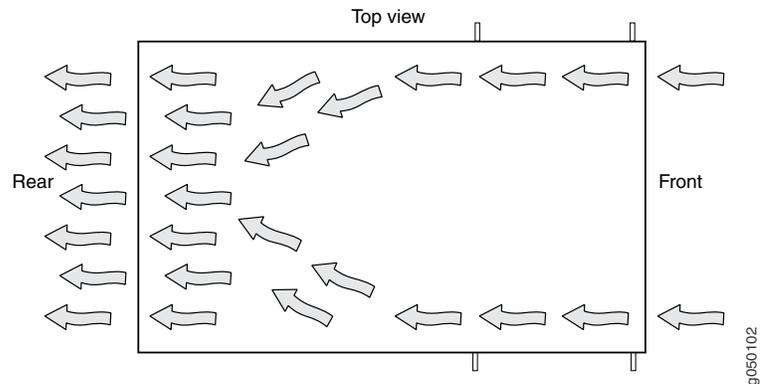
The air intake to cool the front card cage and powerhouse is located below the front fan tray on the chassis. Hot air exhausts from the powerhouse at the bottom of the chassis, and above the rear fan tray at the top of the chassis.

**Figure 49: Airflow Through the Front Card Cage and Powerhouse**



The air intake to cool the rear card cage is located on the front sides of the chassis. Cool air is pulled in through the side fan trays. Hot air exhausts from the Control Boards and rear cards.

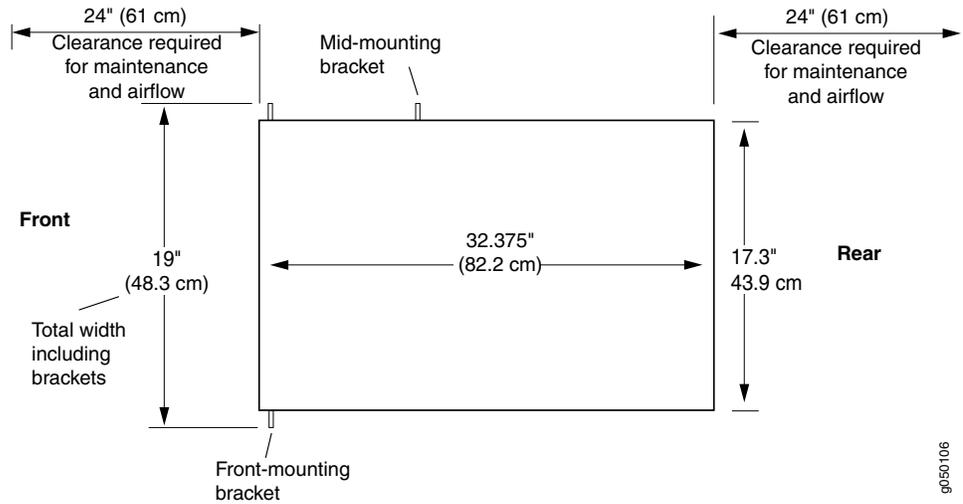
**Figure 50: Airflow Through the Rear Card Cage**



- If you are mounting the device on a rack or cabinet along with other equipment, ensure that the exhaust from other equipment does not blow into the intake vents of the chassis.
- Leave at least 24 in. (61 cm) both in front of and behind the switch. Allow at least 6 in. (15.2 cm) of clearance on each side of the chassis. Leave adequate space at the front of the switch for service personnel to remove and install hardware components. NEBS

GR-63 recommends that you allow at least 30 in. (76.2 cm) in front of the rack or cabinet and 24 in. (61 cm) behind the rack or cabinet. See [Figure 51 on page 102](#).

**Figure 51: Clearance Requirements for Airflow and Hardware Maintenance for a QFX3008-I Interconnect Device**

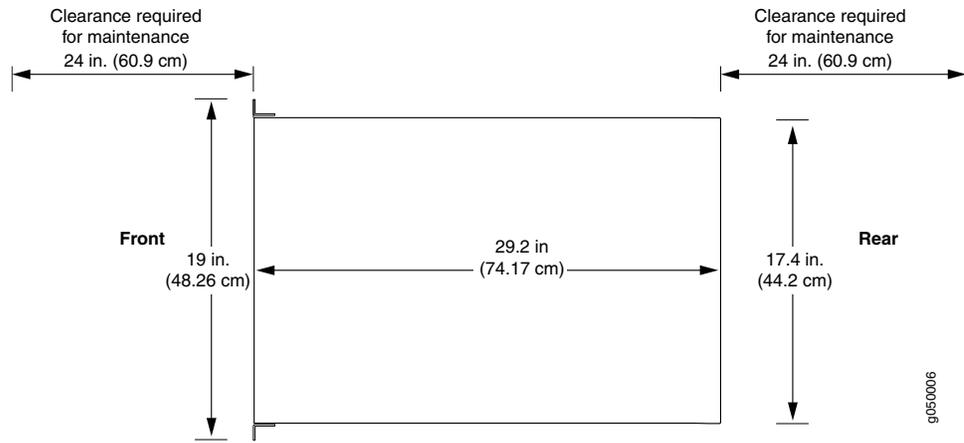


- Related Documentation**
- [Cooling System and Airflow in a QFX3008-I Interconnect Device on page 44](#)
  - [Cabinet Requirements for a QFX3008-I Interconnect Device on page 98](#)
  - [Rack Requirements for a QFX3008-I Interconnect Device on page 95](#)
  - [Rack-Mounting and Cabinet-Mounting Warnings on page 179](#)

## Clearance Requirements for Airflow and Hardware Maintenance for a QFX3500 Device

When planning the site for installing a QFX3500 device, you must allow sufficient clearance around the installed device (see [Figure 52 on page 103](#)).

**Figure 52: Clearance Requirements for Airflow and Hardware Maintenance for QFX3500 Devices**



- For the cooling system to function properly, the airflow around the chassis must be unrestricted. See [“Cooling System and Airflow for a QFX3500 Device” on page 68](#) for more information about the airflow through the chassis.
- If you are mounting a QFX3500 device in a rack or cabinet with other equipment, ensure that the exhaust from other equipment does not blow into the intake vents of the chassis.
- Leave at least 24 in. (61 cm) both in front of and behind the QFX3500 device. For service personnel to remove and install hardware components, you must leave adequate space at the front and back of the device. NEBS GR-63 recommends that you allow at least 30 in. (76.2 cm) in front of the rack or cabinet and 24 in. (61 cm) behind the rack or cabinet.

**Related Documentation**

- [Rack Requirements for a QFX3500 Device on page 96](#)
- [Cabinet Requirements for a QFX3500 Device on page 99](#)
- [General Site Guidelines on page 87](#)
- [Rack-Mounting and Cabinet-Mounting Warnings on page 179](#)



## CHAPTER 7

# Port and Interface Specifications

- [USB Port Specifications for the QFX Series on page 105](#)
- [Console Port Connector Pinouts for the QFX Series on page 106](#)
- [Management Port Connector Pinouts for the QFX Series on page 107](#)
- [Network Module Port Connector Pinouts for a QFX3100 Director Device on page 107](#)
- [Interface Specifications for SFP+ Transceivers for QFX3500 Device Access Ports on page 108](#)
- [Interface Specifications for SFP+ DAC Cables for QFX3500 Device Access Ports on page 117](#)
- [Interface Specifications for Control Plane Connections for the QFabric System on page 124](#)
- [Interface Specifications for Data Plane Connections for the QFabric System on page 127](#)

### USB Port Specifications for the QFX Series

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The following Juniper Networks USB flash drives have been tested and are officially supported for the USB port in a QFX Series device:

- RE-USB-1G-S—1-gigabyte (GB) USB flash drive (except QFX3100 Director device)
- RE-USB-2G-S—2-GB USB flash drive (except QFX3100 Director device)
- RE-USB-4G-S—4-GB USB flash drive



**CAUTION:** Any USB memory product not listed as supported for QFX Series devices has not been tested by Juniper Networks. The use of any unsupported USB memory product could expose your device to unpredictable behavior. Juniper Networks Technical Assistance Center (JTAC) can provide only limited support for issues related to unsupported hardware. We strongly recommend that you use only supported USB flash drives.



**CAUTION:** Remove the USB flash drive before upgrading Junos OS or rebooting the QFX Series device. Failure to do so could expose your device to unpredictable behavior.



**NOTE:** Executing the `request system snapshot` CLI command on a QFX3500 device requires an external USB flash drive with at least 4 GB of free space. We recommend using the RE-USB-4G-S flash drive.



**NOTE:** USB flash drives used with the QFX Series device must support USB 2.0 or later.

#### Related Documentation

- [Creating an Emergency Boot Device for a QFX Series Device on page 407](#)
- [Performing a Recovery Installation on a QFX3500 Device and QFX3008-I Interconnect Device on page 409](#)

## Console Port Connector Pinouts for the QFX Series

The console port (labeled **CON** or **CONSOLE**) is an RS-232 serial interface that uses an RJ-45 connector to connect to a console management device. The default baud rate for the console port is 9600 baud.

[Table 29 on page 106](#) provides the pinout information for the RJ-45 console connector. An RJ-45 cable and RJ-45 to DB-9 adapter are supplied with the QFX Series device.



**NOTE:** If your laptop or PC does not have a DB-9 male connector pin and you want to connect your laptop or PC directly to a QFX Series device, use a combination of the RJ-45 cable and RJ-45 to DB-9 adapter supplied with the device and a USB to DB-9 male adapter. You must provide the USB to DB-9 male adapter.

**Table 29: Console Port Connector Pinouts for the QFX Series**

Pin	Signal	Description
1	RTS Output	Request to send
2	DTR Output	Data terminal ready
3	TxD Output	Transmit data
4	Signal Ground	Signal ground
5	Signal Ground	Signal ground
6	RxD Input	Receive data
7	DCD Input	Data carrier detect

Table 29: Console Port Connector Pinouts for the QFX Series (*continued*)

Pin	Signal	Description
8	CTS Input	Clear to send

**Related Documentation**

- [Connecting a QFX Series Device to a Management Console on page 285](#)

## Management Port Connector Pinouts for the QFX Series

The 1000BASE-T RJ-45 management ports (labeled **C0** and **C1**) in QFX3500 devices use an RJ-45 connector to connect to either the control plane and management network in a QFabric system, or a management device for out-of-band management if you are using the QFX3500 as a standalone switch.

Two LEDs on the port indicate the link speed and any activity on the port. See [“Management Port LEDs on a QFX3500 Device” on page 398](#).

[Table 30 on page 107](#) provides the management port pinout information of the RJ-45 connector.

Table 30: RJ-45 Management Port Connector Pinouts for QFX3500 Devices

Pin	Signal	Description
1	TRP1+	Transmit/receive data pair 1
2	TRP1–	Transmit/receive data pair 1
3	TRP2+	Transmit/receive data pair 2
4	TRP3+	Transmit/receive data pair 3
5	TRP3–	Transmit/receive data pair 3
6	TRP2–	Transmit/receive data pair 2
7	TRP4+	Transmit/receive data pair 4
8	TRP4–	Transmit/receive data pair 4

**Related Documentation**

- [Front Panel of a QFX3500 Device on page 65](#)
- [Connecting a QFX3500 Device to a Network for Out-of-Band Management](#)

## Network Module Port Connector Pinouts for a QFX3100 Director Device

The Gigabit Ethernet ports on each network module use an autosensing RJ-45 connector to support a 10/100/1000BASE-T connection. Two LEDs on the port indicate the presence

of a link or activity on the port and the port status. See [“Network Module Port LEDs on a QFX3100 Director Device” on page 383](#).

[Table 31 on page 108](#) provides the pinout information for the network module’s RJ-45 connector.

**Table 31: Network Port Connector Pinout Information for a QFX3100 Director Device**

Pin	Signal	Description
1	TRP1+	Transmit/receive data pair 1
2	TRP1-	Transmit/receive data pair 1
3	TRP2+	Transmit/receive data pair 2
4	TRP3+	Transmit/receive data pair 3
5	TRP3-	Transmit/receive data pair 3
6	TRP2-	Transmit/receive data pair 2
7	TRP4+	Transmit/receive data pair 4
8	TRP4-	Transmit/receive data pair 4

**Related Documentation** • [Front Panel of a QFX3100 Director Device on page 26](#)

## Interface Specifications for SFP+ Transceivers for QFX3500 Device Access Ports

Access ports in QFX3500 devices support SFP and SFP+ transceivers. This topic describes the optical interfaces supported for those transceivers. It also specifies the copper interface supported for the SFP transceivers.



**CAUTION:** Do not place a copper transceiver in an access port directly above or below another copper transceiver. Internal damage to the access ports and device can occur. Because of this limitation, a maximum of 18 copper transceivers can be installed in ports 6 through 41. We recommend using only the top row of access ports for copper transceivers.



**NOTE:** Use only transceivers purchased from Juniper Networks for your QFX Series device.

The optical transceivers installed in QFX3500 devices support digital optical monitoring (DOM): you can view the diagnostic details for these transceivers by issuing the operational

mode CLI command **show interfaces diagnostics optics**. The command does not give any output for copper transceivers or transceivers not purchased from Juniper Networks.

The three tables in this topic describe the optical interface support over single-mode fiber-optic (SMF) and multimode fiber-optic (MMF) cables and copper interface support over four-pair, Category 5 shielded twisted-pair cables:

- [Table 32 on page 110](#)—Copper interface support and optical interface support for Gigabit Ethernet SFP transceivers.
- [Table 33 on page 113](#)—Optical interface support for Fibre Channel SFP+ transceivers.
- [Table 34 on page 114](#)—Optical interface support for 10-Gigabit Ethernet SFP+ transceivers.



NOTE: For information about the SFP+ direct attach copper (DAC) cables that are supported on the QFX3500 device, see [“Interface Specifications for SFP+ DAC Cables for QFX3500 Device Access Ports” on page 117](#). For information about the QSFP+ to four SFP+ breakout cables that are supported on the QFX3500 device, see [Interface Specifications for QSFP+ DAC Breakout Cables for QFX3500 Device Uplink Ports](#).

**Table 32: Copper Interface Support and Optical Interface Support for Gigabit Ethernet SFP Transceivers in QFX3500 Devices**

Ethernet Standard	Specifications	
1000BASE-T	Model number	QFX-SFP-1GE-T
	Rate	1000 Mbps
	Connector type	RJ-45
	Fiber count	Copper
	Transmitter wavelength	–
	Minimum launch power	–
	Maximum launch power	–
	Minimum receiver sensitivity	–
	Maximum input power	–
	DOM support	Not available
	Software required	Junos OS Release 11.1 or later
	Fiber type	Copper
	Core/cladding size	–
	Modal bandwidth	–
	Distance	100 m (328 ft)

**Table 32: Copper Interface Support and Optical Interface Support for Gigabit Ethernet SFP Transceivers in QFX3500 Devices (continued)**

Ethernet Standard	Specifications				
1000BASE-SX	Model number	QFX-SFP-1GE-SX			
	Rate	1000 Mbps			
	Connector type	LC			
	Fiber count	Dual			
	Transmitter wavelength	850 nm			
	Minimum launch power	−9.5 dBm			
	Maximum launch power	−3 dBm			
	Minimum receiver sensitivity	−21 dBm			
	Maximum input power	0 dBm			
	DOM support	Available			
	Software required	Junos OS Release 11.1 or later			
	Fiber type	MMF	MMF	MMF	MMF
	Core/cladding size	62.5/125 $\mu\text{m}$	62.5/125 $\mu\text{m}$	50/125 $\mu\text{m}$	50/125 $\mu\text{m}$
	Fiber grade	FDDI	OM1	–	OM2
	Modal bandwidth	160 MHz/km	200 MHz/km	400 MHz/km	500 MHz/km
	Distance	220 m (721 ft)	275 m (902 ft)	500 m (1640 ft)	550 m (1804 ft)

**Table 32: Copper Interface Support and Optical Interface Support for Gigabit Ethernet SFP Transceivers in QFX3500 Devices (*continued*)**

Ethernet Standard	Specifications	
1000BASE-LX	Model number	QFX-SFP-1GE-LX
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Dual
	Transmitter wavelength	1310 nm
	Minimum launch power	−9.5 dBm
	Maximum launch power	−3 dBm
	Minimum receiver sensitivity	−25 dBm
	Maximum input power	−3 dBm
	DOM support	Available
	Software required	Junos OS Release 11.1 or later
	Fiber type	SMF
	Core/cladding size	9/125 $\mu\text{m}$
	Modal bandwidth	–
	Distance	10 km (6.2 miles)

Table 33: Optical Interface Support for Fibre Channel SFP+ Transceivers in QFX3500 Devices

Fibre Channel Standard	Specifications			
2GFC, 4GFC, 8GFC (Short-Wavelength)	Model number	QFX-SFP-8GFC-SW		
	Rate	2.125 Gbps, 4.25 Gbps, 8.5 Gbps		
	Connector type	LC		
	Fiber count	Dual		
	Transmitter wavelength	850 nm		
	Minimum launch power	-8.2 dBm		
	Maximum launch power	-1.3 dBm		
	Minimum receiver sensitivity	-11.2 dBm		
	Maximum input power	0 dBm		
	DOM support	Available		
	Software required	Junos OS Release 11.1 or later		
	Fiber type	MMF	MMF	MMF
	Core/cladding size	62.5/125 $\mu$ m	50/125 $\mu$ m	50/125 $\mu$ m
	Fiber grade	OM1	OM2	OM3 (OM4 compatible)
Modal bandwidth	200 MHz/km	500 MHz/km	1500 MHz/km	
Distance	<ul style="list-style-type: none"> <li>• 2.125 Gbps: 150 m (492 ft)</li> <li>• 4.25 Gbps: 70 m (229 ft)</li> <li>• 8.5 Gbps: 21 m (68 ft)</li> </ul>	<ul style="list-style-type: none"> <li>• 2.125 Gbps: 300 m (984 ft)</li> <li>• 4.25 Gbps: 150 m (492 ft)</li> <li>• 8.5 Gbps: 50 m (164 ft)</li> </ul>	<ul style="list-style-type: none"> <li>• 2.125 Gbps: 500 m (1640 ft)</li> <li>• 4.25 Gbps: 380 m (1246 ft)</li> <li>• 8.5 Gbps: 150 m (492 ft)</li> </ul>	

Table 34: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers in QFX3500 Devices

Ethernet Standard	Specifications			
10GBASE-SR	Model number	QFX-SFP-10GE-USR		
	Rate	10 Gbps		
	Connector type	LC		
	Fiber count	Dual		
	Transmitter wavelength	850 nm		
	Minimum launch power	-7.3 dBm		
	Maximum launch power	-1.3 dBm		
	Minimum receiver sensitivity	-11.1 dBm		
	Maximum input power	-9.9 dBm		
	DOM support	Available		
	Software required	Junos OS Release 11.1 or later		
	Fiber type	MMF	MMF	MMF
	Core/cladding size	62.5/125 $\mu$ m	50/125 $\mu$ m	50/125 $\mu$ m
	Fiber grade	OM1	OM2	OM3 (OM4 compatible)
	Modal bandwidth	200 MHz/km	500 MHz/km	1500 MHz/km
	Distance	10 m (32 ft)	30 m (98 ft)	100 m (328 ft)

**Table 34: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers in QFX3500 Devices (continued)**

Ethernet Standard	Specifications				
10GBASE-SR	Model number	QFX-SFP-10GE-SR			
	Rate	10 Gbps			
	Connector type	LC			
	Transmitter wavelength	850 nm			
	Minimum launch power	-7.3 dBm			
	Maximum launch power	-1 dBm			
	Minimum receiver sensitivity	-9.9 dBm			
	Maximum input power	-1 dBm			
	DOM support	Available			
	Software required	Junos OS Release 11.1 or later			
	Fiber type	MMF	MMF	MMF	MMF
	Core/cladding size	62.5/125 $\mu$ m	62.5/125 $\mu$ m	50/125 $\mu$ m	50/125 $\mu$ m
	Fiber grade	FDDI	OM1	-	OM2 OM3 (OM4 compatible)
	Modal bandwidth	160 MHz/km	200 MHz/km	400 MHz/km	500 MHz/km 1500 MHz/km
	Distance	26 m (85 ft)	33 m (108 ft)	66 m (216 ft)	82 m (269 ft) 300 m (984 ft)

**Table 34: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers in QFX3500 Devices (continued)**

Ethernet Standard	Specifications	
10GBASE-LR	Model number	QFX-SFP-10GE-LR
	Rate	10 Gbps
	Connector type	LC
	Transmitter wavelength	1310 nm
	Minimum launch power	-8.2 dBm
	Maximum launch power	0.5 dBm
	Minimum receiver sensitivity	-18 dBm
	Maximum input power	0.5 dBm
	DOM support	Available
	Software required	Junos OS Release 11.1 or later
	Fiber type	SMF
	Core/cladding size	9/125 $\mu\text{m}$
	Modal bandwidth	-
	Distance	10 km (6.2 miles)

**Table 34: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers in QFX3500 Devices (continued)**

Ethernet Standard	Specifications	
10GBASE-ER	Model Number	QFX-SFP-10GE-ER
	Rate	10 Gbps
	Connector type	LC
	Fiber count	Dual
	Transmitter wavelength	1550 nm
	Minimum launch power	−4.7 dBm
	Maximum launch power	4 dBm
	Minimum receiver sensitivity	−11.3 dBm
	Maximum input power	−1 dBm
	DOM support	Available
	Software required	Junos OS Release 11.3 or later
	Fiber type	SMF
	Core/cladding size	9/125 μm
	Modal bandwidth	–
Distance	40 km (24.8 miles)	

- Related Documentation**
- [Rear Panel of a QFX3500 Device on page 66](#)
  - [Installing a Transceiver in a QFX Series Device on page 374](#)
  - [Removing a Transceiver from a QFX Series Device on page 373](#)

## Interface Specifications for SFP+ DAC Cables for QFX3500 Device Access Ports

Small form-factor pluggable plus transceiver (SFP+) direct attach copper (DAC) cables, also known as Twinax cables, are suitable for in-rack connections between servers and QFX3500 devices.

You can use DAC cables purchased from a third party. These cables should meet the specifications described in [Table 36 on page 119](#) and [Table 37 on page 122](#). [Table 35 on page 118](#) describes the Junos OS software releases that supports third-party DAC cables. Prior releases do not support third-party DAC cables.

**Table 35: Third-Party DAC Cable Support**

Platform	Third-Party Cable Supported
QFX3000 QFabric system	Junos OS Release 11.3R1 or later
QFX3500 device as a standalone switch	Junos OS Release 11.3R4 or later

The cables are hot-removable and hot-insertable. A cable consists of a cable assembly that connects directly into two SFP+ modules, one at each end of the cable. The cables use integrated duplex serial data links for bidirectional communication and are designed for data rates up to 10 Gbps. There are two types of DAC cables:

- Passive DAC cables have no signal amplification built into the cable assembly. [Table 36 on page 119](#) describes the passive DAC cable specifications.
- Active DAC cables have signal amplification and equalization built into the cable assembly. [Table 37 on page 122](#) describes the active DAC cable specifications.

Table 36: SFP+ Passive Direct Attach Copper Cable Specifications

Model	Specifications	
QFX-SFP-DAC-1M	Rate	10-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption (per end)	0.015 W
	Storage temperature	-40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	1 in. (2.54 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	1% maximum
	Time delay	4.3 nsec/m
	Length	1 m (3.3 ft)
	Software required	Junos OS Release 11.1 or later

Table 36: SFP+ Passive Direct Attach Copper Cable Specifications (*continued*)

Model	Specifications	
QFX-SFP-DAC-3M	Rate	10-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption (per end)	0.015 W
	Storage temperature	-40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	1 in. (2.54 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	1% maximum
	Time delay	4.3 nsec/m
	Length	3 m (9.9 ft)
	Software required	Junos OS Release 11.1 or later

Table 36: SFP+ Passive Direct Attach Copper Cable Specifications (*continued*)

Model	Specifications	
QFX-SFP-DAC-5M	Rate	10-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption (per end)	0.015 W
	Storage temperature	-40° C to 85° C
	Cable type	Twinax
	Wire AWG	24 AWG
	Minimum cable bend radius	1.25 in. (3.2 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	2% maximum
	Time delay	4.3 nsec/m
	Length	5 m (16.4 ft)
	Software required	Junos OS Release 11.1 or later

Table 37: SFP+ Active Direct Attach Copper Cable Specifications

Model	Specifications	
QFX-SFP-DAC-1MA	Rate	10-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption (per end)	0.627 W
	Storage temperature	-40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	1 in. (2.54 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	2% maximum
	Length	1 m (3.3 ft)
	Software required	Junos OS Release 11.1 or later
	QFX-SFP-DAC-3MA	Rate
Connector type		Copper pigtail
Supply voltage		3.3 V
Power consumption (per end)		0.627 W
Storage temperature		-40° C to 85° C
Cable type		Twinax
Wire AWG		30 AWG
Minimum cable bend radius		1 in. (2.54 cm)
Cable characteristic impedance		100 ohms
Crosstalk between pairs		2% maximum
Length		3 m (9.9 ft)
Software required		Junos OS Release 11.1 or later

Table 37: SFP+ Active Direct Attach Copper Cable Specifications (*continued*)

Model	Specifications	
QFX-SFP-DAC-5MA	Rate	10-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption (per end)	0.627 W
	Storage temperature	-40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	1 in. (2.54 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	2% maximum
	Length	5 m (16.4 ft)
	Software required	Junos OS Release 11.1 or later
	QFX-SFP-DAC-7MA	Rate
Connector type		Copper pigtail
Supply voltage		3.3 V
Power consumption (per end)		0.627 W
Storage temperature		-40° C to 85° C
Cable type		Twinax
Wire AWG		30 AWG
Minimum cable bend radius		1 in. (2.54 cm)
Cable characteristic impedance		100 ohms
Crosstalk between pairs		2% maximum
Length		7 m (23 ft)
Software required		Junos OS Release 11.3 or later

Table 37: SFP+ Active Direct Attach Copper Cable Specifications (*continued*)

Model	Specifications	
QFX-SFP-DAC-10MA	Rate	10-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption (per end)	0.627 W
	Storage temperature	-40° C to 85° C
	Cable type	Twinax
	Wire AWG	28 AWG
	Minimum cable bend radius	2 in. (5 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	2% maximum
	Length	10 m (32.8 ft)
	Software required	Junos OS Release 11.3 or later

- Related Documentation**
- [Rear Panel of a QFX3500 Device on page 66](#)
  - [Interface Specifications for SFP+ Transceivers for QFX3500 Device Access Ports on page 108](#)
  - [Interface Specifications for QSFP+ DAC Breakout Cables for QFX3500 Device Uplink Ports](#)
  - [Installing a Transceiver in a QFX Series Device on page 374](#)
  - [Removing a Transceiver from a QFX Series Device on page 373](#)

## Interface Specifications for Control Plane Connections for the QFabric System

The QFX Series devices support using SFP transceivers to interconnect the QFabric system control plane. The SFP transceivers are installed in ports on the network modules in the QFX3100 Director device, the Control Boards in the QFX3008 Interconnect device, and the management board in the QFX3500 Node device. This topic describes the interface specifications supported for those transceivers. If you are using the QFX3500 device as a standalone switch, see [Interface Specifications for SFP Transceivers for QFX3500 Device Management Ports](#).



**NOTE:** The QFX-SFP-1GE-T transceiver is not supported on the QFX3100 Director device. For 1000BASE-T connections to the QFX3100 Director device, ensure that you have installed RJ-45 network modules.



**NOTE:** Use only transceivers purchased from Juniper Networks for your QFX Series device.

Table 38 on page 125 describes interface support for Gigabit Ethernet SFP transceivers.

**Table 38: Interface Support for Gigabit Ethernet SFP Transceivers for Control Plane Connections**

Ethernet Standard	Specifications	
1000BASE-T	Model number	QFX-SFP-1GE-T  <b>NOTE:</b> The QFX-SFP-1GE-T transceiver is not supported on the QFX3100 Director device. For 1000BASE-T connections to the QFX3100 Director device, ensure that you have installed RJ-45 network modules.
	Rate	1000 Mbps
	Connector type	RJ-45
	Fiber count	Copper
	Transmitter wavelength	–
	Minimum launch power	–
	Maximum launch power	–
	Minimum receiver sensitivity	–
	Maximum input power	–
	DOM support	Not available
	Software required	Junos OS for QFX Series, Release 11.3 or later
	Fiber type	Copper
	Core/cladding size	–
	Modal bandwidth	–
	Distance	100 m (328 ft)

**Table 38: Interface Support for Gigabit Ethernet SFP Transceivers for Control Plane Connections (*continued*)**

Ethernet Standard	Specifications				
1000BASE-SX	Model number	QFX-SFP-1GE-SX			
	Rate	1000 Mbps			
	Connector type	LC			
	Fiber count	Dual			
	Transmitter wavelength	850 nm			
	Minimum launch power	−9.5 dBm			
	Maximum launch power	−3 dBm			
	Minimum receiver sensitivity	−21 dBm			
	Maximum input power	0 dBm			
	DOM support	Available			
	Software Required	Junos OS for QFX Series, Release 11.3 or later			
	Fiber type	MMF	MMF	MMF	MMF
	Core/cladding size	62.5/125 $\mu$ m	62.5/125 $\mu$ m	50/125 $\mu$ m	50/125 $\mu$ m
	Fiber grade	FDDI	OM1	–	OM2
	Modal bandwidth	160 MHz/km	200 MHz/km	400 MHz/km	500 MHz/km
	Distance	220 m (721 ft)	275 m (902 ft)	500 m (1640 ft)	550 m (1804 ft)

**Table 38: Interface Support for Gigabit Ethernet SFP Transceivers for Control Plane Connections (*continued*)**

Ethernet Standard	Specifications	
1000BASE-LX	Model number	QFX-SFP-1GE-LX
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Dual
	Transmitter wavelength	1310 nm
	Minimum launch power	-9.5 dBm
	Maximum launch power	-3 dBm
	Minimum receiver sensitivity	-25 dBm
	Maximum input power	-3 dBm
	DOM support	Available
	Software Required	Junos OS for QFX Series, Release 11.3 or later
	Fiber type	SMF
	Core/cladding size	9/125 $\mu$ m
	Modal bandwidth	-
	Distance	10 km (6.2 miles)

- Related Documentation**
- [Installing a Transceiver in a QFX Series Device on page 374](#)
  - [Removing a Transceiver from a QFX Series Device on page 373](#)

## Interface Specifications for Data Plane Connections for the QFabric System

QFX3000 QFabric system data plane connections use QSFP+ transceivers. The QSFP+ transceivers are installed in QFX3500 Node devices and 16-port QSFP+ front cards on the QFX3008-I Interconnect device. This topic describes the interface specifications for those transceivers.



**NOTE:** Use only transceivers and connectors purchased from Juniper Networks for your QFX Series device.

[Table 39 on page 128](#) describes interface support for 40-Gigabit Ethernet QSFP+ transceivers.

**Table 39: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers in QFX3000 QFabric Systems**

Ethernet Standard	Specifications	
40GBASE-SR	Model number	QFX-QSFP-40GE-SR4
	Rate	40 Gbps
	Connector type	12-ribbon multimode fiber with MTP connector (Rx and Tx)
	Fiber count	12
	Transmitter wavelength	850 nm
	Minimum launch power	-7.6 dBm (per lane)
	Maximum launch power	2.4 dBm (per lane)
	Maximum receiver sensitivity	-5.4 dBm
	Maximum input power	4 dBm
	DOM support	Available
	Fiber type	MMF
	Core/cladding size	50/125 $\mu$ m
	Fiber grade	OM3
	Modal bandwidth	2000 MHz/km
	Distance	100 m (328 ft)

**Related Documentation**

- [16-Port QSFP+ Front Cards in a QFX3008-I Interconnect Device on page 48](#)
- [Rear Panel of a QFX3500 Device on page 66](#)
- [Installing a Transceiver in a QFX Series Device on page 374](#)
- [Removing a Transceiver from a QFX Series Device on page 373](#)

## CHAPTER 8

# Cable Specifications

- [Cable Specifications for Control Plane Connections for the QFX Series on page 129](#)
- [Cable Specifications for Console and Management Connections for the QFX Series on page 130](#)
- [Understanding QFX Series Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion on page 130](#)
- [Calculating the Fiber-Optic Cable Power Budget for a QFX Series Device on page 132](#)
- [Calculating the Fiber-Optic Cable Power Margin for a QFX Series Device on page 132](#)

### Cable Specifications for Control Plane Connections for the QFX Series

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The QFX3100 Director device and QFX3500 Node device support using RJ-45 patch cables to interconnect the QFabric system control plane. The RJ-45 patch cables connect to 1000BASE-T ports on the network modules in the QFX3100 Director device and the management board in the QFX3500 Node device. This topic describes the requirements for those cables.

[Table 40 on page 129](#) lists the specifications for the cables that connect the QFX3100 Director device and QFX3500 Node device to the QFabric system control plane.

**Table 40: Cable Specifications for QFX3100 Director Device and QFX3500 Node Device Control Plane Connections**

Port on QFX Series Device	Cable Specification	Maximum Length	Device Receptacle
<ul style="list-style-type: none"><li>• QFX3100 Director device network module ports</li><li>• QFX3500 Node device management (C0 and C1) ports</li></ul>	Category 5 cable or equivalent suitable for 1000BASE-T operation with RJ-45 connectors	328 feet (100 meters)	RJ-45 autosensing

#### Related Documentation

- [Connecting QFX3100 Director Devices to the Control Plane Network on page 275](#)
- [Connecting a QFX3008-I Interconnect Device to the Control Plane Network on page 278](#)
- [Connecting a QFX3500 Node Device to the Control Plane Network on page 282](#)

## Cable Specifications for Console and Management Connections for the QFX Series

Table 41 on page 130 lists the specifications for the cables that connect a QFX Series device to a management device.



**NOTE:** QFX3500 devices can be configured with SFP management ports that support 1000BASE-SX and 1000BASE-LX transceivers. See Interface Specifications for SFP Transceivers for QFX3500 Device Management Ports for more information about the fiber-optic cables required for use with these transceivers.

Table 41: Cable Specifications for Console and Management Connections for the QFX Series

Port on QFX Series Device	Cable Specification	Cable Supplied	Maximum Length	Device Receptacle
Console port	RS-232 (EIA-232) serial cable	One 7-foot (2.13-meter) length RJ-45 patch cable and RJ-45 to DB-9 adapter	7 feet (2.13 meters)	RJ-45
Management port	Category 5 cable or equivalent suitable for 1000BASE-T operation	One 7-foot (2.13-meter) length RJ-45 patch cable	328 feet (100 meters)	RJ-45 autosensing

### Related Documentation

- [Console Port Connector Pinouts for the QFX Series on page 106](#)
- [Management Port Connector Pinouts for the QFX Series on page 107](#)
- [Connecting a QFX Series Device to a Management Console on page 285](#)
- [Connecting a QFX3500 Device to a Network for Out-of-Band Management](#)

## Understanding QFX Series Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion

To determine the power budget and power margin needed for fiber-optic connections, you need to understand how signal loss, attenuation, and dispersion affect transmission. QFX Series devices use various types of network cable, including multimode and single-mode fiber-optic cable.

- [Signal Loss in Multimode and Single-Mode Fiber-Optic Cable on page 130](#)
- [Attenuation and Dispersion in Fiber-Optic Cable on page 131](#)

### Signal Loss in Multimode and Single-Mode Fiber-Optic Cable

Multimode fiber is large enough in diameter to allow rays of light to reflect internally (bounce off the walls of the fiber). Interfaces with multimode optics typically use LEDs as light sources. However, LEDs are not coherent light sources. They spray varying wavelengths of light into the multimode fiber, which reflects the light at different angles. Light rays travel in jagged lines through a multimode fiber, causing signal dispersion.

When light traveling in the fiber core radiates into the fiber cladding (layers of lower refractive index material in close contact with a core material of higher refractive index), higher-order mode loss (HOL) occurs. Together, these factors reduce the transmission distance of multimode fiber compared to that of single-mode fiber.

Single-mode fiber is so small in diameter that rays of light reflect internally through one layer only. Interfaces with single-mode optics use lasers as light sources. Lasers generate a single wavelength of light, which travels in a straight line through the single-mode fiber. Compared to multimode fiber, single-mode fiber has a higher bandwidth and can carry signals for longer distances. It is consequently more expensive.

For information about the maximum transmission distance and supported wavelength range for the types of single-mode and multimode fiber-optic cables that are connected to QFX Series devices, see [“Interface Specifications for Data Plane Connections for the QFabric System” on page 127](#) and [“Interface Specifications for SFP+ Transceivers for QFX3500 Device Access Ports” on page 108](#). Exceeding the maximum transmission distances can result in significant signal loss, which causes unreliable transmission.

## Attenuation and Dispersion in Fiber-Optic Cable

An optical data link functions correctly provided that modulated light reaching the receiver has enough power to be demodulated correctly. *Attenuation* is the reduction in strength of the light signal during transmission. Passive media components such as cables, cable splices, and connectors cause attenuation. Although attenuation is significantly lower for optical fiber than for other media, it still occurs in both multimode and single-mode transmission. An efficient optical data link must transmit enough light to overcome attenuation.

*Dispersion* is the spreading of the signal over time. The following two types of dispersion can affect signal transmission through an optical data link:

- Chromatic dispersion, which is the spreading of the signal over time caused by the different speeds of light rays.
- Modal dispersion, which is the spreading of the signal over time caused by the different propagation modes in the fiber.

For multimode transmission, modal dispersion, rather than chromatic dispersion or attenuation, usually limits the maximum bit rate and link length. For single-mode transmission, modal dispersion is not a factor. However, at higher bit rates and over longer distances, chromatic dispersion limits the maximum link length.

An efficient optical data link must have enough light to exceed the minimum power that the receiver requires to operate within its specifications. In addition, the total dispersion must be within the limits specified for the type of link in Telcordia Technologies document GR-253-CORE (Section 4.3) and International Telecommunications Union (ITU) document G.957.

When chromatic dispersion is at the maximum allowed, its effect can be considered as a power penalty in the power budget. The optical power budget must allow for the sum of component attenuation, power penalties (including those from dispersion), and a safety margin for unexpected losses.

- Related Documentation**
- [Calculating the Fiber-Optic Cable Power Budget for a QFX Series Device on page 132](#)
  - [Calculating the Fiber-Optic Cable Power Margin for a QFX Series Device on page 132](#)

## Calculating the Fiber-Optic Cable Power Budget for a QFX Series Device

Calculate the link's power budget when planning fiber-optic cable layout and distances to ensure that fiber-optic connections have sufficient power for correct operation. The power budget is the maximum amount of power the link can transmit. When you calculate the power budget, you use a worst-case analysis to provide a margin of error, even though all the parts of an actual system do not operate at the worst-case levels.

To calculate the worst-case estimate for fiber-optic cable power budget ( $P_B$ ) for the link:

1. Determine values for the link's minimum transmitter power ( $P_T$ ) and minimum receiver sensitivity ( $P_R$ ). For example, here, ( $P_T$ ) and ( $P_R$ ) are measured in decibels, and decibels are referenced to one milliwatt (dBm).

$$P_T = -15 \text{ dBm}$$

$$P_R = -28 \text{ dBm}$$



**NOTE:** See the specifications for your transmitter and receiver to find the minimum transmitter power and minimum receiver sensitivity.

2. Calculate the power budget ( $P_B$ ) by subtracting ( $P_R$ ) from ( $P_T$ ):

$$-15 \text{ dBm} - (-28 \text{ dBm}) = 13 \text{ dBm}$$

- Related Documentation**
- [Understanding QFX Series Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion on page 130](#)
  - [Calculating the Fiber-Optic Cable Power Margin for a QFX Series Device on page 132](#)

## Calculating the Fiber-Optic Cable Power Margin for a QFX Series Device

Calculate the link's power margin when planning fiber-optic cable layout and distances to ensure that fiber-optic connections have sufficient signal power to overcome system losses and still satisfy the minimum input requirements of the receiver for the required performance level. The power margin ( $P_M$ ) is the amount of power available after attenuation or link loss (LL) has been subtracted from the power budget ( $P_B$ ).

When you calculate the power margin, you use a worst-case analysis to provide a margin of error, even though all the parts of an actual system do not operate at worst-case levels. A power margin ( $P_M$ ) greater than zero indicates that the power budget is sufficient to operate the receiver and that it does not exceed the maximum receiver input power. This means the link will work. A ( $P_M$ ) that is zero or negative indicates insufficient power

to operate the receiver. See the specification for your receiver to find the maximum receiver input power.

Before you begin to calculate the power margin:

- Calculate the power budget. See “Calculating the Fiber-Optic Cable Power Budget for a QFX Series Device” on page 132.

To calculate the worst-case estimate for the power margin ( $P_M$ ) for the link:

1. Determine the maximum value for link loss (LL) by adding estimated values for applicable link-loss factors—for example, use the sample values for various factors as provided in Table 42 on page 133 (here, the link is 2 km long and multimode, and the ( $P_B$ ) is 13 dBm):

**Table 42: Estimated Values for Factors Causing Link Loss**

Link-Loss Factor	Estimated Link-Loss Value	Sample (LL) Calculation Values
Higher-order mode losses (HOL)	Multimode—0.5 dBm	0.5 dBm
	Single-mode—None	0 dBm
Modal and chromatic dispersion	Multimode—None, if product of bandwidth and distance is less than 500 MHz/km	0 dBm
	Single-mode—None	0 dBm
Connector	0.5 dBm	This example assumes five connectors. Loss for five connectors: 5 (0.5 dBm) = 2.5 dBm
Splice	0.5 dBm	This example assumes two splices. Loss for two splices: 2 (0.5 dBm) = 1 dBm
Fiber attenuation	Multimode—1 dBm/km	This example assumes the link is 2 km long. Fiber attenuation for 2 km: 2 km (1 dBm/km) = 2 dBm
	Single-mode—0.5 dBm/km	This example assumes the link is 2 km long. Fiber attenuation for 2 km: 2 km (0.5 dBm/km) = 1 dBm
Clock Recovery Module (CRM)	1 dBm	1 dBm



**NOTE:** For information about the actual amount of signal loss caused by equipment and other factors, see your vendor documentation for that equipment.

2. Calculate the ( $P_M$ ) by subtracting (LL) from ( $P_B$ ):

$$P_B - LL = P_M$$

$$13 \text{ dBm} - 0.5 \text{ dBm [HOL]} - 5 (0.5 \text{ dBm}) - 2 (0.5 \text{ dBm}) - 2 \text{ km} (1.0 \text{ dBm/km}) - 1 \text{ dB [CRM]} = P_M$$

$$13 \text{ dBm} - 0.5 \text{ dBm} - 2.5 \text{ dBm} - 1 \text{ dBm} - 2 \text{ dBm} - 1 \text{ dBm} = P_M$$

$$P_M = 6 \text{ dBm}$$

The calculated power margin is greater than zero, indicating that the link has sufficient power for transmission. Also, the power margin value does not exceed the maximum receiver input power. Refer to the specifications for your receiver to find the maximum receiver input power.

- Related Documentation**
- [Understanding QFX Series Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion on page 130](#)

# Planning QFX3100 Power Requirements

- [AC Power Specifications for a QFX3100 Director Device on page 135](#)
- [AC Power Cord Specifications for a QFX3100 Director Device on page 135](#)

## AC Power Specifications for a QFX3100 Director Device

Table 43 on page 135 describes the AC power specifications for a QFX3100 Director device.

**Table 43: AC Power Specifications for a QFX3100 Director Device**

Item	Specifications
AC input voltage	Operating range: 100–240 VAC
AC input line frequency	50–60 Hz
AC input current rating	<ul style="list-style-type: none"> <li>• 5 A at 100 VAC</li> <li>• 2 A at 240 VAC</li> </ul>
Typical power consumption	476 W
Maximum power consumption	220 W

**Related Documentation**

- [AC Power Supply in a QFX3100 Director Device on page 30](#)
- [AC Power Cord Specifications for a QFX3100 Director Device on page 135](#)

## AC Power Cord Specifications for a QFX3100 Director Device

Detachable AC power cords are supplied with the QFX3100 Director device. The coupler is type C13 as described by International Electrotechnical Commission (IEC) standard 60320. The plug at the male end of the power cord fits into the power source outlet that is standard for your geographical location.



**CAUTION:** The supplied AC power cord for the switches is intended for use with the QFX3100 Director device only and not for any other use.



**NOTE:** In North America, AC power cords must not exceed 4.5 meters (approximately 14.75 feet) in length, to comply with National Electrical Code (NEC) Sections 400-8 (NFPA 75, 5-2.2) and 210-52 and Canadian Electrical Code (CEC) Section 4-010(3). The cords supplied with the QFX3100 Director device are in compliance.

Table 44 on page 136 lists AC power cord specifications provided for each country or region.

**Table 44: AC Power Cord Specifications for a QFX3100 Director Device**

Country or Region	Electrical Specifications	Plug Standards
Australia	250 VAC, 10 A, 50 Hz	AS/NZ 3112-1993
China	250 VAC, 10 A, 50 Hz	GB2099.1 1996 and GB1002 1996 (CHI-10P)
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 10 A, 50 Hz	CEE (7) VII
Italy	250 VAC, 10 A, 50 Hz	CEI 23-16/VII
Japan	125 VAC, 12 A, 50 Hz or 60 Hz	JIS 8303
Korea	250 VAC, 10A, 50 Hz	CEE 7/4
North America	125 VAC, 13 A, 60 Hz	NEMA 5-15
Switzerland	250 VAC, 10A, 50 Hz	SEV 1011 SEV 6534/2
United Kingdom	250 VAC, 10 A, 50 Hz	BS 1363A

Figure 53 on page 136 illustrates the plug on the power cord for some of the countries or regions listed in Table 44 on page 136.

**Figure 53: AC Plug Types**



**Related Documentation**

- [AC Power Supply in a QFX3100 Director Device on page 30](#)
- [General Safety Guidelines and Warnings on page 161](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [Prevention of Electrostatic Discharge Damage on page 192](#)

## CHAPTER 10

# Planning QFX3008-I Power Requirements

- AC Power Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 137
- AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays on page 138
- AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays on page 138
- Power Requirements for a QFX3008-I Interconnect Device on page 139
- AC Power Cord Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 139
- AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays on page 141
- AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays on page 142
- Calculating Power Requirements for a QFX3008-I Interconnect Device on page 143

## AC Power Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays

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Table 45 on page 137 lists the AC power system specifications for a QFX3008-I Interconnect device using single-phase wiring trays.

**Table 45: AC Power Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays**

Item	Specifications
AC input voltage	200–240 VAC
AC input line frequency	50–60 Hz
AC system current rating	16 A per appliance inlet (48 A per wiring tray)
AC system input power	9000 W (3000 W per power supply)

- Related Documentation**
- [AC Power Supply in a QFX3008-I Interconnect Device on page 52](#)
  - [AC Power Supply LEDs on a QFX3008-I Interconnect Device on page 394](#)
  - [AC Power Cord Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 139](#)

## AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays

Table 46 on page 138 lists the AC power system specifications for a QFX3008-I Interconnect device using three-phase delta wiring trays.

**Table 46: AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays**

Item	Specifications
AC input voltage	200–240 VAC
AC input line frequency	50–60 Hz
AC system current rating	40 A
AC system input power	13,333 W

- Related Documentation**
- [AC Power Supply in a QFX3008-I Interconnect Device on page 52](#)
  - [AC Power Supply LEDs on a QFX3008-I Interconnect Device on page 394](#)
  - [AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays on page 141](#)

## AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays

Table 47 on page 138 lists the AC power system specifications for a QFX3008-I Interconnect device using three-phase wye wiring trays.

**Table 47: AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays**

Item	Specifications
AC input voltage	380 VAC
AC input line frequency	50–60 Hz
AC system current rating	24 A
AC system input power	13,333 W

- Related Documentation**
- [AC Power Supply in a QFX3008-I Interconnect Device on page 52](#)
  - [AC Power Supply LEDs on a QFX3008-I Interconnect Device on page 394](#)
  - [AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays on page 142](#)

## Power Requirements for a QFX3008-I Interconnect Device

Table 48 on page 139 lists the power requirements for different hardware components of a QFX3008-I Interconnect device under typical voltage conditions.

**Table 48: QFX3008-I Interconnect Device Component Power Requirements**

Components	Equivalent Input Power
Chassis, including Control Boards, rear cards, cooling system, and power components	<ul style="list-style-type: none"> <li>• 3100 W (at normal fan speed, typical input power)</li> <li>• 4500 W (at maximum fan speed, maximum input power)</li> </ul>
16-port QSFP+ front card (including optical transceivers)	<ul style="list-style-type: none"> <li>• 190 W (typical input power)</li> <li>• 240 W (maximum input power)</li> </ul>

- Related Documentation**
- [Calculating Power Requirements for a QFX3008-I Interconnect Device on page 143](#)
  - [AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays on page 138](#)
  - [AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays on page 138](#)

## AC Power Cord Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays

Most sites distribute power through a main conduit that leads to frame-mounted power distribution panels, one of which can be located at the top of the rack that houses the device. Three AC power cords connect each wiring tray to the power distribution panel.

Six detachable AC power cords, each 2.5 m (approximately 8 ft) long, are supplied with the device. The appliance coupler at the female end of the cord inserts into one of the three appliance inlets on the faceplate of the single-phase wiring tray. The coupler is type C19 as described by International Electrotechnical Commission (IEC) standard 60320. The plug at the male end of the power cord fits into the power source receptacle that is standard for your geographical location.



**WARNING:** The QFX3008-I Interconnect device is pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal provided on the chassis in addition to the grounding pin of the power supply cord. This separate protective earthing terminal must be permanently connected to earth.



**WARNING:** The AC power cord for the device is intended for use with the device only and not for any other use.



**WARNING:** Translation from Japanese: The attached power cable is only for this product. Do not use the cable for another product.

## 注意

附属の電源コードセットはこの製品専用です。  
他の電気機器には使用しないでください。

g017253



**CAUTION:** Power cords and cables must not block access to device components or drape where people could trip on them.



**NOTE:** In North America, AC power cords must not exceed 4.5 m (approximately 14.75 ft) in length, to comply with National Electrical Code (NEC) Sections 400-8 (NFPA 75, 5-2.2) and 210-52, and Canadian Electrical Code (CEC) Section 4-010(3). The cords supplied with the router are in compliance.

Table 49 on page 140 provides specifications for the AC power cord provided for each region supported.

**Table 49: AC Power Cord Specifications for a Single-Phase Wiring Tray**

Country/Region	Electrical Specifications	Plug Standards
Australia	250 VAC, 15 A, 50 Hz	AS/NZS 3112 Type SAA/3/15
China	250 VAC, 16 A, 50 Hz	GB 1002 Type PRC/3/16
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 16 A, 50 Hz	CEE (7) VII Type VIIG
Italy	250 VAC, 16 A, 50 Hz	CEI 23-16 Type I/3/16
Japan	250 VAC, 16 A, 50 Hz	NEMA 6-20 Type N6/20
		NEMA L6-20 Type NEMA Locking
	125VAC, 15A, 50 Hz	NEMA 5-20 Type N5/20

Table 49: AC Power Cord Specifications for a Single-Phase Wiring Tray (*continued*)

Country/Region	Electrical Specifications	Plug Standards
North America	250 VAC, 16 A, 50 Hz	NEMA 6-20 Type N6/20
		NEMA L6-20 Type NEMA Locking
	125 VAC, 20 A, 50 Hz	NEMA 5-20 Type N5/20
South Korea	250 VAC, 16 A, 50 Hz	CEE(7) VII Type VIIG
Switzerland	250 VAC, 16 A, 50 Hz	SEV 5934-2 Type 23G
United Kingdom	250 VAC, 13 A, 50 Hz	BS 1363/A Type BS89/13

**Related Documentation**

- [AC Power Supply in a QFX3008-I Interconnect Device on page 52](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [AC Power Electrical Safety Guidelines on page 194](#)
- [AC Power Disconnection Warning on page 196](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 239](#)

## AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays

Most sites distribute power through a main conduit that leads to frame-mounted power distribution panels, one of which can be located at the top of the rack that houses the device. An AC power cord connects each wiring tray to the power distribution panel.



**WARNING:** The QFX3008-I Interconnect device is pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal provided on the chassis in addition to the grounding pin of the power supply cord. This separate protective earthing terminal must be permanently connected to earth.



**CAUTION:** Power cords and cables must not block access to device components or drape where people could trip on them.

Each three-phase AC wiring tray has a metal wiring compartment that contains the AC terminal block and ground. There are two types of three-phase wiring trays: *delta* (three-wire) and *wye* (four-wire). The *delta* AC terminal block consists of three input terminals labeled L1, L2, and L3, from top to bottom in the common three-phase naming convention.

You must provide cords appropriate for your geographical location. The AC power cord wires insert into the AC terminal block on the wiring tray.

The power cords you provide must comply with the specifications listed in [Table 50 on page 142](#).



**NOTE:** In North America, AC power cords must not exceed 4.5 m (approximately 14.75 ft) in length, to comply with National Electrical Code (NEC) Sections 400-8 (NFPA 75, 5-2.2) and 210-52, and Canadian Electrical Code (CEC) Section 4-010(3).

**Table 50: Three-Phase Delta AC Power Cord Specifications**

Electrical Rating	Plug Type	Plug Color	Cord or Cable Type
250 VAC, 60 A	International Electrotechnical Commission (IEC) 60309	Blue	The cord or cable must be HAR compliant, IEC 60245 (designation 60245 IEC 53) or IEC 60227 (designation 60227 IEC 53); or meet one of the following standards (North America): SV, SVE, SVO, SVOO, SVT, SVTO, SVTOO, SP-2, SPE-2, SPT-2, NISP-2, NISPE-2, NISPT-2, SP-3, SPE-3, SPT-3, SJ, SJE, SJO, SJOO, SJT, SJTO, SJTOO, S, SE, SO, SOO, ST, STO, STOO

**Related Documentation**

- [AC Power Supply in a QFX3008-I Interconnect Device on page 52](#)
- [Wiring Tray in a QFX3008-I Interconnect Device on page 54](#)
- [AC Power Electrical Safety Guidelines on page 194](#)
- [AC Power Disconnection Warning on page 196](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays on page 246](#)

## AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays

Most sites distribute power through a main conduit that leads to frame-mounted power distribution panels, one of which can be located at the top of the rack that houses the device. An AC power cord connects each wiring tray to the power distribution panel.



**WARNING:** The QFX3008-I Interconnect device is pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal provided on the chassis in addition to the grounding pin of the power supply cord. This separate protective earthing terminal must be permanently connected to earth.



**CAUTION:** Power cords and cables must not block access to device components or drape where people could trip on them.

Each three-phase AC wiring tray has a metal wiring compartment that contains the AC terminal block and ground. There are two types of three-phase wiring trays: *delta* (three-wire) and *wye* (four-wire). The *wye* AC terminal block consists of four input terminals labeled **N**, **L1**, **L2**, and **L3**, from top to bottom in the common three-phase naming convention.

You must provide cords appropriate for your geographical location. The AC power cord wires insert into the AC terminal block on the wiring tray.

The power cords you provide must comply with the specifications listed in [Table 51 on page 143](#).



**NOTE:** In North America, AC power cords must not exceed 4.5 m (approximately 14.75 ft) in length, to comply with National Electrical Code (NEC) Sections 400-8 (NFPA 75, 5-2.2) and 210-52, and Canadian Electrical Code (CEC) Section 4-010(3).

**Table 51: Three-Phase Delta AC Power Cord Specifications**

Electrical Rating	Plug Type	Plug Color	Cord or Cable Type
400 VAC, 32 A	International Electrotechnical Commission (IEC) 60309	Red	The cord or cable must be HAR compliant, IEC 60245 (designation 60245 IEC 53) or IEC 60227 (designation 60227 IEC 53); or meet one of the following standards (North America): SV, SVE, SVO, SVOO, SVT, SVTO, SVTOO, SP-2, SPE-2, SPT-2, NISP-2, NISPE-2, NISPT-2, SP-3, SPE-3, SPT-3, SJ, SJE, SJO, SJOO, SJT, SJTO, SJTOO, S, SE, SO, SOO, ST, STO, STOO

**Related Documentation**

- [AC Power Supply in a QFX3008-I Interconnect Device on page 52](#)
- [Wiring Tray in a QFX3008-I Interconnect Device on page 54](#)
- [AC Power Electrical Safety Guidelines on page 194](#)
- [AC Power Disconnection Warning on page 196](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays on page 250](#)

## Calculating Power Requirements for a QFX3008-I Interconnect Device

Use the information in this topic to calculate power consumption, system thermal output, and number of power supplies required for different QFX3008-I Interconnect device configurations.

Before you begin these calculations:

- Ensure that you know the power requirements of different QFX3008-I Interconnect device components. See [“Power Requirements for a QFX3008-I Interconnect Device” on page 139](#).

This topic describes these tasks:

- [Power Consumption of Different QFX3008-I Interconnect Device Configurations on page 144](#)
- [System Thermal Output for Different QFX3008-I Interconnect Device Configurations on page 144](#)

### Power Consumption of Different QFX3008-I Interconnect Device Configurations

- To calculate the maximum system power consumption for a QFX3008-I Interconnect device with one 16-port QSFP+ front card installed:

Add the individual power requirements of all components in the chassis configuration. See [“Power Requirements for a QFX3008-I Interconnect Device” on page 139](#).

Thus, power consumption = Power requirements of: (Chassis) + 1 (16-port QSFP+ front card)

$$= 4500 \text{ W} + 240 \text{ W}$$

$$= 4740 \text{ W}$$

- To calculate the maximum system power consumption for a QFX3008-I Interconnect device with eight 16-port QSFP+ front cards installed:

Add the individual power requirements of all components in the chassis configuration. See [“Power Requirements for a QFX3008-I Interconnect Device” on page 139](#).

Thus, power consumption = Power requirements of: (Chassis) + 8 (16-port QSFP+ front card)

$$= 4500 \text{ W} + 8 (240 \text{ W})$$

$$= 4500 \text{ W} + 1920 \text{ W}$$

$$= 6420 \text{ W}$$

### System Thermal Output for Different QFX3008-I Interconnect Device Configurations

To calculate the system thermal output in British thermal units (BTU) per hour for your device configuration, multiply the maximum system power consumption of the switch by 3.41.

To calculate the system thermal output for a fully loaded QFX3008-I Interconnect device:

1. Compute the maximum system power consumption of a fully loaded configuration. See maximum system power consumption for a fully loaded configuration device in [“Power Consumption of Different QFX3008-I Interconnect Device Configurations” on page 144](#).

2. Multiply the maximum system power consumption by 3.41

$$= 6420 \text{ W} \times 3.41$$

System thermal output for a fully loaded switch configuration = 21,892 BTU/hr



**NOTE:** Using the maximum system power consumption values to calculate the system thermal output often results in overprovisioning the cooling systems. Typical power consumption is about one-third lower than these calculated values.

**Related  
Documentation**

- [AC Power Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 137](#)
- [AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays on page 138](#)
- [AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays on page 138](#)



# Planning QFX35000 Power Requirements

- [AC Power Specifications for a QFX3500 Device on page 147](#)
- [AC Power Cord Specifications for a QFX3500 Device on page 147](#)
- [DC Power Specifications for a QFX3500 Device on page 149](#)

## AC Power Specifications for a QFX3500 Device

Table 52 on page 147 describes the AC power specifications for a QFX3500 device.

Table 52: AC Power Specifications for a QFX3500 Device

Item	Specification
AC input voltage	Operating range: <ul style="list-style-type: none"> <li>• 100–127 VAC</li> <li>• 200–240 VAC</li> </ul>
AC input line frequency	50–60 Hz
AC input current rating	<ul style="list-style-type: none"> <li>• 7.8 A at 100–127 VAC</li> <li>• 3.8 A at 200–240 VAC</li> </ul>
Typical power consumption	230 W
Maximum power consumption	365 W

### Related Documentation

- [AC Power Cord Specifications for a QFX3500 Device on page 147](#)
- [AC Power Supply for a QFX3500 Device on page 73](#)
- [General Safety Guidelines and Warnings on page 161](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)

## AC Power Cord Specifications for a QFX3500 Device

Detachable AC power cords are supplied with the chassis. The coupler is type C13 as described by International Electrotechnical Commission (IEC) standard 60320. The plug

at the male end of the power cord fits into the power source outlet that is standard for your geographical location.



**CAUTION:** The AC power cord for the device is intended for use with that chassis only and not for any other use.



**NOTE:** In North America, AC power cords must not exceed 4.5 meters (approximately 14.75 feet) in length, to comply with National Electrical Code (NEC) Sections 400-8 (NFPA 75, 5-2.2) and 210-52 and Canadian Electrical Code (CEC) Section 4-010(3). The cords supplied with the QFX3500 device are in compliance.

Table 53 on page 148 lists AC power cord specifications provided for each country or region.

**Table 53: AC Power Cord Specifications**

Country/Region	Electrical Specifications	Plug Standards
Australia	250 VAC, 10 A, 50 Hz	AS/NZ 3112-1993
China	250 VAC, 10 A, 50 Hz	GB2099.1 1996 and GB1002 1996 (CHI-10P)
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 10 A, 50 Hz	CEE (7) VII
Italy	250 VAC, 10 A, 50 Hz	CEI 23-16/VII
Japan	125 VAC, 12 A, 50 Hz or 60 Hz	JIS 8303
North America	125 VAC, 13 A, 60 Hz	NEMA 5-15
South Korea	250 VAC, 10 A, 60 Hz	KSC 8305
Switzerland	250 VAC, 10 A, 50 Hz	SEV 1011 SEV 6534/2
United Kingdom	250 VAC, 10 A, 50 Hz	BS 1363A

Figure 54 on page 148 illustrates the plug on the power cord for some of the countries or regions listed in Table 53 on page 148.

**Figure 54: AC Plug Types**



- Related Documentation**
- [AC Power Supply for a QFX3500 Device on page 73](#)
  - [General Safety Guidelines and Warnings on page 161](#)
  - [General Electrical Safety Guidelines and Warnings on page 191](#)
  - [Prevention of Electrostatic Discharge Damage on page 192](#)

## DC Power Specifications for a QFX3500 Device

Table 54 on page 149 describes the DC power specifications for a QFX3500 device.

**Table 54: DC Power Specifications for a QFX3500 Device**

Item	Specifications
DC input voltage	<ul style="list-style-type: none"> <li>• Minimum operating voltage: –40 VDC</li> <li>• Nominal operating voltage: –48 VDC</li> <li>• Operating voltage range: –40 VDC through –72 VDC</li> </ul>
DC input current rating	7 A maximum at nominal operating voltage (–48 VDC)
Typical power consumption	250 W
Maximum power consumption	385 W

- Related Documentation**
- [DC Power Supply for a QFX3500 Device on page 75](#)
  - [DC Power Supply LEDs on a QFX3500 Device on page 403](#)



## CHAPTER 12

# Compliance

- [Agency Approvals for the QFX Series on page 151](#)
- [Compliance Statements for EMC Requirements for the QFX Series on page 152](#)
- [Declaration of Conformity for QFX Series Devices on page 156](#)

### Agency Approvals for the QFX Series

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The QFX Series complies with the following standards:

- Safety
  - CAN/CSA-C22.2 No. 60950-1 (2007) Information Technology Equipment - Safety
  - EN 60950-1 (2006 Information Technology Equipment - Safety
  - EN 60825-1 +A1+A2 (1994) Safety of Laser Products - Part 1: Equipment Classification
  - IEC 60950-1 (2005) Information Technology Equipment - Safety (All country deviations): CB Scheme report
  - UL 60950-1 (2nd Ed.) Information Technology Equipment - Safety
- EMC
  - FCC 47CFR Part 15 Class A (USA)
  - EN 55022 Class A Emissions (Europe)
  - ICES-003 Class A
  - VCCI Class A (Japan)
  - AS/NZS CISPR 22 Class A (Australia/New Zealand)
  - CISPR 22 Class A
  - EN 55024
  - EN 300386
  - EN 61000-3-2 Power Line Harmonics

- [EN 61000-3-3 Voltage Fluctuations and Flicker](#)
- [EN 61000-4-2 ESD](#)
- [EN 61000-4-3 Radiated Immunity](#)
- [EN 61000-4-4 EFT](#)
- [EN 61000-4-5 Surge](#)
- [EN 61000-4-6 Low Frequency Common Immunity](#)
- [EN 61000-4-11 Voltage Dips and Sags](#)

**Related Documentation**

- [Compliance Statements for EMC Requirements for the QFX Series on page 152](#)
- [Declaration of Conformity for QFX Series Devices on page 156](#)

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## Compliance Statements for EMC Requirements for the QFX Series

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This topic describes the EMC requirements for the QFX Series for:

- [Canada on page 152](#)
- [European Community on page 153](#)
- [Japan on page 153](#)
- [Korea on page 153](#)
- [United States on page 153](#)
- [FCC Part 15 Statement on page 154](#)
- [Nonregulatory Environmental Standards on page 154](#)

### Canada

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

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

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. Industry Canada does not guarantee the equipment will operate to the users' satisfaction.

Before installing this equipment, users should ensure that it is permissible to connect the equipment to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the inside wiring associated with a single line individual service may be extended by means of a certified connector assembly. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this

equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.



**CAUTION:** Users should not attempt to make electrical ground connections by themselves, but should contact the appropriate inspection authority or an electrician, as appropriate.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

## European Community

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

この装置は、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。 VCCI-A

The preceding translates as follows:

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.

VCCI-A

## Korea

이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

Korean Class A Warning

9040913

The preceding translates as follows:

This equipment is Industrial (Class A) electromagnetic wave suitability equipment and seller or user should take notice of it, and this equipment is to be used in the places except for home.

## United States

The QFX Series device 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.

## FCC Part 15 Statement

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 in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or TV technician for help.

## Nonregulatory Environmental Standards

These QFX Series models are designed to be Network Equipment Building System (NEBS) compliant:

- QFX3500
- QFX3008-I

Those device models are designed to meet the following NEBS compliance standards:

- SR-3580 NEBS Criteria Levels (Level 3 Compliance)
- GR-1089-CORE: EMC and Electrical Safety for Network Telecommunications Equipment
  - The equipment is suitable for installation in locations where the National Electrical Code (NEC) applies.
  - The battery return connection is to be treated as an Isolated DC return (DC-I), as defined in GR-1089-CORE.
- GR-63-CORE: NEBS, Physical Protection
  - The equipment is suitable for installation as part of the Common Bonding Network (CBN).

- The equipment is suitable for installation in a central office (CO).

**Related  
Documentation**

- [Agency Approvals for the QFX Series on page 151](#)
- [Declaration of Conformity for QFX Series Devices on page 156](#)

## Declaration of Conformity for QFX Series Devices

**JUNIPER**  
NETWORKS

**Declaration of Conformity**

**CE**

**Juniper Networks, Inc.**  
1194 N. Mathilda Ave  
Sunnyvale, CA 94089 USA

declares under our sole responsibility that the product:

**QFabric L2/L3 Switch  
QFX3100**

is compliant with Directive 2002/95/EC (RoHS) Restriction on Hazardous Substances,  
and is in conformity with the provisions of the following EC Directives, including all amendments,  
and with national legislation implementing these directives:

**Low Voltage Directive 2006/95/EC  
EMC Directive 2004/108/EC**

The following harmonized standards were applied:

<b>EMC</b>	<b>EN 300 386 v1.4.1: 2008</b>
	<b>EN 55022: 2006 + A1: 2007, Class A</b>
	<b>EN 55024: 1998 + A1:2001 + A2: 2003</b>
<b>Safety</b>	<b>EN 60950-1: 2006 + A1: 2010</b>

This product carries the CE Mark, which was first affixed in 2011.

Place	Signature	Date
Sunnyvale, CA		8/23/2011

**Michael J. Azar**  
**Homologation Manager**  
1194 N. Mathilda Ave  
Sunnyvale, CA 94089 USA

DoC: 11-0093



### Declaration of Conformity



**Juniper Networks, Inc.**  
1194 N. Mathilda Ave  
Sunnyvale, CA 94089 USA

declares under our sole responsibility that the product:

**QFX3008-I**  
**Qfabric Interconnect**

is compliant with Directive 2002/95/EC (RoHS) Restriction on Hazardous Substances,  
and is in conformity with the provisions of the following EC Directives, including all amendments,  
and with national legislation implementing these directives:

**Low Voltage Directive 2006/95/EC**  
**EMC Directive 2004/108/EC**

The following harmonized standards were applied:

<b>EMC</b>	EN 300 386 v1.5.1: 2010
	EN 55022: 2006 + A1: 2007, Class A
	EN 55024: 1998 + A1:2001 + A2: 2003
<b>Safety</b>	EN 60950-1: 2006 + A1: 2010

This product carries the CE Mark, which was first affixed in 2011.

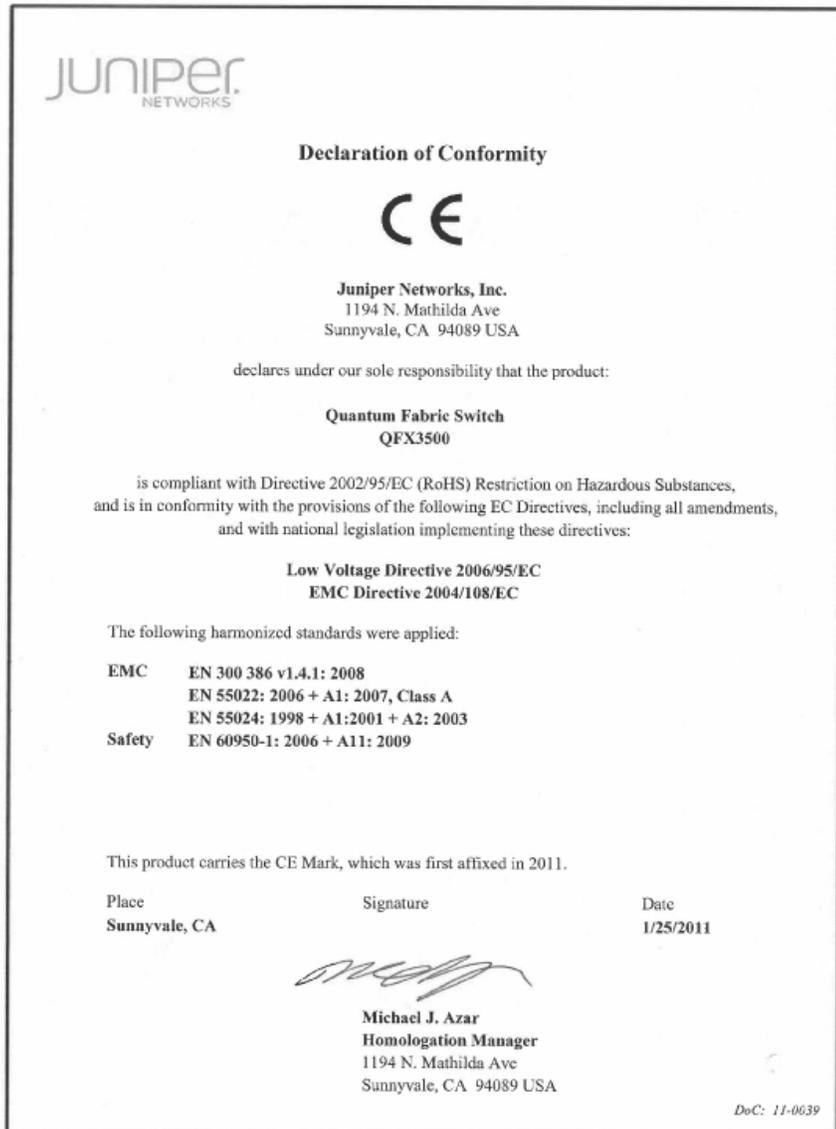
Place  
Sunnyvale, CA

Signature

Date  
2/15/2012

**Michael J. Azar**  
**Homologation Manager**  
1194 N. Mathilda Ave  
Sunnyvale, CA 94089 USA

DoC: 11-0108



- Related Documentation**
- [Agency Approvals for the QFX Series on page 151](#)
  - [Compliance Statements for EMC Requirements for the QFX Series on page 152](#)

## PART 3

# Safety

- General Safety Information on page 161
- Radiation and Laser Warnings on page 167
- Installation and Maintenance Safety Information on page 173
- Power and Electrical Safety Information on page 191



# General Safety Information

- [General Safety Guidelines and Warnings on page 161](#)
- [Definitions of Safety Warning Levels on page 162](#)
- [Fire Safety Requirements on page 164](#)
- [Qualified Personnel Warning on page 165](#)
- [Warning Statement for Norway and Sweden on page 166](#)

## General Safety Guidelines and Warnings

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This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.

The following guidelines help ensure your safety and protect the device from damage. The list of guidelines might not address all potentially hazardous situations in your working environment, so be alert and exercise good judgment at all times.

- Perform only the procedures explicitly described in the hardware documentation for this device. Make sure that only authorized service personnel perform other system services.
- Keep the area around the device clear and free from dust before, during, and after installation.
- Keep tools away from areas where people could trip over them while walking.
- Do not wear loose clothing or jewelry, such as rings, bracelets, or chains, which could become caught in the device.
- Wear safety glasses if you are working under any conditions that could be hazardous to your eyes.
- Do not perform any actions that create a potential hazard to people or make the equipment unsafe.
- Never attempt to lift an object that is too heavy for one person to handle.
- Never install or manipulate wiring during electrical storms.

- Never install electrical jacks in wet locations unless the jacks are specifically designed for wet environments.
- Operate the device only when it is properly grounded.
- Ensure that the separate protective earthing terminal provided on this device is permanently connected to earth.
- Replace fuses only with fuses of the same type and rating.
- Do not open or remove chassis covers or sheet-metal parts unless instructions are provided in the hardware documentation for this device. Such an action could cause severe electrical shock.
- Do not push or force any objects through any opening in the chassis frame. Such an action could result in electrical shock or fire.
- Avoid spilling liquid onto the chassis or onto any device component. Such an action could cause electrical shock or damage the device.
- Avoid touching uninsulated electrical wires or terminals that have not been disconnected from their power source. Such an action could cause electrical shock.
- Always ensure that all modules, power supplies, and cover panels are fully inserted and that the installation screws are fully tightened.

**Related Documentation**

- [AC Power Electrical Safety Guidelines on page 194](#)
- [DC Power Electrical Safety Guidelines on page 197](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [Maintenance and Operational Safety Guidelines and Warnings on page 184](#)
- [Installation Instructions Warning on page 173](#)
- [Grounded Equipment Warning on page 183](#)

## Definitions of Safety Warning Levels

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This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.

The documentation uses the following levels of safety warnings (there are two “Warning” formats):



.....

**NOTE:** You might find this information helpful in a particular situation, or you might overlook this important information if it was not highlighted in a Note.

.....



**CAUTION:** You need to observe the specified guidelines to avoid minor injury or discomfort to you or severe damage to the device.



**WARNING:** This symbol alerts you to the risk of personal injury from a laser.



**WARNING:** This symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents.

**Waarschuwing** Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen.

**Varoitus** Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista.

**Attention** Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents.

**Warnung** Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt.

**Avvertenza** Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti.

**Advarsel** Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker.

**Aviso** Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos

elétricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes.

**¡Atención!** Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes.

**Varning!** Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador.

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**Related  
Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [Installation Instructions Warning on page 173](#)
- [Maintenance and Operational Safety Guidelines and Warnings on page 184](#)
- [Grounded Equipment Warning on page 183](#)
- [Laser and LED Safety Guidelines and Warnings for EX Series Switches](#)
- [Warning Statement for Norway and Sweden on page 166](#)
- [Laser and LED Safety Guidelines and Warnings for the QFX Series on page 168](#)

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## Fire Safety Requirements

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This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.

In the event of a fire emergency involving switches and other network equipment, the safety of people is the primary concern. You should establish procedures for protecting people in the event of a fire emergency, provide safety training, and properly provision fire-control equipment and fire extinguishers.

In addition, you should establish procedures to protect your equipment in the event of a fire emergency. Juniper Networks products should be installed in an environment suitable for electronic equipment. We recommend that fire suppression equipment be available in the event of a fire in the vicinity of the equipment and that all local fire, safety, and electrical codes and ordinances be observed when you install and operate your equipment.

### Fire Suppression

In the event of an electrical hazard or an electrical fire, you should first turn power off to the equipment at the source. Then use a Type C fire extinguisher, which uses noncorrosive fire retardants, to extinguish the fire.

## Fire Suppression Equipment

Type C fire extinguishers, which use noncorrosive fire retardants such as carbon dioxide and Halotron™, are most effective for suppressing electrical fires. Type C fire extinguishers displace oxygen from the point of combustion to eliminate the fire. For extinguishing fire on or around equipment that draws air from the environment for cooling, you should use this type of inert oxygen displacement extinguisher instead of an extinguisher that leaves residues on equipment.

Do not use multipurpose Type ABC chemical fire extinguishers (dry chemical fire extinguishers). The primary ingredient in these fire extinguishers is monoammonium phosphate, which is very sticky and difficult to clean. In addition, in the presence of minute amounts of moisture, monoammonium phosphate can become highly corrosive and corrodes most metals.

Any equipment in a room in which a chemical fire extinguisher has been discharged is subject to premature failure and unreliable operation. The equipment is considered to be irreparably damaged.



**NOTE:** To keep warranties effective, do not use a dry chemical fire extinguisher to control a fire at or near a Juniper Networks switch or other network device provided by Juniper. If a dry chemical fire extinguisher is used, the unit is no longer eligible for coverage under a service agreement.

We recommend that you dispose of any irreparably damaged equipment in an environmentally responsible manner.

### Related Documentation

- [General Safety Guidelines and Warnings on page 161](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [Action to Take After an Electrical Accident on page 205](#)

## Qualified Personnel Warning

This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.



**WARNING:** Only trained and qualified personnel should install or replace the device.

**Waarschuwing** Installatie en reparaties mogen uitsluitend door getraind en bevoegd personeel uitgevoerd worden.

**Varoitus** Ainoastaan koulutettu ja pätevä henkilökunta saa asentaa tai vaihtaa tämän laitteen.

**Attention** Tout installation ou remplacement de l'appareil doit être réalisé par du personnel qualifié et compétent.

**Warnung** Gerät nur von geschultem, qualifiziertem Personal installieren oder auswechseln lassen.

**Avvertenza** Solo personale addestrato e qualificato deve essere autorizzato ad installare o sostituire questo apparecchio.

**Advarsel** Kun kvalifisert personell med riktig opplæring bør montere eller bytte ut dette utstyret.

**Aviso** Este equipamento deverá ser instalado ou substituído apenas por pessoal devidamente treinado e qualificado.

**¡Atención!** Estos equipos deben ser instalados y reemplazados exclusivamente por personal técnico adecuadamente preparado y capacitado.

**Varning!** Denna utrustning ska endast installeras och bytas ut av utbildad och kvalificerad personal.

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**Related  
Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [AC Power Electrical Safety Guidelines on page 194](#)
- [DC Power Electrical Safety Guidelines on page 197](#)

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## Warning Statement for Norway and Sweden

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This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.



**WARNING:** The equipment must be connected to an earthed mains socket-outlet.

**Advarsel** Apparatet skal kobles til en jordet stikkontakt.

**Varning!** Apparaten skall anslutas till jordat nätuttag.

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**Related  
Documentation**

- [General Safety Guidelines and Warnings on page 161](#)

# Radiation and Laser Warnings

- [Radiation from Open Port Apertures Warning on page 167](#)
- [Laser and LED Safety Guidelines and Warnings for the QFX Series on page 168](#)

## Radiation from Open Port Apertures Warning

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This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.



**WARNING:** Because invisible radiation might be emitted from the aperture of the port when no fiber cable is connected, avoid exposure to radiation and do not stare into open apertures.

**Waarschuwing** Aangezien onzichtbare straling vanuit de opening van de poort kan komen als er geen fiberkabel aangesloten is, dient blootstelling aan straling en het kijken in open openingen vermeden te worden.

**Varoitus** Koska portin aukosta voi emittoitua näkymätöntä säteilyä, kun kuitukaapelia ei ole kytkettynä, vältä säteilylle altistumista äläkä katso avoimiin aukkoihin.

**Attention** Des radiations invisibles à l'il nu pouvant traverser l'ouverture du port lorsqu'aucun câble en fibre optique n'y est connecté, il est recommandé de ne pas regarder fixement l'intérieur de ces ouvertures.

**Warnung** Aus der Port-Öffnung können unsichtbare Strahlen emittieren, wenn kein Glasfaserkabel angeschlossen ist. Vermeiden Sie es, sich den Strahlungen auszusetzen, und starren Sie nicht in die Öffnungen!

**Avvertenza** Quando i cavi in fibra non sono inseriti, radiazioni invisibili possono essere emesse attraverso l'apertura della porta. Evitate di esporvi alle radiazioni e non guardate direttamente nelle aperture.

**Advarsel** Unngå utsettelse for stråling, og stirr ikke inn i åpninger som er åpne, fordi usynlig stråling kan emitteres fra portens åpning når det ikke er tilkoblet en fiberkabel.

**Aviso** Dada a possibilidade de emissão de radiação invisível através do orifício da via de acesso, quando esta não tiver nenhum cabo de fibra conectado, deverá evitar a exposição à radiação e não deverá olhar fixamente para orifícios que se encontrarem a descoberto.

**¡Atención!** Debido a que la apertura del puerto puede emitir radiación invisible cuando no existe un cable de fibra conectado, evite mirar directamente a las aperturas para no exponerse a la radiación.

**Varning!** Osynlig strålning kan avges från en portöppning utan ansluten fiberkabel och du bör därför undvika att bli utsatt för strålning genom att inte stirra in i oskyddade öppningar.

**Related  
Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [Laser and LED Safety Guidelines and Warnings for EX Series Switches](#)
- [Installation Instructions Warning on page 173](#)
- [Grounded Equipment Warning on page 183](#)
- [Laser and LED Safety Guidelines and Warnings for the QFX Series on page 168](#)

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## Laser and LED Safety Guidelines and Warnings for the QFX Series

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QFX Series devices are equipped with laser transmitters:

- SFP and SFP+ transceivers are classified as Class 1 Laser Products (complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice 50, dated July 26, 2001) or Class 1 LED Products.
- QSFP+ transceivers are classified as Class 1M Laser Products (IEC 60825-1 2001–01).

Observe the following guidelines and warnings:

- [General Laser Safety Guidelines on page 169](#)
- [Class 1M Laser Product Warning on page 169](#)
- [Class 1M Laser Radiation Warning on page 169](#)
- [Class 1 Laser Product Warning on page 169](#)
- [Class 1 LED Product Warning on page 170](#)
- [Laser Beam Warning on page 170](#)
- [Unterminated Fiber-Optic Cable Warning on page 171](#)

## General Laser Safety Guidelines

When working around ports that support optical transceivers, observe the following safety guidelines to prevent eye injury:

- Do not look into unterminated ports or at fibers that connect to unknown sources.
- Do not examine unterminated optical ports with optical instruments.
- Avoid direct exposure to the beam.



**WARNING:** Unterminated optical connectors can emit invisible laser radiation. The lens in the human eye focuses all the laser power on the retina, so focusing the eye directly on a laser source—even a low-power laser—could permanently damage the eye.

## Class 1M Laser Product Warning



**WARNING:** Class 1M laser product.

**Waarschuwing** Laserproducten van Klasse 1M (IEC).

**Varoitus** Luokan 1M (IEC) lasertuotteita.

**Attention** Produits laser catégorie 1M (IEC).

**Warnung** Laserprodukte der Klasse 1M (IEC).

**Avvertenza** Prodotti laser di Classe 1M (IEC).

**Advarsel** Klasse 1M (IEC) laserprodukter.

**Aviso** Produtos laser Classe 1M (IEC).

**¡Atención!** Productos láser de Clase 1M (IEC).

**Varning!** Laserprodukter av Klass 1M (IEC).

## Class 1M Laser Radiation Warning



**WARNING:** Class 1M laser radiation when open. Do not view directly with optical instruments.

## Class 1 Laser Product Warning



**WARNING:** Class 1 laser product.

Waarschuwing Klasse-1 laser produkt.

Varoitus Luokan 1 lasertuote.

Attention Produit laser de classe I.

Warnung Laserprodukt der Klasse 1.

Avvertenza Prodotto laser di Classe 1.

Advarsel Laserprodukt av klasse 1.

Aviso Produto laser de classe 1.

¡Atención! Producto láser Clase I.

Varning! Laserprodukt av klass 1.

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## Class 1 LED Product Warning

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**WARNING:** Class 1 LED product.

Waarschuwing Klasse 1 LED-product.

Varoitus Luokan 1 valodiodituote.

Attention Alarme de produit LED Class I.

Warnung Class 1 LED-Produktwarnung.

Avvertenza Avvertenza prodotto LED di Classe 1.

Advarsel LED-produkt i klasse 1.

Aviso Produto de classe 1 com LED.

¡Atención! Aviso sobre producto LED de Clase 1.

Varning! Lysdiodprodukt av klass 1.

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## Laser Beam Warning

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**WARNING:** Do not stare into the laser beam or view it directly with optical instruments.

Waarschuwing Niet in de straal staren of hem rechtstreeks bekijken met optische instrumenten.

Varoitus Älä katso säteeseen äläkä tarkastele sitä suoraan optisen laitteen avulla.

**Attention** Ne pas fixer le faisceau des yeux, ni l'observer directement à l'aide d'instruments optiques.

**Warnung** Nicht direkt in den Strahl blicken und ihn nicht direkt mit optischen Geräten prüfen.

**Avvertenza** Non fissare il raggio con gli occhi né usare strumenti ottici per osservarlo direttamente.

**Advarsel** Stirr eller se ikke direkte p strlen med optiske instrumenter.

**Aviso** Não olhe fixamente para o raio, nem olhe para ele directamente com instrumentos ópticos.

**iAtención!** No mirar fijamente el haz ni observarlo directamente con instrumentos ópticos.

**Varning!** Rikta inte blicken in mot strålen och titta inte direkt på den genom optiska instrument.

## Unterminated Fiber-Optic Cable Warning



**WARNING:** Invisible laser radiation might be emitted from the unterminated connector of a fiber-optic cable. To avoid injury to your eye, do not view the fiber optics with a magnifying optical device, such as a loupe, within 100 mm.

**Waarschuwing** Er kunnen onzichtbare laserstralen worden uitgezonden vanuit het uiteinde van de onafgebroken vezelkabel of connector. Niet in de straal kijken of deze rechtstreeks bekijken met optische instrumenten. Als u de laseruitvoer met bepaalde optische instrumenten bekijkt (zoals bijv. een oogloep, vergrootglas of microscoop) binnen een afstand van 100 mm kan dit gevaar voor uw ogen opleveren.

**Varoitus** Päättämättömän kuitukaapelin tai -liittimen päästä voi tulla näkymätöntä lasersäteilyä. Älä tuijota sädettä tai katso sitä suoraan optisilla välineillä. Lasersäteen katsominen tietyillä optisilla välineillä (esim. suurennuslasilla tai mikroskoopilla) 10 cm:n päästä tai sitä lähempää voi olla vaarallista silmille.

**Attention** Des émissions de radiations laser invisibles peuvent se produire à l'extrémité d'un câble en fibre ou d'un raccord sans terminaison. Ne pas fixer du regard le rayon ou l'observer directement avec des instruments optiques. L'observation du laser à l'aide certains instruments optiques (loupes et microscopes) à une distance inférieure à 100 mm peut poser des risques pour les yeux.

**Warnung** Eine unsichtbare Laserstrahlung kann vom Ende des nicht angeschlossenen Glasfaserkabels oder Steckers ausgestrahlt werden. Nicht in den Laserstrahl schauen oder diesen mit einem optischen Instrument direkt

ansehen. Ein Betrachten des Laserstrahls mit bestimmten optischen Instrumenten, wie z.B. Augenlupen, Vergrößerungsgläsern und Mikroskopen innerhalb eines Abstands von 100 mm kann für das Auge gefährlich sein.

**Avvertenza** L'estremità del connettore o del cavo ottico senza terminazione può emettere radiazioni laser invisibili. Non fissare il raggio od osservarlo in modo diretto con strumenti ottici. L'osservazione del fascio laser con determinati strumenti ottici (come lupette, lenti di ingrandimento o microscopi) entro una distanza di 100 mm può provocare danni agli occhi.

**Advarsel** Usynlig laserstråling kan emitte fra enden av den ikke-terminerte fiberkabelen eller koblingen. Ikke se inn i strålen og se heller ikke direkte på strålen med optiske instrumenter. Observering av laserutgang med visse optiske instrumenter (for eksempel øyelupe, forstørrelsesglass eller mikroskoper) innenfor en avstand på 100 mm kan være farlig for øynene.

**Aviso** Radiação laser invisível pode ser emitida pela ponta de um conector ou cabo de fibra não terminado. Não olhe fixa ou diretamente para o feixe ou com instrumentos ópticos. Visualizar a emissão do laser com certos instrumentos ópticos (por exemplo, lupas, lentes de aumento ou microscópios) a uma distância de 100 mm pode causar riscos à visão.

**¡Atención!** El extremo de un cable o conector de fibra sin terminación puede emitir radiación láser invisible. No se acerque al radio de acción ni lo mire directamente con instrumentos ópticos. La exposición del ojo a una salida de láser con determinados instrumentos ópticos (por ejemplo, lupas y microscopios) a una distancia de 100 mm puede comportar lesiones oculares.

**Varning!** Osynlig laserstrålning kan komma från änden på en oavslutad fiberkabel eller -anslutning. Titta inte rakt in i strålen eller direkt på den med optiska instrument. Att titta på laserstrålen med vissa optiska instrument (t.ex. lupper, förstoringsglas och mikroskop) från ett avstånd på 100 mm kan skada ögonen.

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**Related Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [Radiation from Open Port Apertures Warning on page 167](#)
- [Installation Instructions Warning on page 173](#)
- [Grounded Equipment Warning on page 183](#)

# Installation and Maintenance Safety Information

- Installation Instructions Warning on page 173
- Chassis Lifting Guidelines for a QFX3100 Director Device on page 175
- Chassis Lifting Guidelines for a QFX3008-I Interconnect Device on page 175
- Chassis Lifting Guidelines for a QFX3500 Device on page 176
- Restricted Access Warning on page 177
- Ramp Warning on page 178
- Rack-Mounting and Cabinet-Mounting Warnings on page 179
- Grounded Equipment Warning on page 183
- Maintenance and Operational Safety Guidelines and Warnings on page 184

## Installation Instructions Warning

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This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.



**WARNING:** Read the installation instructions before you connect the device to a power source.

**Waarschuwing** Raadpleeg de installatie-aanwijzingen voordat u het systeem met de voeding verbindt.

**Varoitus** Lue asennusohjeet ennen järjestelmän yhdistämistä virtalähteeseen.

**Attention** Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation.

**Warnung** Lesen Sie die Installationsanweisungen, bevor Sie das System an die Stromquelle anschließen.

**Avvertenza** Consultare le istruzioni di installazione prima di collegare il sistema all'alimentatore.

**Advarsel** Les installasjonsinstruksjonene før systemet kobles til strømkilden.

**Aviso** Leia as instruções de instalação antes de ligar o sistema à sua fonte de energia.

**¡Atención!** Ver las instrucciones de instalación antes de conectar el sistema a la red de alimentación.

**Varning!** Läs installationsanvisningarna innan du kopplar systemet till dess strömförsörjningsenhet.

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**Related  
Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [Laser and LED Safety Guidelines and Warnings for EX Series Switches](#)
- [Laser and LED Safety Guidelines and Warnings for the QFX Series on page 168](#)
- [Grounded Equipment Warning on page 183](#)
- [Connecting AC Power to an EX2200 Switch](#)
- [Connecting AC Power to an EX3200 Switch](#)
- [Connecting AC Power to an EX3300 Switch](#)
- [Connecting AC Power to an EX4200 Switch](#)
- [Connecting AC Power to an EX4500 Switch](#)
- [Connecting AC Power to an EX6200 Switch](#)
- [Connecting AC Power to an EX8200 Switch](#)
- [Connecting DC Power to an EX2200 Switch](#)
- [Connecting DC Power to an EX3200 Switch](#)
- [Connecting DC Power to an EX3300 Switch](#)
- [Connecting DC Power to an EX4200 Switch](#)
- [Connecting DC Power to an EX4500 Switch](#)
- [Connecting DC Power to an EX6200 Switch](#)
- [Connecting DC Power to an EX8200 Switch](#)
- [Connecting AC Power to an XRE200 External Routing Engine](#)
- [Connecting DC Power to an XRE200 External Routing Engine](#)
- [Connecting AC Power to a QFX3100 Director Device on page 218](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 239](#)

- [Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays on page 246](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays on page 250](#)
- [Connecting AC Power to a QFX3500 Device on page 265](#)

## Chassis Lifting Guidelines for a QFX3100 Director Device

The weight of a fully loaded QFX3100 Director device chassis is approximately 41.2 lb (18.7 kg). Observe the following guidelines for lifting and moving a QFX3100 Director device:

- Before installing a QFX3100 Director device, read the guidelines in “[Site Preparation Checklist for a QFX3100 Director Device](#)” on page 83 to verify that the intended site meets the specified power, environmental, and clearance requirements.
- Before lifting or moving the QFX3100 Director device, disconnect all external cables.
- As when lifting any heavy object, lift most of the weight with your legs rather than your back. Keep your knees bent and your back relatively straight and avoid twisting your body as you lift. Balance the load evenly and be sure that your footing is solid.

### Related Documentation

- [General Safety Guidelines and Warnings on page 161](#)
- [Installation Instructions Warning on page 173](#)
- [Mounting a QFX3100 Director Device on Two Posts in a Rack or Cabinet on page 215](#)
- [Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet on page 217](#)

## Chassis Lifting Guidelines for a QFX3008-I Interconnect Device

The weight of a fully loaded QFX3008-I Interconnect device is approximately 650 lb (295 kg). Observe the following guidelines for lifting and moving the device:

- Before moving the device to a site, ensure that the site meets the power, environmental, and clearance requirements specified in the “[Site Preparation Checklist for a QFX3008-I Interconnect Device](#)” on page 84.
- Do not attempt to lift the QFX3008-I Interconnect device by yourself. We recommend using a mechanical lift rated for at least 750 lb (340.2 kg) to install the QFX3008 device in a rack or cabinet. If you do not have a lift rated for 750 lb (341 kg), you must remove all components from the chassis and use a lift rated for at least 250 lb (114 kg). The weight of an empty QFX3008-I Interconnect device and midplane is approximately 205 lb (93 kg).



**WARNING:** Because of the QFX3008-I Interconnect device size and weight, we require the use of a mechanical lift to install the QFX3008-I Interconnect

device in a rack or cabinet or to move the device from one location to another.



**CAUTION:** The handles on the QFX3008-I Interconnect device are designed to help maneuver the chassis from the mechanical lift to the mounting shelves in the rack. Do not attempt to lift the chassis using the handles.

- Before lifting or moving the device, disconnect all external cables and wires.

**Related Documentation**

- [Chassis Physical Specifications for a QFX3008-I Interconnect Device on page 41](#)
- [General Safety Guidelines and Warnings on page 161](#)
- [Installation Instructions Warning on page 173](#)

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## Chassis Lifting Guidelines for a QFX3500 Device

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The weight of a fully loaded QFX3500 device chassis is approximately 30.8 lb (14 kg). Observe the following guidelines for lifting and moving a QFX3500 device:



**CAUTION:** If you are installing the QFX3500 device above 60 in. (152.4 cm) from the floor, you must remove the power supplies, fan trays, and management board before attempting to install the device, or ask someone to assist you during the installation.

- Before installing a QFX3500 device, read the guidelines in [“Site Preparation Checklist for a QFX3500 Device” on page 86](#) to verify that the intended site meets the specified power, environmental, and clearance requirements.
- Before lifting or moving the QFX3500 device, disconnect all external cables.
- As when lifting any heavy object, lift most of the weight with your legs rather than your back. Keep your knees bent and your back relatively straight and avoid twisting your body as you lift. Balance the load evenly and be sure that your footing is solid.

**Related Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [Installation Instructions Warning on page 173](#)
- [Mounting a QFX3500 Device in a Rack or Cabinet on page 261](#)

## Restricted Access Warning



**WARNING:** This unit is intended for installation in restricted access areas. A restricted access area is an area to which access can be gained only by service personnel through the use of a special tool, lock and key, or other means of security, and which is controlled by the authority responsible for the location.

**Waarschuwing** Dit toestel is bedoeld voor installatie op plaatsen met beperkte toegang. Een plaats met beperkte toegang is een plaats waar toegang slechts door servicepersoneel verkregen kan worden door middel van een speciaal instrument, een slot en sleutel, of een ander veiligheidsmiddel, en welke beheerd wordt door de overheidsinstantie die verantwoordelijk is voor de locatie.

**Varoitus** Tämä laite on tarkoitettu asennettavaksi paikkaan, johon pääsy on rajoitettua. Paikka, johon pääsy on rajoitettua, tarkoittaa paikkaa, johon vain huoltohenkilöstö pääsee jonkin erikoistyökalun, lukkoon sopivan avaimen tai jonkin muun turvalaitteen avulla ja joka on paikasta vastuussa olevien toimivaltaisten henkilöiden valvoma.

**Attention** Cet appareil est à installer dans des zones d'accès réservé. Ces dernières sont des zones auxquelles seul le personnel de service peut accéder en utilisant un outil spécial, un mécanisme de verrouillage et une clé, ou tout autre moyen de sécurité. L'accès aux zones de sécurité est sous le contrôle de l'autorité responsable de l'emplacement.

**Warnung** Diese Einheit ist zur Installation in Bereichen mit beschränktem Zutritt vorgesehen. Ein Bereich mit beschränktem Zutritt ist ein Bereich, zu dem nur Wartungspersonal mit einem Spezialwerkzeugs, Schloß und Schlüssel oder anderer Sicherheitsvorkehrungen Zugang hat, und der von dem für die Anlage zuständigen Gremium kontrolliert wird.

**Avvertenza** Questa unità deve essere installata in un'area ad accesso limitato. Un'area ad accesso limitato è un'area accessibile solo a personale di assistenza tramite un'attrezzo speciale, lucchetto, o altri dispositivi di sicurezza, ed è controllata dall'autorità responsabile della zona.

**Advarsel** Denne enheten er laget for installasjon i områder med begrenset adgang. Et område med begrenset adgang gir kun adgang til servicepersonale som bruker et spesielt verktøy, lås og nøkkel, eller en annen sikkerhetsanordning, og det kontrolleres av den autoriteten som er ansvarlig for området.

**Aviso** Esta unidade foi concebida para instalação em áreas de acesso restrito. Uma área de acesso restrito é uma área à qual apenas tem acesso o pessoal de serviço autorizado, que possua uma ferramenta, chave e fechadura especial, ou qualquer outra forma de segurança. Esta área é controlada pela autoridade responsável pelo local.

**¡Atención!** Esta unidad ha sido diseñada para instalarse en áreas de acceso restringido. Área de acceso restringido significa un área a la que solamente tiene acceso el personal de servicio mediante la utilización de una herramienta especial, cerradura con llave, o algún otro medio de seguridad, y que está bajo el control de la autoridad responsable del local.

**Varning!** Denna enhet är avsedd för installation i områden med begränsat tillträde. Ett område med begränsat tillträde får endast tillträddas av servicepersonal med ett speciellt verktyg, lås och nyckel, eller annan säkerhetsanordning, och kontrolleras av den auktoritet som ansvarar för området.

#### Related Documentation

- [General Safety Guidelines and Warnings on page 161](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [Installation Instructions Warning on page 173](#)
- [Grounded Equipment Warning on page 183](#)

## Ramp Warning

This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.



**WARNING:** When installing the device, do not use a ramp inclined at more than 10 degrees.

**Waarschuwing** Gebruik een oprijplaat niet onder een hoek van meer dan 10 graden.

**Varoitus** Älä käytä sellaista kaltevaa pintaa, jonka kaltevuus ylittää 10 astetta.

**Attention** Ne pas utiliser une rampe dont l'inclinaison est supérieure à 10 degrés.

**Warnung** Keine Rampen mit einer Neigung von mehr als 10 Grad verwenden.

**Avvertenza** Non usare una rampa con pendenza superiore a 10 gradi.

**Advarsel** Bruk aldri en rampe som heller mer enn 10 grader.

**Aviso** Não utilize uma rampa com uma inclinação superior a 10 graus.

**¡Atención!** No usar una rampa inclinada más de 10 grados

**Varning!** Använd inte ramp med en lutning på mer än 10 grader.

- Related Documentation**
- [General Safety Guidelines and Warnings on page 161](#)
  - [Installation Instructions Warning on page 173](#)
  - [Grounded Equipment Warning on page 183](#)

## Rack-Mounting and Cabinet-Mounting Warnings

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This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.

Ensure that the rack or cabinet in which the device is installed is evenly and securely supported. Uneven mechanical loading could lead to a hazardous condition.



**WARNING:** To prevent bodily injury when mounting or servicing the device in a rack, take the following precautions to ensure that the system remains stable. The following directives help maintain your safety:

- The device must be installed in a rack that is secured to the building structure.
- The device should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting the device on a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing equipment, install the stabilizers before mounting or servicing the device in the rack.

**Waarschuwing** Om lichamelijk letsel te voorkomen wanneer u dit toestel in een rek monteert of het daar een servicebeurt geeft, moet u speciale voorzorgsmaatregelen nemen om ervoor te zorgen dat het toestel stabiel blijft. De onderstaande richtlijnen worden verstrekt om uw veiligheid te verzekeren:

- De Juniper Networks switch moet in een stellage worden geïnstalleerd die aan een bouwsel is verankerd.
- Dit toestel dient onderaan in het rek gemonteerd te worden als het toestel het enige in het rek is.
- Wanneer u dit toestel in een gedeeltelijk gevuld rek monteert, dient u het rek van onderen naar boven te laden met het zwaarste onderdeel onderaan in het rek.
- Als het rek voorzien is van stabiliseringshulpmiddelen, dient u de stabilisatoren te monteren voordat u het toestel in het rek monteert of het daar een servicebeurt geeft.

**Varoitus** Kun laite asetetaan telineeseen tai huolletaan sen ollessa telineessä, on noudatettava erityisiä varotoimia järjestelmän vakavuuden säilyttämiseksi, jotta vältetään loukkaantumiselta. Noudata seuraavia turvallisuusohjeita:

- Juniper Networks switch on asennettava telineeseen, joka on kiinnitetty rakennukseen.
- Jos telineessä ei ole muita laitteita, aseta laite telineen alaosaan.
- Jos laite asetetaan osaksi täytettyyn telineeseen, aloita kuormittaminen sen alaosasta kaikkein raskaimmalla esineellä ja siirry sitten sen yläosaan.
- Jos telinettä varten on vakaimet, asenna ne ennen laitteen asettamista telineeseen tai sen huoltamista siinä.

**Attention** Pour éviter toute blessure corporelle pendant les opérations de montage ou de réparation de cette unité en casier, il convient de prendre des précautions spéciales afin de maintenir la stabilité du système. Les directives ci-dessous sont destinées à assurer la protection du personnel:

- Le rack sur lequel est monté le Juniper Networks switch doit être fixé à la structure du bâtiment.
- Si cette unité constitue la seule unité montée en casier, elle doit être placée dans le bas.
- Si cette unité est montée dans un casier partiellement rempli, charger le casier de bas en haut en plaçant l'élément le plus lourd dans le bas.
- Si le casier est équipé de dispositifs stabilisateurs, installer les stabilisateurs avant de monter ou de réparer l'unité en casier.

**Warnung** Zur Vermeidung von Körperverletzung beim Anbringen oder Warten dieser Einheit in einem Gestell müssen Sie besondere Vorkehrungen treffen, um sicherzustellen, daß das System stabil bleibt. Die folgenden Richtlinien sollen zur Gewährleistung Ihrer Sicherheit dienen:

- Der Juniper Networks switch muß in einem Gestell installiert werden, das in der Gebäudestruktur verankert ist.
- Wenn diese Einheit die einzige im Gestell ist, sollte sie unten im Gestell angebracht werden.
- Bei Anbringung dieser Einheit in einem zum Teil gefüllten Gestell ist das Gestell von unten nach oben zu laden, wobei das schwerste Bauteil unten im Gestell anzubringen ist.
- Wird das Gestell mit Stabilisierungszubehör geliefert, sind zuerst die Stabilisatoren zu installieren, bevor Sie die Einheit im Gestell anbringen oder sie warten.

**Avvertenza** Per evitare infortuni fisici durante il montaggio o la manutenzione di questa unità in un supporto, occorre osservare speciali precauzioni per

garantire che il sistema rimanga stabile. Le seguenti direttive vengono fornite per garantire la sicurezza personale:

- Il Juniper Networks switch deve essere installato in un telaio, il quale deve essere fissato alla struttura dell'edificio.
- Questa unità deve venire montata sul fondo del supporto, se si tratta dell'unica unità da montare nel supporto.
- Quando questa unità viene montata in un supporto parzialmente pieno, caricare il supporto dal basso all'alto, con il componente più pesante sistemato sul fondo del supporto.
- Se il supporto è dotato di dispositivi stabilizzanti, installare tali dispositivi prima di montare o di procedere alla manutenzione dell'unità nel supporto.

**Advarsel Unngå fysiske skader under montering eller reparasjonsarbeid på denne enheten når den befinner seg i et kabinett. Vær nøye med at systemet er stabilt. Følgende retningslinjer er gitt for å verne om sikkerheten:**

- Juniper Networks switch må installeres i et stativ som er forankret til bygningsstrukturen.
- Denne enheten bør monteres nederst i kabinettet hvis dette er den eneste enheten i kabinettet.
- Ved montering av denne enheten i et kabinett som er delvis fylt, skal kabinettet lastes fra bunnen og opp med den tyngste komponenten nederst i kabinettet.
- Hvis kabinettet er utstyrt med stabiliseringsutstyr, skal stabilisatorene installeres før montering eller utføring av reparasjonsarbeid på enheten i kabinettet.

**Aviso Para se prevenir contra danos corporais ao montar ou reparar esta unidade numa estante, deverá tomar precauções especiais para se certificar de que o sistema possui um suporte estável. As seguintes directrizes ajudá-lo-ão a efectuar o seu trabalho com segurança:**

- O Juniper Networks switch deverá ser instalado numa prateleira fixa à estrutura do edifício.
- Esta unidade deverá ser montada na parte inferior da estante, caso seja esta a única unidade a ser montada.
- Ao montar esta unidade numa estante parcialmente ocupada, coloque os itens mais pesados na parte inferior da estante, arrumando-os de baixo para cima.
- Se a estante possuir um dispositivo de estabilização, instale-o antes de montar ou reparar a unidade.

**¡Atención! Para evitar lesiones durante el montaje de este equipo sobre un bastidor, o posteriormente durante su mantenimiento, se debe poner mucho**

cuidado en que el sistema quede bien estable. Para garantizar su seguridad, proceda según las siguientes instrucciones:

- El Juniper Networks switch debe instalarse en un bastidor fijado a la estructura del edificio.
- Colocar el equipo en la parte inferior del bastidor, cuando sea la única unidad en el mismo.
- Cuando este equipo se vaya a instalar en un bastidor parcialmente ocupado, comenzar la instalación desde la parte inferior hacia la superior colocando el equipo más pesado en la parte inferior.
- Si el bastidor dispone de dispositivos estabilizadores, instalar éstos antes de montar o proceder al mantenimiento del equipo instalado en el bastidor.

**Varning!** För att undvika kroppsskada när du installerar eller utför underhållsarbete på denna enhet på en ställning måste du vidta särskilda försiktighetsåtgärder för att försäkra dig om att systemet står stadigt. Följande riktlinjer ges för att trygga din säkerhet:

- Juniper Networks switch måste installeras i en ställning som är förankrad i byggnadens struktur.
- Om denna enhet är den enda enheten på ställningen skall den installeras längst ned på ställningen.
- Om denna enhet installeras på en delvis fylld ställning skall ställningen fyllas nedifrån och upp, med de tyngsta enheterna längst ned på ställningen.
- Om ställningen är försedd med stabiliseringsdon skall dessa monteras fast innan enheten installeras eller underhålls på ställningen.

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**Related Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [Installation Instructions Warning on page 173](#)
- [Grounded Equipment Warning on page 183](#)
- [Mounting an EX2200 Switch](#)
- [Mounting an EX3200 Switch](#)
- [Mounting an EX3300 Switch](#)
- [Mounting an EX4200 Switch](#)
- [Mounting an EX4500 Switch](#)
- [Mounting an EX6210 Switch on a Rack or Cabinet](#)
- [Mounting an EX8208 Switch on a Rack or Cabinet](#)
- [Mounting an EX8216 Switch on a Rack or Cabinet](#)
- [Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet on page 217](#)

- [Mounting a QFX3100 Director Device on Two Posts in a Rack or Cabinet on page 215](#)
- [Mounting a QFX3008-I Interconnect Device on a Rack or Cabinet Using a Mechanical Lift on page 234](#)
- [Mounting a QFX3500 Device in a Rack or Cabinet on page 261](#)

## Grounded Equipment Warning

This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.



**WARNING:** The device is intended to be grounded. During normal use, ensure that you have connected earth ground to the chassis.

**Waarschuwing** Deze apparatuur hoort geaard te worden. Zorg dat de host-computer tijdens normaal gebruik met aarde is verbonden.

**Varoitus** Tämä laitteisto on tarkoitettu maadoitettavaksi. Varmista, että isäntälaitte on yhdistetty maahan normaalikäytön aikana.

**Attention** Cet équipement doit être relié à la terre. S'assurer que l'appareil hôte est relié à la terre lors de l'utilisation normale.

**Warnung** Dieses Gerät muß geerdet werden. Stellen Sie sicher, daß das Host-Gerät während des normalen Betriebs an Erde gelegt ist.

**Avvertenza** Questa apparecchiatura deve essere collegata a massa. Accertarsi che il dispositivo host sia collegato alla massa di terra durante il normale utilizzo.

**Advarsel** Dette utstyret skal jordes. Forviss deg om vertsterminalen er jordet ved normalt bruk.

**Aviso** Este equipamento deverá estar ligado à terra. Certifique-se que o host se encontra ligado à terra durante a sua utilização normal.

**¡Atención!** Este equipo debe conectarse a tierra. Asegurarse de que el equipo principal esté conectado a tierra durante el uso normal.

**Varning!** Denna utrustning är avsedd att jordas. Se till att värdenheten är jordad vid normal användning.

- Related Documentation**
- [General Safety Guidelines and Warnings on page 161](#)

## Maintenance and Operational Safety Guidelines and Warnings

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This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.

While performing the maintenance activities for devices, observe the following guidelines and warnings:

- [Battery Handling Warning on page 184](#)
- [Jewelry Removal Warning on page 185](#)
- [Lightning Activity Warning on page 186](#)
- [Operating Temperature Warning on page 187](#)
- [Product Disposal Warning on page 188](#)

### Battery Handling Warning



**WARNING:** Replacing a battery incorrectly might result in an explosion. Replace a battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

**Waarschuwing** Er is ontploffingsgevaar als de batterij verkeerd vervangen wordt. Vervang de batterij slechts met hetzelfde of een equivalent type dat door de fabrikant aanbevolen is. Gebruikte batterijen dienen overeenkomstig fabrieksvoorschriften weggeworpen te worden.

**Varoitus** Räjähdyksen vaara, jos akku on vaihdettu väärään akkuun. Käytä vaihtamiseen ainoastaan saman- tai vastaavantyyppistä akkua, joka on valmistajan suosittelema. Hävitä käytetyt akut valmistajan ohjeiden mukaan.

**Attention** Danger d'explosion si la pile n'est pas remplacée correctement. Ne la remplacer que par une pile de type semblable ou équivalent, recommandée par le fabricant. Jeter les piles usagées conformément aux instructions du fabricant.

**Warnung** Bei Einsetzen einer falschen Batterie besteht Explosionsgefahr. Ersetzen Sie die Batterie nur durch den gleichen oder vom Hersteller empfohlenen Batterietyp. Entsorgen Sie die benutzten Batterien nach den Anweisungen des Herstellers.

**Advarsel** Det kan være fare for eksplosjon hvis batteriet skiftes på feil måte. Skift kun med samme eller tilsvarende type som er anbefalt av produsenten. Kasser brukte batterier i henhold til produsentens instruksjoner.

**Avvertenza** Pericolo di esplosione se la batteria non è installata correttamente. Sostituire solo con una di tipo uguale o equivalente, consigliata dal produttore. Eliminare le batterie usate secondo le istruzioni del produttore.

**Aviso** Existe perigo de explosão se a bateria for substituída incorrectamente. Substitua a bateria por uma bateria igual ou de um tipo equivalente recomendado pelo fabricante. Destrua as baterias usadas conforme as instruções do fabricante.

**¡Atención!** Existe peligro de explosión si la batería se reemplaza de manera incorrecta. Reemplazar la batería exclusivamente con el mismo tipo o el equivalente recomendado por el fabricante. Desechar las baterías gastadas según las instrucciones del fabricante.

**Varning!** Explosionsfara vid felaktigt batteribyte. Ersätt endast batteriet med samma batterityp som rekommenderas av tillverkaren eller motsvarande. Följ tillverkarens anvisningar vid kassering av använda batterier.

## Jewelry Removal Warning



**WARNING:** Before working on equipment that is connected to power lines, remove jewelry, including rings, necklaces, and watches. Metal objects heat up when connected to power and ground and can cause serious burns or can be welded to the terminals.

**Waarschuwing** Alvorens aan apparatuur te werken die met elektrische leidingen is verbonden, sieraden (inclusief ringen, kettingen en horloges) verwijderen. Metalen voorwerpen worden warm wanneer ze met stroom en aarde zijn verbonden, en kunnen ernstige brandwonden veroorzaken of het metalen voorwerp aan de aansluitklemmen lassen.

**Varoitus** Ennen kuin työskentelet voimavirtajohtoihin kytkettyjen laitteiden parissa, ota pois kaikki korut (sormukset, kaulakorut ja kellot mukaan lukien). Metalliesineet kuumenevat, kun ne ovat yhteydessä sähkövirran ja maan kanssa, ja ne voivat aiheuttaa vakavia palovammoja tai hitsata metalliesineet kiinni liitäntänapoihin.

**Attention** Avant d'accéder à cet équipement connecté aux lignes électriques, ôter tout bijou (anneaux, colliers et montres compris). Lorsqu'ils sont branchés à l'alimentation et reliés à la terre, les objets métalliques chauffent, ce qui peut provoquer des blessures graves ou souder l'objet métallique aux bornes.

**Warnung** Vor der Arbeit an Geräten, die an das Netz angeschlossen sind, jeglichen Schmuck (einschließlich Ringe, Ketten und Uhren) abnehmen. Metallgegenstände erhitzen sich, wenn sie an das Netz und die Erde angeschlossen werden, und können schwere Verbrennungen verursachen oder an die Anschlußklemmen angeschweißt werden.

**Avvertenza** Prima di intervenire su apparecchiature collegate alle linee di alimentazione, togliersi qualsiasi monile (inclusi anelli, collane, braccialetti ed orologi). Gli oggetti metallici si riscaldano quando sono collegati tra punti di alimentazione e massa: possono causare ustioni gravi oppure il metallo può saldarsi ai terminali.

**Advarsel** Fjern alle smykker (inkludert ringer, halskjeder og klokker) før du skal arbeide på utstyr som er koblet til kraftledninger. Metallgjenstander som er koblet til kraftledninger og jord blir svært varme og kan forårsake alvorlige brannskader eller smelte fast til polene.

**Aviso** Antes de trabalhar em equipamento que esteja ligado a linhas de corrente, retire todas as jóias que estiver a usar (incluindo anéis, fios e relógios). Os objectos metálicos aquecerão em contacto com a corrente e em contacto com a ligação à terra, podendo causar queimaduras graves ou ficarem soldados aos terminais.

**¡Atención!** Antes de operar sobre equipos conectados a líneas de alimentación, quitarse las joyas (incluidos anillos, collares y relojes). Los objetos de metal se calientan cuando se conectan a la alimentación y a tierra, lo que puede ocasionar quemaduras graves o que los objetos metálicos queden soldados a los bornes.

**Varning!** Tag av alla smycken (inklusive ringar, halsband och armbandsur) innan du arbetar på utrustning som är kopplad till kraftledningar. Metallobjekt hettas upp när de kopplas ihop med ström och jord och kan förorsaka allvarliga brännskador; metallobjekt kan också sammansvetsas med kontakterna.

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## Lightning Activity Warning

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**WARNING:** Do not work on the system or connect or disconnect cables during periods of lightning activity.

**Waarschuwing** Tijdens onweer dat gepaard gaat met bliksem, dient u niet aan het systeem te werken of kabels aan te sluiten of te ontkoppelen.

**Varoitus** Älä työskentele järjestelmän parissa äläkä yhdistä tai irrota kaapeleita ukkosilmalla.

**Attention** Ne pas travailler sur le système ni brancher ou débrancher les câbles pendant un orage.

**Warnung** Arbeiten Sie nicht am System und schließen Sie keine Kabel an bzw. trennen Sie keine ab, wenn es gewittert.

**Avvertenza** Non lavorare sul sistema o collegare oppure scollegare i cavi durante un temporale con fulmini.

**Advarsel** Utfør aldri arbeid på systemet, eller koble kabler til eller fra systemet når det tordner eller lynet.

**Aviso** Não trabalhe no sistema ou ligue e desligue cabos durante períodos de mau tempo (trovoada).

**¡Atención!** No operar el sistema ni conectar o desconectar cables durante el transcurso de descargas eléctricas en la atmósfera.

**Varning!** Vid åska skall du aldrig utföra arbete på systemet eller ansluta eller koppla loss kablar.

## Operating Temperature Warning



**WARNING:** To prevent the device from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 104° F (40° C) for EX6200 switches, EX8208 switches, EX8216 switches, QFX Series devices, and XRE200 External Routing Engines and 113° F (45° C) for EX2200, EX3300, EX3200, EX4200, and EX4500 switches. To prevent airflow restriction, allow at least 6 in. (15.2 cm) of clearance around the ventilation openings.

**Waarschuwing** Om te voorkomen dat welke switch van de Juniper Networks router dan ook oververhit raakt, dient u deze niet te bedienen op een plaats waar de maximale aanbevolen omgevingstemperatuur van 40° C wordt overschreden. Om te voorkomen dat de luchtstroom wordt beperkt, dient er minstens 15,2 cm speling rond de ventilatie-openingen te zijn.

**Varoitus** Ettei Juniper Networks switch-sarjan reititin ylikuumentuisi, sitä ei saa käyttää tilassa, jonka lämpötila ylittää korkeimman suositellun ympäristölämpötilan 40° C. Ettei ilmanvaihto estyisi, tuuletusaukkojen ympärille on jätettävä ainakin 15,2 cm tilaa.

**Attention** Pour éviter toute surchauffe des routeurs de la gamme Juniper Networks switch, ne l'utilisez pas dans une zone où la température ambiante est supérieure à 40° C. Pour permettre un flot d'air constant, dégagez un espace d'au moins 15,2 cm autour des ouvertures de ventilations.

**Warnung** Um einen Router der switch vor Überhitzung zu schützen, darf dieser nicht in einer Gegend betrieben werden, in der die Umgebungstemperatur das empfohlene Maximum von 40° C überschreitet. Um Lüftungsverschluß zu verhindern, achten Sie darauf, daß mindestens 15,2 cm lichter Raum um die Lüftungsöffnungen herum frei bleibt.

**Avvertenza** Per evitare il surriscaldamento dei switch, non adoperateli in un locale che ecceda la temperatura ambientale massima di 40° C. Per evitare che la circolazione dell'aria sia impedita, lasciate uno spazio di almeno 15.2 cm di fronte alle aperture delle ventole.

**Advarsel** Unngå overoppheting av eventuelle rutere i Juniper Networks switch. Disse skal ikke brukes på steder der den anbefalte maksimale omgivelsestemperaturen overstiger 40° C (104° F). Sørg for at klaringen rundt lufteåpningene er minst 15,2 cm (6 tommer) for å forhindre nedsatt luftsirkulasjon.

**Aviso** Para evitar o sobreaquecimento do encaminhador Juniper Networks switch, não utilize este equipamento numa área que exceda a temperatura máxima recomendada de 40° C. Para evitar a restrição à circulação de ar, deixe pelo menos um espaço de 15,2 cm à volta das aberturas de ventilação.

**¡Atención!** Para impedir que un encaminador de la serie Juniper Networks switch se recaliente, no lo haga funcionar en un área en la que se supere la temperatura ambiente máxima recomendada de 40° C. Para impedir la restricción de la entrada de aire, deje un espacio mínimo de 15,2 cm alrededor de las aperturas para ventilación.

**Varning!** Förhindra att en Juniper Networks switch överhettas genom att inte använda den i ett område där den maximalt rekommenderade omgivningstemperaturen på 40° C överskrids. Förhindra att luftcirkulationen inskränks genom att se till att det finns fritt utrymme på minst 15,2 cm omkring ventilationsöppningarna.

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## Product Disposal Warning



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**WARNING:** Disposal of this device must be handled according to all national laws and regulations.

**Waarschuwing** Dit produkt dient volgens alle landelijke wetten en voorschriften te worden afgedankt.

**Varoitus** Tämän tuotteen lopullisesta hävittämisestä tulee huolehtia kaikkia valtakunnallisia lakeja ja säännöksiä noudattaen.

**Attention** La mise au rebut définitive de ce produit doit être effectuée conformément à toutes les lois et réglementations en vigueur.

**Warnung** Dieses Produkt muß den geltenden Gesetzen und Vorschriften entsprechend entsorgt werden.

**Avvertenza** L'eliminazione finale di questo prodotto deve essere eseguita osservando le normative italiane vigenti in materia

**Advarsel** Endelig disponering av dette produktet må skje i henhold til nasjonale lover og forskrifter.

**Aviso** A descartagem final deste produto deverá ser efectuada de acordo com os regulamentos e a legislação nacional.

**¡Atención!** El desecho final de este producto debe realizarse según todas las leyes y regulaciones nacionales

**Varning!** Slutlig kassering av denna produkt bör skötas i enlighet med landets alla lagar och föreskrifter.

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**Related  
Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [AC Power Electrical Safety Guidelines on page 194](#)
- [DC Power Electrical Safety Guidelines on page 197](#)
- [Laser and LED Safety Guidelines and Warnings for EX Series Switches](#)
- [Installation Instructions Warning on page 173](#)
- [Grounded Equipment Warning on page 183](#)
- [Laser and LED Safety Guidelines and Warnings for the QFX Series on page 168](#)



# Power and Electrical Safety Information

- General Electrical Safety Guidelines and Warnings on page 191
- Prevention of Electrostatic Discharge Damage on page 192
- AC Power Electrical Safety Guidelines on page 194
- AC Power Disconnection Warning on page 196
- DC Power Electrical Safety Guidelines on page 197
- DC Power Disconnection Warning on page 198
- DC Power Grounding Requirements and Warning on page 200
- DC Power Wiring Sequence Warning on page 201
- DC Power Wiring Terminations Warning on page 202
- Multiple Power Supplies Disconnection Warning on page 204
- TN Power Warning on page 204
- Action to Take After an Electrical Accident on page 205

## General Electrical Safety Guidelines and Warnings

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This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.



**WARNING:** Certain ports on the device are designed for use as intrabuilding (within-the-building) interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 4) and require isolation from the exposed outside plant (OSP) cabling. To comply with NEBS requirements and protect against lightning surges and commercial power disturbances, the intrabuilding ports *must not* be metallically connected to interfaces that connect to the OSP or its wiring. The intrabuilding ports on the device are suitable for connection to intrabuilding or unexposed wiring or cabling only. The addition of primary protectors is not sufficient protection for connecting these interfaces metallically to OSP wiring.



**CAUTION:** Before removing or installing components of a device, attach an ESD strap to an ESD point and place the other end of the strap around your bare wrist. Failure to use an ESD strap could result in damage to the switch.

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- Install the device in compliance with the following local, national, and international electrical codes:
  - United States—National Fire Protection Association (NFPA 70), United States National Electrical Code.
  - Other countries—International Electromechanical Commission (IEC) 60364, Part 1 through Part 7.
  - Evaluated to the TN power system.
  - Canada—Canadian Electrical Code, Part 1, CSA C22.1.
- Locate the emergency power-off switch for the room in which you are working so that if an electrical accident occurs, you can quickly turn off the power.
- Make sure that grounding surfaces are cleaned and brought to a bright finish before grounding connections are made.
- Do not work alone if potentially hazardous conditions exist anywhere in your workspace.
- Never assume that power is disconnected from a circuit. Always check the circuit before starting to work.
- Carefully look for possible hazards in your work area, such as moist floors, ungrounded power extension cords, and missing safety grounds.
- Operate the device within marked electrical ratings and product usage instructions.
- To ensure that the device and peripheral equipment function safely and correctly, use the cables and connectors specified for the attached peripheral equipment, and make certain they are in good condition.

You can remove and replace many device components without powering off or disconnecting power to the device, as detailed elsewhere in the hardware documentation for this device. Never install equipment if it appears damaged.

**Related Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [AC Power Electrical Safety Guidelines on page 194](#)
- [DC Power Electrical Safety Guidelines on page 197](#)

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## Prevention of Electrostatic Discharge Damage

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This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.

Device components that are shipped in antistatic bags are sensitive to damage from static electricity. Some components can be impaired by voltages as low as 30 V. You can easily generate potentially damaging static voltages whenever you handle plastic or foam packing material or if you move components across plastic or carpets. Observe the following guidelines to minimize the potential for electrostatic discharge (ESD) damage, which can cause intermittent or complete component failures:

- Always use an ESD grounding strap when you are handling components that are subject to ESD damage, and make sure that it is in direct contact with your skin.

If a grounding strap is not available, hold the component in its antistatic bag (see [Figure 55 on page 193](#)) in one hand and touch the exposed, bare metal of the device with the other hand immediately before inserting the component into the device.



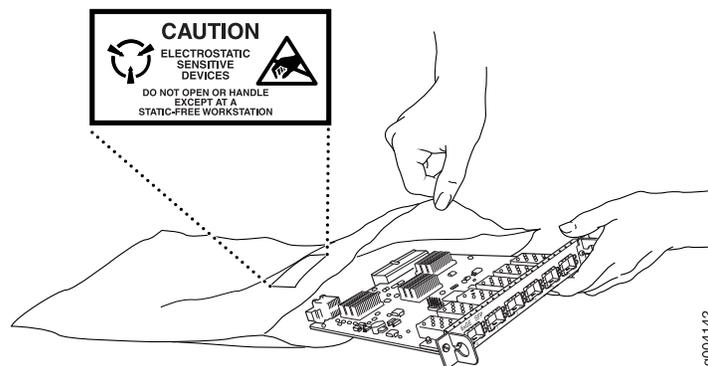
**WARNING:** For safety, periodically check the resistance value of the ESD strap. The measurement must be in the range of 1 through 10 Mohms.

- When handling any component that is subject to ESD damage and that is removed from the device, make sure the equipment end of your ESD strap is attached to the ESD point on the chassis.

If no grounding strap is available, touch the exposed, bare metal of the device to ground yourself before handling the component.

- Avoid contact between the component that is subject to ESD damage and your clothing. ESD voltages emitted from clothing can damage components.
- When removing or installing a component that is subject to ESD damage, always place it component-side up on an antistatic surface, in an antistatic card rack, or in an antistatic bag (see [Figure 55 on page 193](#)). If you are returning a component, place it in an antistatic bag before packing it.

**Figure 55: Place a Component into an Antistatic Bag**



**CAUTION:** ANSI/TIA/EIA-568 cables such as Category 5e and Category 6 can get electrostatically charged. To dissipate this charge, always ground

the cables to a suitable and safe earth ground before connecting them to the system.

**Related Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- See EX2200 Switches Hardware Overview for the ESD point location.
- See Rear Panel of an EX3200 Switch for the ESD point location.
- See Rear Panel of an EX3300 Switch for the ESD point location.
- See Rear Panel of an EX4200 Switch for the ESD point location.
- See Front Panel of an EX4500 Switch for the ESD point location.
- See Chassis Physical Specifications of an EX6210 Switch for the ESD point location.
- See Chassis Physical Specifications of an EX8208 Switch for the ESD point location.
- See Chassis Physical Specifications of an EX8216 Switch for the ESD point location.
- See [Front Panel of a QFX3500 Device on page 65](#) for the ESD point location.

## AC Power Electrical Safety Guidelines

This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.



**CAUTION:** For devices with AC power supplies, an external surge protective device (SPD) must be used at the AC power source.

The following electrical safety guidelines apply to AC-powered devices:

- Note the following warnings printed on the device:
  - “**CAUTION:** THIS UNIT HAS MORE THAN ONE POWER SUPPLY CORD. DISCONNECT ALL POWER SUPPLY CORDS BEFORE SERVICING TO AVOID ELECTRIC SHOCK.”
  - “**ATTENTION:** CET APPAREIL COMPORTE PLUS D'UN CORDON D'ALIMENTATION. AFIN DE PRÉVENIR LES CHOCS ÉLECTRIQUES, DÉBRANCHER TOUT CORDON D'ALIMENTATION AVANT DE FAIRE LE DÉPANNAGE.”
- AC-powered devices are shipped with a three-wire electrical cord with a grounding-type plug that fits only a grounding-type power outlet. Do not circumvent this safety feature. Equipment grounding must comply with local and national electrical codes.
- You must provide an external certified circuit breaker rated minimum 20 A in the building installation.

- The power cord serves as the main disconnecting device for the AC-powered device. The socket outlet must be near the AC-powered device and be easily accessible.
- For devices that have more than one power supply connection, you must ensure that all power connections are fully disconnected so that power to the device is completely removed to avoid electric shock. To disconnect power, unplug all power cords (one for each power supply).

#### Power Cable Warning (Japanese)

**WARNING:** The attached power cable is only for this product. Do not use the cable for another product.

## 注意

附属の電源コードセットはこの製品専用です。  
他の電気機器には使用しないでください。

g017253

#### Related Documentation

- [General Safety Guidelines and Warnings on page 161](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [Multiple Power Supplies Disconnection Warning on page 204](#)
- [Connecting AC Power to an EX2200 Switch](#)
- [Connecting AC Power to an EX3200 Switch](#)
- [Connecting AC Power to an EX3300 Switch](#)
- [Connecting AC Power to an EX4200 Switch](#)
- [Connecting AC Power to an EX4500 Switch](#)
- [Connecting AC Power to an EX6200 Switch](#)
- [Connecting AC Power to an EX8200 Switch](#)
- [Connecting AC Power to an XRE200 External Routing Engine](#)
- [Connecting AC Power to a QFX3100 Director Device on page 218](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 239](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays on page 246](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays on page 250](#)
- [Connecting AC Power to a QFX3500 Device on page 265](#)

## AC Power Disconnection Warning

This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.



**WARNING:** Before working on the switch or near power supplies, unplug all the power cords from an AC switch.

**Waarschuwing** Voordat u aan een frame of in de nabijheid van voedingen werkt, dient u bij wisselstroom toestellen de stekker van het netsnoer uit het stopcontact te halen.

**Varoitus** Kytke irti vaihtovirtalaitteiden virtajohto, ennen kuin teet mitään asennuspohjalle tai työskentelet virtalähteiden läheisyydessä.

**Attention** Avant de travailler sur un châssis ou à proximité d'une alimentation électrique, débrancher le cordon d'alimentation des unités en courant alternatif.

**Warnung** Bevor Sie an einem Chassis oder in der Nähe von Netzgeräten arbeiten, ziehen Sie bei Wechselstromeinheiten das Netzkabel ab bzw.

**Avvertenza** Prima di lavorare su un telaio o intorno ad alimentatori, scollegare il cavo di alimentazione sulle unità CA.

**Advarsel** Før det utføres arbeid på kabinettet eller det arbeides i nærheten av strømforsyningsenheter, skal strømledningen trekkes ut på vekselstrømsenheter.

**Aviso** Antes de trabalhar num chassis, ou antes de trabalhar perto de unidades de fornecimento de energia, desligue o cabo de alimentação nas unidades de corrente alternada.

**¡Atención!** Antes de manipular el chasis de un equipo o trabajar cerca de una fuente de alimentación, desenchufar el cable de alimentación en los equipos de corriente alterna (CA).

**Varning!** Innan du arbetar med ett chassi eller nära strömförsörjningsenheter skall du för växelströmsenheter dra ur nätsladden.

### Related Documentation

- [General Safety Guidelines and Warnings on page 161](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [AC Power Electrical Safety Guidelines on page 194](#)

## DC Power Electrical Safety Guidelines

This topic applies to hardware devices in the EX Series product family, which includes switches and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.

- A DC-powered device is equipped with a DC terminal block that is rated for the power requirements of a maximally configured device.



**NOTE:** To supply sufficient power, terminate the DC input wiring on a facility DC source that is capable of supplying:

- Minimum of 7.5 A at –48 VDC for EX2200 and EX3300 switches
- Minimum of 8 A at –48 VDC for EX3200 and EX4200 switches
- Minimum of 50 A at –48 VDC for EX6210 switches
- Minimum of 60 A at –48 VDC for EX8208 switches
- Minimum of 100 A at –48 VDC for EX8216 switches
- Minimum of 7 A at –48 VDC for QFX3500 devices

Incorporate an easily accessible disconnect device into the facility wiring. Be sure to connect the ground wire or conduit to a solid office earth ground. A closed loop ring is recommended for terminating the ground conductor at the ground stud.

- Run two wires from the circuit breaker box to a source of 48 VDC.
- A DC-powered device that is equipped with a DC terminal block is intended only for installation in a restricted access location. In the United States, a restricted access area is one in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code ANSI/NFPA 70.



**NOTE:** Primary overcurrent protection is provided by the building circuit breaker. This breaker must protect against excess currents, short circuits, and earth grounding faults in accordance with NEC ANSI/NFPA 70.

- Ensure that the polarity of the DC input wiring is correct. Under certain conditions, connections with reversed polarity might trip the primary circuit breaker or damage the equipment.
- For personal safety, connect the green and yellow wire to safety (earth) ground at both the device and the supply side of the DC wiring.

- The marked input voltage of –48 VDC for a DC-powered device is the nominal voltage associated with the battery circuit, and any higher voltages are only to be associated with float voltages for the charging function.
- Because the device is a positive ground system, you must connect the positive lead to the terminal labeled RTN, the negative lead to the terminal labeled –48 VDC, and the earth ground to the device grounding points.

**Related Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [DC Power Disconnection Warning on page 198](#)
- [DC Power Grounding Requirements and Warning on page 200](#)
- [DC Power Wiring Sequence Warning on page 201](#)
- [DC Power Wiring Terminations Warning on page 202](#)
- [Connecting DC Power to an EX2200 Switch](#)
- [Connecting DC Power to an EX3200 Switch](#)
- [Connecting DC Power to an EX4200 Switch](#)
- [Connecting DC Power to an EX4500 Switch](#)
- [Connecting DC Power to an EX6200 Switch](#)
- [Connecting DC Power to an EX8200 Switch](#)
- [Connecting DC Power to an XRE200 External Routing Engine](#)
- [Connecting DC Power to a QFX3500 Device on page 267](#)

## DC Power Disconnection Warning

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This topic applies to hardware devices in the EX Series product family, which includes switches and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.



**WARNING:** Before performing any of the DC power procedures, ensure that power is removed from the DC circuit. To ensure that all power is off, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the device handle of the circuit breaker in the OFF position.

**Waarschuwing** Voordat u een van de onderstaande procedures uitvoert, dient u te controleren of de stroom naar het gelijkstroom circuit uitgeschakeld is. Om u ervan te verzekeren dat alle stroom UIT is geschakeld, kiest u op het schakelbord de stroomverbreker die het gelijkstroom circuit bedient, draait de stroomverbreker naar de UIT positie en plakt de schakelaarhendel van de stroomverbreker met plakband in de UIT positie vast.

**Varoitus** Varmista, että tasavirtapiirissä ei ole virtaa ennen seuraavien toimenpiteiden suorittamista. Varmistaaksesi, että virta on KATKAISTU täysin, paikanna tasavirrasta huolehtivassa kojetaulussa sijaitseva suojakytkin, käännä suojakytkin KATKAISTU-asentoon ja teippaa suojakytkimen varsi niin, että se pysyy KATKAISTU-asennossa.

**Attention** Avant de pratiquer l'une quelconque des procédures ci-dessous, vérifiez que le circuit en courant continu n'est plus sous tension. Pour en être sûr, localiser le disjoncteur situé sur le panneau de service du circuit en courant continu, placer le disjoncteur en position fermée (OFF) et, à l'aide d'un ruban adhésif, bloquer la poignée du disjoncteur en position OFF.

**Warnung** Vor Ausführung der folgenden Vorgänge ist sicherzustellen, daß die Gleichstromschaltung keinen Strom erhält. Um sicherzustellen, daß sämtlicher Strom abgestellt ist, machen Sie auf der Schalttafel den Unterbrecher für die Gleichstromschaltung ausfindig, stellen Sie den Unterbrecher auf AUS, und kleben Sie den Schaltergriff des Unterbrechers mit Klebeband in der AUS-Stellung fest.

**Avvertenza** Prima di svolgere una qualsiasi delle procedure seguenti, verificare che il circuito CC non sia alimentato. Per verificare che tutta l'alimentazione sia scollegata (OFF), individuare l'interruttore automatico sul quadro strumenti che alimenta il circuito CC, mettere l'interruttore in posizione OFF e fissarlo con nastro adesivo in tale posizione.

**Advarsel** Før noen av disse prosedyrene utføres, kontroller at strømmen er frakoblet likestrømkretsen. Sørg for at all strøm er slått AV. Dette gjøres ved å lokalisere strømbryteren på brytertavlen som betjener likestrømkretsen, slå strømbryteren AV og teipe bryterhåndtaket på strømbryteren i AV-stilling.

**Aviso** Antes de executar um dos seguintes procedimentos, certifique-se que desligou a fonte de alimentação de energia do circuito de corrente contínua. Para se assegurar que toda a corrente foi DESLIGADA, localize o disjuntor no painel que serve o circuito de corrente contínua e coloque-o na posição OFF (Desligado), segurando nessa posição a manivela do interruptor do disjuntor com fita isoladora.

**¡Atención!** Antes de proceder con los siguientes pasos, comprobar que la alimentación del circuito de corriente continua (CC) esté cortada (OFF). Para asegurarse de que toda la alimentación esté cortada (OFF), localizar el interruptor automático en el panel que alimenta al circuito de corriente continua, cambiar el interruptor automático a la posición de Apagado (OFF), y sujetar con cinta la palanca del interruptor automático en posición de Apagado (OFF).

**Varning!** Innan du utför någon av följande procedurer måste du kontrollera att strömförsörjningen till likströmskretsen är bruten. Kontrollera att all strömförsörjning är BRUTEN genom att slå AV det överspänningsskydd som skyddar likströmskretsen och tejpa fast överspänningsskyddets omkopplare i FRÅN-läget.

- Related Documentation**
- [General Safety Guidelines and Warnings on page 161](#)
  - [General Electrical Safety Guidelines and Warnings on page 191](#)
  - [DC Power Electrical Safety Guidelines on page 197](#)
  - [DC Power Grounding Requirements and Warning on page 200](#)
  - [DC Power Wiring Sequence Warning on page 201](#)
  - [DC Power Wiring Terminations Warning on page 202](#)

## DC Power Grounding Requirements and Warning

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This topic applies to hardware devices in the EX Series product family, which includes switches and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.

An insulated grounding conductor that is identical in size to the grounded and ungrounded branch circuit supply conductors but is identifiable by green and yellow stripes is installed as part of the branch circuit that supplies the device. The grounding conductor is a separately derived system at the supply transformer or motor generator set.



**WARNING:** When you install the device, the ground connection must always be made first and disconnected last.

**Waarschuwing** Bij de installatie van het toestel moet de aardverbinding altijd het eerste worden gemaakt en het laatste worden losgemaakt.

**Varoitus** Laitetta asennettaessa on maahan yhdistäminen aina tehtävä ensiksi ja maadoituksen irti kytkeminen viimeiseksi.

**Attention** Lors de l'installation de l'appareil, la mise à la terre doit toujours être connectée en premier et déconnectée en dernier.

**Warnung** Der Erdanschluß muß bei der Installation der Einheit immer zuerst hergestellt und zuletzt abgetrennt werden.

**Avvertenza** In fase di installazione dell'unità, eseguire sempre per primo il collegamento a massa e disconnetterlo per ultimo.

**Advarsel** Når enheten installeres, må jordledningen alltid tilkobles først og frakobles sist.

**Aviso** Ao instalar a unidade, a ligação à terra deverá ser sempre a primeira a ser ligada, e a última a ser desligada.

**¡Atención!** Al instalar el equipo, conectar la tierra la primera y desconectarla la última.

**Varning!** Vid installation av enheten måste jordledningen alltid anslutas först och kopplas bort sist.

**Related Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [DC Power Electrical Safety Guidelines on page 197](#)
- [DC Power Disconnection Warning on page 198](#)
- [DC Power Wiring Sequence Warning on page 201](#)
- [DC Power Wiring Terminations Warning on page 202](#)

## DC Power Wiring Sequence Warning

This topic applies to hardware devices in the EX Series product family, which includes switches and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.



**WARNING:** Wire the DC power supply using the appropriate lugs. When connecting power, the proper wiring sequence is ground to ground, +RTN to +RTN, then  $-48\text{ V}$  to  $-48\text{ V}$ . When disconnecting power, the proper wiring sequence is  $-48\text{ V}$  to  $-48\text{ V}$ , +RTN to +RTN, then ground to ground. Note that the ground wire must always be connected first and disconnected last.

**Waarschuwing** De juiste bedradingsvolgorde verbonden is aarde naar aarde, +RTN naar +RTN, en  $-48\text{ V}$  naar  $-48\text{ V}$ . De juiste bedradingsvolgorde losgemaakt is en  $-48$  naar  $-48\text{ V}$ , +RTN naar +RTN, aarde naar aarde.

**Varoitus** Oikea yhdistettävä kytkentajarjestys on maajohto maajohtoon, +RTN varten +RTN,  $-48\text{ V}$  varten  $-48\text{ V}$ . Oikea irrotettava kytkentajarjestys on  $-48\text{ V}$  varten  $-48\text{ V}$ , +RTN varten +RTN, maajohto maajohtoon.

**Attention** Câblez l'alimentation CC En utilisant les crochets appropriés à l'extrémité de câblage. En reliant la puissance, l'ordre approprié de câblage est rectifié pour rectifier, +RTN à +RTN, puis  $-48\text{ V}$  à  $-48\text{ V}$ . En débranchant la puissance, l'ordre approprié de câblage est  $-48\text{ V}$  à  $-48\text{ V}$ , +RTN à +RTN, a alors rectifié pour rectifier. Notez que le fil de masse devrait toujours être relié d'abord et débranché pour la dernière fois. Notez que le fil de masse devrait toujours être relié d'abord et débranché pour la dernière fois.

**Warnung** Die Stromzufuhr ist nur mit geeigneten Ringösen an das DC Netzteil anzuschliessen. Die richtige Anschlusssequenz ist: Erdanschluss zu Erdanschluss, +RTN zu +RTN und dann  $-48\text{V}$  zu  $-48\text{V}$ . Die richtige Sequenz zum Abtrennen der Stromversorgung ist  $-48\text{V}$  zu  $-48\text{V}$ , +RTN zu +RTN und

dann Erdanschluss zu Erdanschluss. Es ist zu beachten dass der Erdanschluss immer zuerst angeschlossen und als letztes abgetrennt wird.

**Avvertenza** Mostra la morsettiera dell alimentatore CC. Cablare l'alimentatore CC usando i connettori adatti all'estremità del cablaggio, come illustrato. La corretta sequenza di cablaggio è da massa a massa, da positivo a positivo (da linea ad L) e da negativo a negativo (da neutro a N). Tenere presente che il filo di massa deve sempre venire collegato per primo e scollegato per ultimo.

**Advarsel** Riktig tilkoples tilkoplingssekvens er jord til jord, +RTN til +RTN, -48 V til -48 V. Riktig frakoples tilkoplingssekvens er -48 V til -48 V, +RTN til +RTN, jord til jord.

**Aviso** Ate con alambre la fuente de potencia cc Usando los terminales apropiados en el extremo del cableado. Al conectar potencia, la secuencia apropiada del cableado se muele para moler, +RTN a +RTN, entonces -48 V a -48 V. Al desconectar potencia, la secuencia apropiada del cableado es -48 V a -48 V, +RTN a +RTN, entonces molió para moler. Observe que el alambre de tierra se debe conectar siempre primero y desconectar por último. Observe que el alambre de tierra se debe conectar siempre primero y desconectar por último.

**Atenção!** Wire a fonte de alimentação de DC Usando os talões apropriados na extremidade da fiação. Ao conectar a potência, a seqüência apropriada da fiação é moída para moer, +RTN a +RTN, então -48 V a -48 V. Ao desconectar a potência, a seqüência apropriada da fiação é -48 V a -48 V, +RTN a +RTN, moeu então para moer. Anote que o fio à terra deve sempre ser conectado primeiramente e desconectado por último. Anote que o fio à terra deve sempre ser conectado primeiramente e desconectado por último.

**Varning!** Korrekt kopplingssekvens ar jord till jord, +RTN till +RTN, -48 V till -48 V. Korrekt kopplas kopplingssekvens ar -48 V till -48 V, +RTN till +RTN, jord till jord.

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**Related Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [DC Power Electrical Safety Guidelines on page 197](#)
- [DC Power Disconnection Warning on page 198](#)
- [DC Power Grounding Requirements and Warning on page 200](#)
- [DC Power Wiring Terminations Warning on page 202](#)

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## DC Power Wiring Terminations Warning

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This topic applies to hardware devices in the EX Series product family, which includes switches and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.



**WARNING:** When stranded wiring is required, use approved wiring terminations, such as closed-loop or spade-type with upturned lugs. These terminations must be the appropriate size for the wires and must clamp both the insulation and conductor.

**Waarschuwing** Wanneer geslagen bedrading vereist is, dient u bedrading te gebruiken die voorzien is van goedgekeurde aansluitingspunten, zoals het gesloten-lus type of het grijperschop type waarbij de aansluitpunten omhoog wijzen. Deze aansluitpunten dienen de juiste maat voor de draden te hebben en dienen zowel de isolatie als de geleider vast te klemmen.

**Varoitus** Jos säikeellinen johdin on tarpeen, käytä hyväksyttyä johdinliitäntää, esimerkiksi suljettua silmukkaa tai kourumaista liitäntää, jossa on ylöspäin käännetty kiinnityskorvat. Tällaisten liitäntöjen tulee olla kooltaan johtimiin sopivia ja niiden tulee puristaa yhteen sekä eristeen että johdinosan.

**Attention** Quand des fils torsadés sont nécessaires, utiliser des douilles terminales homologuées telles que celles à circuit fermé ou du type à plage ouverte avec cosses rebroussées. Ces douilles terminales doivent être de la taille qui convient aux fils et doivent être refermées sur la gaine isolante et sur le conducteur.

**Warnung** Wenn Litzenverdrahtung erforderlich ist, sind zugelassene Verdrahtungsabschlüsse, z.B. für einen geschlossenen Regelkreis oder gabelförmig, mit nach oben gerichteten Kabelschuhen zu verwenden. Diese Abschlüsse sollten die angemessene Größe für die Drähte haben und sowohl die Isolierung als auch den Leiter festklemmen.

**Avvertenza** Quando occorre usare trecce, usare connettori omologati, come quelli a occhio o a forcilla con linguette rivolte verso l'alto. I connettori devono avere la misura adatta per il cablaggio e devono serrare sia l'isolante che il conduttore.

**Advarsel** Hvis det er nødvendig med flertrådede ledninger, brukes godkjente ledningsavslutninger, som for eksempel lukket sløyfe eller spadetype med oppoverbøyde kabelsko. Disse avslutningene skal ha riktig størrelse i forhold til ledningene, og skal klemme sammen både isolasjonen og lederen.

**Aviso** Quando forem requeridas montagens de instalação elétrica de cabo torcido, use terminações de cabo aprovadas, tais como, terminações de cabo em circuito fechado e planas com terminais de orelha voltados para cima. Estas terminações de cabo deverão ser do tamanho apropriado para os respectivos cabos, e deverão prender simultaneamente o isolamento e o fio condutor.

**¡Atención!** Cuando se necesite hilo trenzado, utilizar terminales para cables homologados, tales como las de tipo "bucle cerrado" o "espada", con las lengüetas de conexión vueltas hacia arriba. Estos terminales deberán ser del

tamaño apropiado para los cables que se utilicen, y tendrán que sujetar tanto el aislante como el conductor.

**Varning!** När flertrådiga ledningar krävs måste godkända ledningskontakter användas, t.ex. kabelsko av slutet eller öppen typ med uppåtvänd tapp. Storleken på dessa kontakter måste vara avpassad till ledningarna och måste kunna hålla både isoleringen och ledaren fastklämda.

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**Related  
Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [DC Power Electrical Safety Guidelines on page 197](#)
- [DC Power Disconnection Warning on page 198](#)
- [DC Power Grounding Requirements and Warning on page 200](#)
- [DC Power Wiring Sequence Warning on page 201](#)

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## Multiple Power Supplies Disconnection Warning

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This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.

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**WARNING:** For a device that has more than one power supply connection, you must ensure that all power connections are fully disconnected so that power to the device is completely removed.

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**Related  
Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [AC Power Electrical Safety Guidelines on page 194](#)
- [DC Power Electrical Safety Guidelines on page 197](#)

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## TN Power Warning

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This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.



**WARNING:** The device is designed to work with a TN power system.

**Waarschuwing** Het apparaat is ontworpen om te functioneren met TN energiesystemen.

**Varoitus** Koje on suunniteltu toimimaan TN-sähkövoimajärjestelmien yhteydessä.

**Attention** Ce dispositif a été conçu pour fonctionner avec des systèmes d'alimentation TN.

**Warnung** Das Gerät ist für die Verwendung mit TN-Stromsystemen ausgelegt.

**Avvertenza** Il dispositivo è stato progettato per l'uso con sistemi di alimentazione TN.

**Advarsel** Utstyret er utfomet til bruk med TN-strømsystemer.

**Aviso** O dispositivo foi criado para operar com sistemas de corrente TN.

**¡Atención!** El equipo está diseñado para trabajar con sistemas de alimentación tipo TN.

**Varning!** Enheten är konstruerad för användning tillsammans med elkraftssystem av TN-typ.

**Related Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [Grounded Equipment Warning on page 183](#)
- [Multiple Power Supplies Disconnection Warning on page 204](#)

## Action to Take After an Electrical Accident

This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.

If an electrical accident results in an injury, take the following actions in this order:

1. Use caution. Be aware of potentially hazardous conditions that could cause further injury.
2. Disconnect power from the device.
3. If possible, send another person to get medical aid. Otherwise, assess the condition of the victim, then call for help.

**Related  
Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [General Electrical Safety Guidelines and Warnings on page 191](#)
- [AC Power Electrical Safety Guidelines on page 194](#)
- [DC Power Electrical Safety Guidelines on page 197](#)

## PART 4

# Installation

- [Before You Begin on page 209](#)
- [Installing a QFX3100 Director Device on page 213](#)
- [Installing a QFX3008-I Interconnect Device on page 223](#)
- [Installing QFX3008-I Optional Components on page 255](#)
- [Installing a QFX3500 Node Device on page 259](#)
- [Cabling the QFabric Switch on page 271](#)
- [Performing the Initial Configuration on page 287](#)



# Before You Begin

- [QFX3000-G QFabric System Installation Overview on page 209](#)

## QFX3000-G QFabric System Installation Overview

---

A QFX3000-G QFabric system is formed by interconnecting QFX3500 Node devices, QFX3008-I Interconnect Devices, and QFX3100 Director devices. Two Virtual Chassis, composed of four EX4200 switches each, are used to interconnect the control plane and management network. For more information about the role of each device in the QFX3000 QFabric system see [“Understanding QFX3000-G QFabric System Hardware Configurations” on page 10](#).

Before you begin to install the QFX3000 QFabric system:

- Read [“General Safety Guidelines and Warnings” on page 161](#), with particular attention to [“Chassis Lifting Guidelines for a QFX3008-I Interconnect Device” on page 175](#).
- Review [“Planning a QFX3000-G QFabric System Deployment” on page 81](#) and the topics it references. The installation should not begin until you have completed the site preparation checklists for each device type:
  - [Site Preparation Checklist for a QFX3500 Device on page 86](#)
  - [Site Preparation Checklist for a QFX3008-I Interconnect Device on page 84](#)
  - [Site Preparation Checklist for a QFX3100 Director Device on page 83](#)
  - [Site Preparation Checklist for EX4200 Switches](#)

To install a QFX3000 QFabric system:

1. Install all the devices in their permanent location, connect the devices to earth ground, and connect power to the devices. See:
  - [Installing and Connecting a QFX3100 Director Device on page 213](#)
  - [Installing and Connecting a QFX3008-I Interconnect Device on page 223](#)
  - [Installing and Connecting a QFX3500 Device on page 259](#)
  - [Installing and Connecting an EX4200 Switch](#)
2. Ensure that each QFX3500 Node device is set to fabric mode. By default, the devices work as standalone switches. You perform this step using the console (**CON**) port on each QFX3500 Node device. Leave the QFX3500 Node devices powered on. See [Converting the Device Mode for a QFabric Switch Component](#).
3. Cable two Virtual Chassis of four EX4200 switches each. See [Understanding Virtual Chassis Hardware Configuration on an EX4200 Switch and Virtual Chassis Cabling Configuration Examples for EX4200 Switches](#).
4. Interconnect the two Virtual Chassis using the 10-Gigabit Ethernet SFP+ uplink ports. These ports will later be configured in a LAG. See [“Interconnecting Two Virtual Chassis for QFabric System Control Plane Redundancy” on page 271](#).
5. Interconnect the two QFX3100 Director devices for control plane redundancy. See [“Connecting QFX3100 Director Devices in a Director Group” on page 274](#).
6. Connect each QFX Series device to each Virtual Chassis for control plane interconnection. See:
  - [Connecting QFX3100 Director Devices to the Control Plane Network on page 275](#)
  - [Connecting a QFX3008-I Interconnect Device to the Control Plane Network on page 278](#)
  - [Connecting a QFX3500 Node Device to the Control Plane Network on page 282](#)
  - [Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device on page 284](#)
7. Connect each QFX3500 Node device to each QFX3008-I Interconnect Device for data plane interconnection. See [“Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device” on page 284](#).
8. Configure each Virtual Chassis using the recommended configuration described in [Example: Configuring the Virtual Chassis for the QFabric Switch Control Plane](#). Leave the Virtual Chassis powered on.
9. Power on each QFX3008-I Interconnect Device. See [“Powering On a QFX3008-I Interconnect Device” on page 253](#).
10. Power on the QFX3100 Director devices and complete the initial configuration for the QFX3000 QFabric system described in [“Configuring the QFabric System Initial Setup on a QFX3100 Director Group” on page 287](#).

- Related Documentation**
- QFabric Switch Initial and Default Configuration Information



# Installing a QFX3100 Director Device

- [Installing and Connecting a QFX3100 Director Device on page 213](#)
- [Unpacking a QFX3100 Director Device on page 213](#)
- [Mounting a QFX3100 Director Device on Two Posts in a Rack or Cabinet on page 215](#)
- [Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet on page 217](#)
- [Connecting AC Power to a QFX3100 Director Device on page 218](#)
- [Powering On a QFX3100 Director Device on page 220](#)

## Installing and Connecting a QFX3100 Director Device

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To install and connect a QFX3100 Director device:

1. Follow instructions in [“Unpacking a QFX3100 Director Device” on page 213](#).
2. Mount the QFX3100 Director device by following instructions appropriate for your site:
  - [“Mounting a QFX3100 Director Device on Two Posts in a Rack or Cabinet” on page 215](#) (using the mounting brackets provided)
  - [“Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet” on page 217](#) (using the mounting brackets provided)
3. Follow instructions in [“Connecting AC Power to a QFX3100 Director Device” on page 218](#) to connect power.
4. See [“QFX3000-G QFabric System Installation Overview” on page 209](#) for information about the steps to install and configure your QFX3000 QFabric system.

**Related  
Documentation**

- [Rack Requirements for a QFX3100 Director Device on page 93](#)
- [Cabinet Requirements for a QFX3100 Director Device on page 97](#)
- [Clearance Requirements for Airflow and Hardware Maintenance for a QFX3100 Director Device on page 99](#)

## Unpacking a QFX3100 Director Device

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The QFX3100 Director devices are shipped in a cardboard carton, secured with foam packing material. The carton also contains an accessory box and quick start instructions.

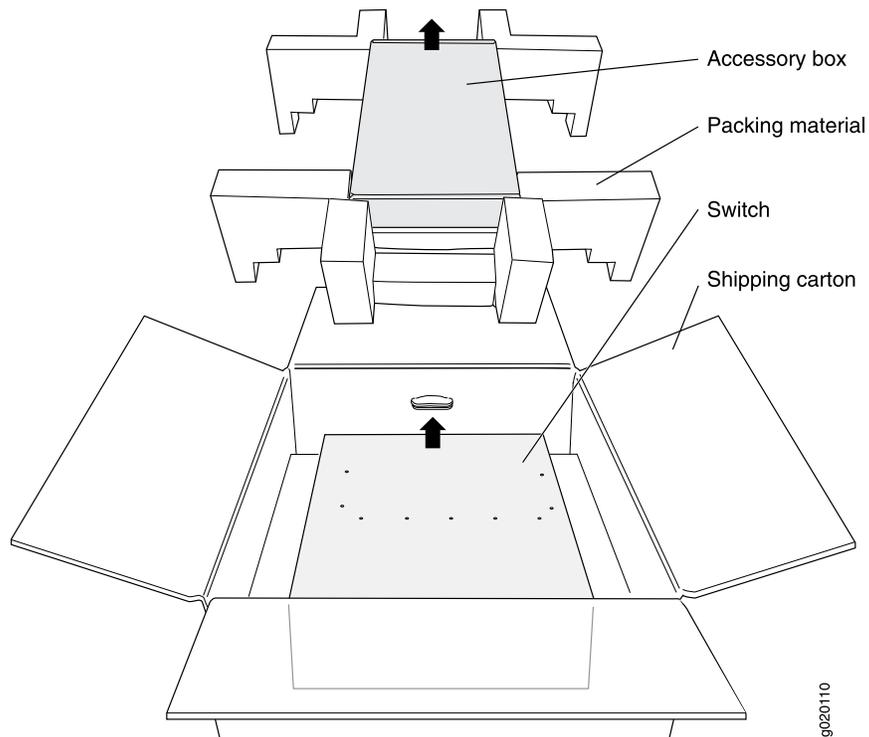


**CAUTION:** QFX3100 Director devices are maximally protected inside the shipping carton. Do not unpack the Director devices until you are ready to begin installation.

To unpack a QFX3100 Director device (see [Figure 56 on page 214](#)):

1. Move the shipping carton to a staging area as close to the installation site as possible but where you have enough room to remove the system components.
2. Position the carton so that the arrows are pointing up.
3. Open the top flaps on the shipping carton.
4. Remove the accessory box and verify the contents against the parts inventory.
5. Pull out the packing material holding the QFX3100 Director device in place.
6. Verify the components received against the inventory provided in [Table 55 on page 214](#).
7. Save the shipping carton and packing materials in case you need to move or ship the device later.

**Figure 56: Unpacking a QFX3100 Director Device**



**Table 55: Inventory of Components Provided with a QFX3100 Director Device**

Component	Quantity
QFX3100 Director device	1

Table 55: Inventory of Components Provided with a QFX3100 Director Device (*continued*)

Component	Quantity
Fan module (installed)	3
AC power supply module (installed)	2
4-port Ethernet network module (installed)	2
Hard disk drive (HDD) module (installed)	2
Mounting screws	8
Two-post rack-mount kit	1
Four-post rack-mount kit	1

**Related Documentation** • [Installing and Connecting a QFX3100 Director Device on page 213](#)

## Mounting a QFX3100 Director Device on Two Posts in a Rack or Cabinet

You can mount a QFX3100 Director device on two posts of a 19-in. rack or cabinet by using the mounting brackets provided with the device. (The remainder of this topic uses “rack” to mean “rack or cabinet.”)

You can mount the QFX3100 Director device on four posts of a four-post rack by using the side rail brackets provided with the device. See [“Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet” on page 217](#).

Before mounting the device on two posts in a rack:

- Verify that the site meets the requirements described in [“Site Preparation Checklist for a QFX3100 Director Device” on page 83](#).
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure.
- Read [“General Safety Guidelines and Warnings” on page 161](#).
- Remove the device from the shipping carton (see [“Unpacking a QFX3100 Director Device” on page 213](#)).

Ensure that you have the following parts and tools available:

- Electrostatic discharge (ESD) grounding strap (provided)
- Phillips (+) screwdriver, number 2
- Four mid-mount mounting brackets and mounting screws (provided)
- Screws to secure the chassis to the rack (not provided)



**NOTE:** One person must be available to lift the QFX3100 Director device while another secures it to the rack.

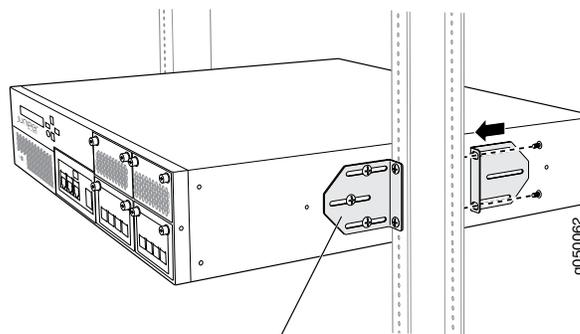


**CAUTION:** If you are mounting multiple units on the rack, mount the heaviest unit at the bottom and mount the others from bottom to top in order of decreasing weight.

To mount the QFX3100 Director device on two posts in a rack:

1. Place the QFX3100 Director device on a flat, stable surface.
2. Align one mid-mount bracket to the mid-mount bracket holes near the center of the side of the QFX3100 Director device. Ensure that the bracket is aligned with the mounting holes and that the bracket face is facing the rack post.
3. Attach the mounting bracket to the QFX3100 Director device.
4. Mount the attached mounting bracket to the rack post. Tighten all screws.
5. Attach the mounting bracket on the opposite end of the same side to the QFX3100 Director device and mount it to the rack post. Tighten all screws.
6. Repeat this procedure for the mounting brackets on the opposite side of the QFX3100 Director device. Tighten all screws.
7. Ensure that the QFX3100 Director device chassis is level by verifying that all screws on one side of the rack are aligned with the screws on the other side. See [Figure 57 on page 216](#).

**Figure 57: Mounting the QFX3100 Director Device on Two Posts in a Rack**



Attach the front bracket to the chassis, and secure the chassis to the post. Attach the rear bracket to the other side of the post, and secure the chassis to the rear bracket, adjusting the bracket width as needed.

**Related Documentation**

- [Rack-Mounting and Cabinet-Mounting Warnings on page 179](#)
- [Installing and Connecting a QFX3100 Director Device on page 213](#)
- [Connecting AC Power to a QFX3100 Director Device on page 218](#)

## Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet

You can mount a QFX3100 Director device on four posts of a 19-in. rack or cabinet by using the adjustable rear mounting brackets provided. (The remainder of this topic uses “rack” to mean “rack or cabinet.”)

Before mounting the QFX3100 Director device on four posts in a rack:

- Verify that the site meets the requirements described in [“Site Preparation Checklist for a QFX3100 Director Device” on page 83](#).
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure.
- Read [“General Safety Guidelines and Warnings” on page 161](#).
- Remove the QFX3100 Director device from the shipping carton (see [“Unpacking a QFX3100 Director Device” on page 213](#)).

Ensure that you have the following parts and tools available:

- Electrostatic discharge (ESD) grounding strap (provided).
- Phillips (+) screwdriver, number 2.
- Screws to secure the chassis and mounting brackets to the rack (not provided).
- One pair of adjustable rear mounting brackets (provided). These mounting brackets support the rear of the chassis, and must be installed.
- Screws to attach the mounting brackets to the chassis (provided).



**CAUTION:** If you are mounting multiple units on a rack, mount the heaviest unit at the bottom of the rack and mount the other units from the bottom of the rack to the top in decreasing order of the weight of the units.

To mount the QFX3100 Director device on four posts in a rack:

1. Place the QFX3100 Director device on a flat, stable surface.
2. Measure the distance between the front and rear rack rails. Using this measurement, attach the adjustable rear mounting brackets on the chassis using the provided screws.
3. Flip the hinged rack-mounting plates at the end of the brackets outward.

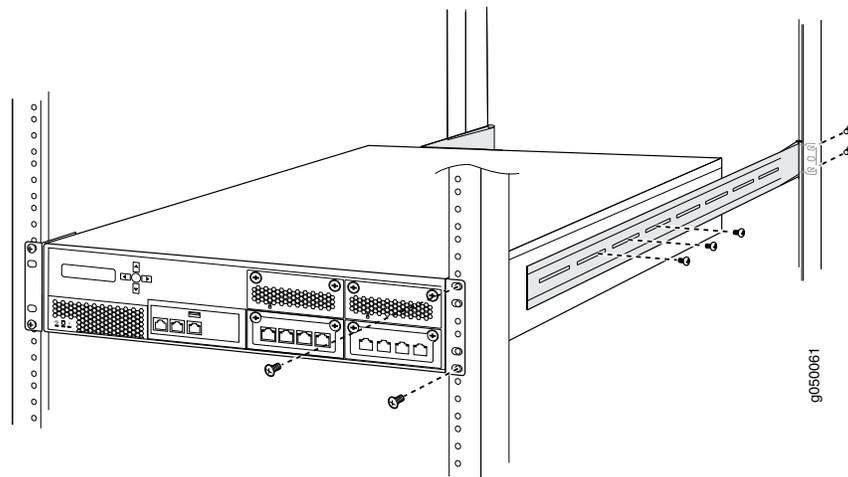


**NOTE:** The device weighs approximately 41.2 lb (18.73 kg). Installing the QFX3100 Director device in a rack or cabinet requires one person to lift it and a second person to secure it to the rack.

4. Have one person grasp both sides of the device, lift it, and position it in the rack, aligning the bracket holes with the holes in the rack.

5. Have a second person install a mounting screw—and cage nut and washer if your rack requires them—in each of the four bracket holes to secure the device to the front rack rails.
6. While still supporting the chassis, have the second person install a mounting screw—and cage nut and washer if your rack requires them—in each of the four bracket holes on the adjustable rear mounting brackets to secure the device to the rear rack rails.
7. Ensure that the chassis is level by verifying that all the screws on the front of the rack are aligned with the screws at the back of the rack. See [Figure 58 on page 218](#).

**Figure 58: Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet**



**Related Documentation**

- [Connecting Earth Ground to an EX Series Switch](#)
- [Connecting AC Power to a QFX3100 Director Device on page 218](#)
- [Installing and Connecting a QFX3100 Director Device on page 213](#)
- [Rack-Mounting and Cabinet-Mounting Warnings on page 179](#)

## Connecting AC Power to a QFX3100 Director Device

The power supply in a QFX3100 Director device is a hot-removable and hot-insertable field-replaceable unit (FRU) located on the far right side of the rear panel. You can remove and replace a single power supply without powering off the QFX3100 Director device or disrupting QFX3100 Director device functions.

Before you begin connecting AC power to a QFX3100 Director device:

- Install the power supply in the chassis. See [“Installing a Power Supply in a QFX3100 Director Device” on page 311](#).



**NOTE:** Each power supply must be connected to a dedicated power source outlet to ensure power supply redundancy.

Ensure that you have the following parts and tools available:

- A power cord appropriate for your geographical location

To connect AC power to a QFX3100 Director device:

1. Ensure that the power supplies are fully inserted in the QFX3100 Director device.
2. Locate the power cords shipped with the QFX3100 Director device; the cords have plugs appropriate for your geographical location. See [“AC Power Cord Specifications for a QFX3100 Director Device” on page 135](#).



**WARNING:** Ensure that the power cord does not block access to QFX3100 Director device components or drape where people can trip on it.

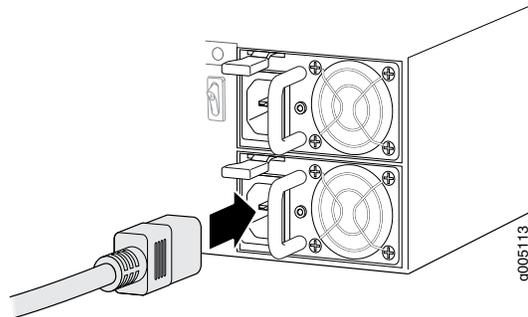
3. Insert the coupler end of the power cord into the AC power cord inlet on the AC power supply faceplate.
4. If the AC power source outlet has a power switch, set it to the OFF (O) position.
5. Insert the power cord plug into an AC power source outlet.
6. If the AC power source outlet has a power switch, set it to the ON (I) position.
7. Repeat these steps for the second AC power supply.
8. Press the power switch on the rear panel of the QFX3100 Director device to power on the device.



**NOTE:** Momentarily pressing the power switch causes the system to power on or causes a power event to the operating system, which causes a graceful shutdown. Pressing the power switch for 4 seconds or longer causes an abrupt power shutdown.

9. Verify that the power LED on the power supply is lit and is on steadily.

Figure 59: Connecting an AC Power Cord to an AC Power Supply in a QFX3100 Director Device



**Related Documentation**

- [Installing and Connecting a QFX3100 Director Device on page 213](#)
- [AC Power Supply in a QFX3100 Director Device on page 30](#)

## Powering On a QFX3100 Director Device

Before you power on the QFX3100 Director device, ensure that:

- All required QFX3100 Director device components are installed.
- You understand how to protect the QFX3100 Director device from electrostatic damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).

Ensure that you have the following parts and tools available to power on the QFX3100 Director device:

- An external management device such as a PC to monitor the startup process—For connecting a management device to the console port, see [“Connecting a QFX Series Device to a Management Console” on page 285](#). For connecting a management device to the management port, see [“Connecting a QFX3100 Director Device to a Network for Out-of-Band Management” on page 277](#).



**NOTE:** You cannot use the management (MGMT) port to perform the initial configuration of the QFX3100 Director device. You must configure the management ports before you can successfully connect to the QFX3100 Director device using these ports. See [“Configuring the QFabric System Initial Setup on a QFX3100 Director Group” on page 287](#).



**TIP:** When you power on the QFX3100 Director devices in the Director group for the first time the first device to be powered on assumes the Director Group 0 or dg0 role, the second device to be powered on assumes the Director Group 1 or dg1 role.

To power on the QFX3100 Director device:

1. Ensure that the power supplies are fully inserted in the QFX3100 Director device and that each of their handles is flush against the faceplate.
2. Ensure that the source power cord is inserted securely into the appliance inlet for each AC power supply.
3. Switch on the site circuit breakers.
4. Press the power switch on the rear panel of the QFX3100 Director device to power on the device.



**NOTE:** Pressing the power switch momentarily either causes the system to power on or causes a graceful shutdown. Pressing the power switch for 4 seconds or longer causes an abrupt power shutdown.

5. Observe the power supply faceplate LEDs. If the power supply is installed correctly and functioning normally, the AC power supply LED is green.
6. On the external management device, monitor the startup process to ensure that the system boots properly.



**NOTE:** After you power on a power supply, wait for at least 60 seconds before you turn it off. After you power off a power supply, wait for at least 60 seconds before you turn it back on.

**Related  
Documentation**

- [Powering Off a QFX3100 Director Device on page 295](#)
- [AC Power Supply in a QFX3100 Director Device on page 30](#)
- [AC Power Cord Specifications for a QFX3100 Director Device on page 135](#)



# Installing a QFX3008-I Interconnect Device

- [Installing and Connecting a QFX3008-I Interconnect Device on page 223](#)
- [Unpacking a QFX3008-I Interconnect Device on page 224](#)
- [Parts Inventory \(Packing List\) for a QFX3008-I Interconnect Device on page 225](#)
- [Installing QFX3008-I Interconnect Device Mounting Hardware on Four-Post Racks or Cabinets on page 227](#)
- [Installing QFX3008-I Interconnect Device Mounting Hardware on Two-Post Racks on page 231](#)
- [Mounting a QFX3008-I Interconnect Device on a Rack or Cabinet Using a Mechanical Lift on page 234](#)
- [Connecting Earth Ground to a QFX3008-I Interconnect Device on page 237](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 239](#)
- [Preparing Delta and Wye Three-Phase Power Cords on page 241](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays on page 246](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays on page 250](#)
- [Powering On a QFX3008-I Interconnect Device on page 253](#)

## Installing and Connecting a QFX3008-I Interconnect Device

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Before you begin, ensure that the installation site meets the requirements described in “Site Preparation Checklist for a QFX3008-I Interconnect Device” on page 84.

To install and connect a QFX3008-I Interconnect device:

1. Follow the instructions in “[Unpacking a QFX3008-I Interconnect Device](#)” on page 224.
2. Install the mounting hardware on your four-post or two-post rack or cabinet by following the instructions in “[Installing QFX3008-I Interconnect Device Mounting Hardware on Four-Post Racks or Cabinets](#)” on page 227 or “[Installing QFX3008-I Interconnect Device Mounting Hardware on Two-Post Racks](#)” on page 231.

3. Mount the device by following the instructions in [“Mounting a QFX3008-I Interconnect Device on a Rack or Cabinet Using a Mechanical Lift”](#) on page 234.
4. Connect the QFX3008-I Interconnect device to earth ground.  
See [“Connecting Earth Ground to a QFX3008-I Interconnect Device”](#) on page 237.
5. Connect power to the device.  
See [“Connecting AC Power to a QFX3008-I Interconnect Device with Single-Phase Wiring Trays”](#) on page 239, [“Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays”](#) on page 246, and [“Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays”](#) on page 250.
6. (Optional) If you have purchased the cable management system or the lockable front doors, install them by following the instructions in [“Installing the Cable Management System on a QFX3008-I Interconnect Device”](#) on page 255 and [“Installing the Lockable Front Doors on a QFX3008-I Interconnect Device”](#) on page 256.
7. See [“QFX3000-G QFabric System Installation Overview”](#) on page 209 for information about the next steps to install and configure your QFX3000 QFabric system.

**Related Documentation**

- [Rack Requirements for a QFX3008-I Interconnect Device on page 95](#)
- [Cabinet Requirements for a QFX3008-I Interconnect Device on page 98](#)
- [Clearance Requirements for Airflow and Hardware Maintenance for a QFX3008-I Interconnect Device on page 100](#)
- [Chassis Lifting Guidelines for a QFX3008-I Interconnect Device on page 175](#)

## Unpacking a QFX3008-I Interconnect Device

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After you prepare the installation site as described in [“Site Preparation Checklist for a QFX3008-I Interconnect Device”](#) on page 84, you may unpack the device.



**NOTE:** The device is maximally protected inside the shipping box. Do not unpack it until you are ready to begin installation.

Before you begin, ensure that you have the following parts and tools available to unpack the QFX3008-I Interconnect Device:

- Phillips (+) screwdriver, number 2
- A 5/16-in. open-end or socket wrench to remove the bracket bolts from the shipping pallet
- A box cutter or packing knife to slice open the tape that seals the top of the box

The device ships in a cardboard box that has a two-layer wooden pallet base with foam cushioning between the layers. The device chassis is bolted to the pallet base. Quick Start installation instructions and a cardboard accessory box are also included in the shipping crate.

To unpack the device:

1. Move the shipping box to a staging area as close to the installation site as possible. Make sure there is enough space to remove components from the chassis if necessary. While the chassis is bolted to the pallet, you can use a forklift or pallet jack to move it.
2. Remove the cardboard cover, foam padding, and accessory box.
3. Unpack the accessory box and lay out the contents so that they are ready for use.
4. Verify that your order includes all appropriate parts. See [“Parts Inventory \(Packing List\) for a QFX3008-I Interconnect Device” on page 225](#).
5. Use a 5/16-in. open-end or socket wrench and a number 2 Phillips screwdriver to remove the four sets of bracket bolts and screws that secure the chassis to the shipping pallet. Store the brackets and bolts inside the accessory box.
6. Save the shipping box, pallet, and packing materials in case you need to move or ship the device at a later time.

**Related Documentation**

- [Mounting a QFX3008-I Interconnect Device on a Rack or Cabinet Using a Mechanical Lift on page 234](#)

## Parts Inventory (Packing List) for a QFX3008-I Interconnect Device

The device shipment includes a packing list. Check the parts you receive in the shipping crate against the items on the packing list. The packing list specifies the part number and description of each part in your order. The parts shipped depend on the configuration you order.

If any part on the packing list is missing, contact your customer service representative or contact Juniper Networks customer care from within the U.S. or Canada by telephone at 1-800-638-8296. For international-dial or direct-dial options in countries without toll-free numbers, see <http://www.juniper.net/support/requesting-support.html>.

[Table 56 on page 225](#) lists the parts and their quantities in the packing list for a QFX3008-I Interconnect device.

**Table 56: Parts List for QFX3008-I Interconnect Device Configurations**

Component	Quantity
Chassis, including the midplane and rack-mounting brackets	1
Cable manager	1 (optional)
Lockable front door	1 (optional)
Control Boards	2
16-port QSFP+ front cards	1–8

**Table 56: Parts List for QFX3008-I Interconnect Device Configurations (continued)**

Component	Quantity
Rear cards	8
Power supplies	6
Wiring trays	2
Top fan tray	1
Bottom fan tray and front panel display	1
Side fan trays	8
Front air filter	1
Side air filters	8
Large mounting shelf	1
Small mounting shelf	1
Spacer bars	2
Cover panels for slots without installed components	Front card cover panels: 0–7

[Table 57 on page 226](#), [Table 58 on page 226](#), and [Table 59 on page 227](#) list the parts contained in the accessory box.

**Table 57: QFX3008-I Interconnect Device Accessory Kit Part Contents**

Parts	Quantity
Chassis grounding lug	1
Screws to attach the chassis grounding lug to the protective earth terminal on the chassis	2
Electrostatic discharge (ESD) grounding strap	1
RJ-45 cable and RJ-45 to DB-9 adapter for console port connection	1

**Table 58: QFX3008-I Interconnect Device Accessory Kit Document Contents**

Documents
<i>QFX3008-I Interconnect Device Quick Start</i>
End User License Agreement (EULA)

Table 58: QFX3008-I Interconnect Device Accessory Kit Document Contents (*continued*)

Documents	
RoHS Compliance and Warranty Information Card	

Table 59: Wiring Tray Accessory Kit Part Contents

Parts	Quantity
Strain relief connector	2 (delta or wye three-phase wiring trays only)
90-degree connector	2 (delta or wye three-phase wiring trays only)
Power cords	6 (single-phase wiring trays only)



**NOTE:** You must provide mounting screws that are appropriate for your rack or cabinet to front-mount the chassis in a rack or a cabinet. The spacer bars are attached to the chassis for shipment using 14 mounting screws. These screws can be reused during installation.

For four-post rack installation, you need 36 screws:

- 6 screws to attach the small mounting shelf to the rear of the rack
- 4 screws to attach the large mounting shelf to the front of the rack
- 12 screws to attach the spacer bars to the front of the rack
- 14 screws to attach the front-mounting brackets (“ears”) that come installed on the chassis to the front of the rack

For two-post rack installation, you need 46 screws:

- 6 screws to attach the small mounting shelf to the front of the rack
- 22 screws to attach the large mounting shelf to the rear of the rack
- 18 screws to attach the center-mounting brackets (“ears”) that come installed on the chassis to the front of the rack

**Related Documentation**

- [Unpacking a QFX3008-I Interconnect Device on page 224](#)
- [QFX3008-I Interconnect Device Overview on page 33](#)

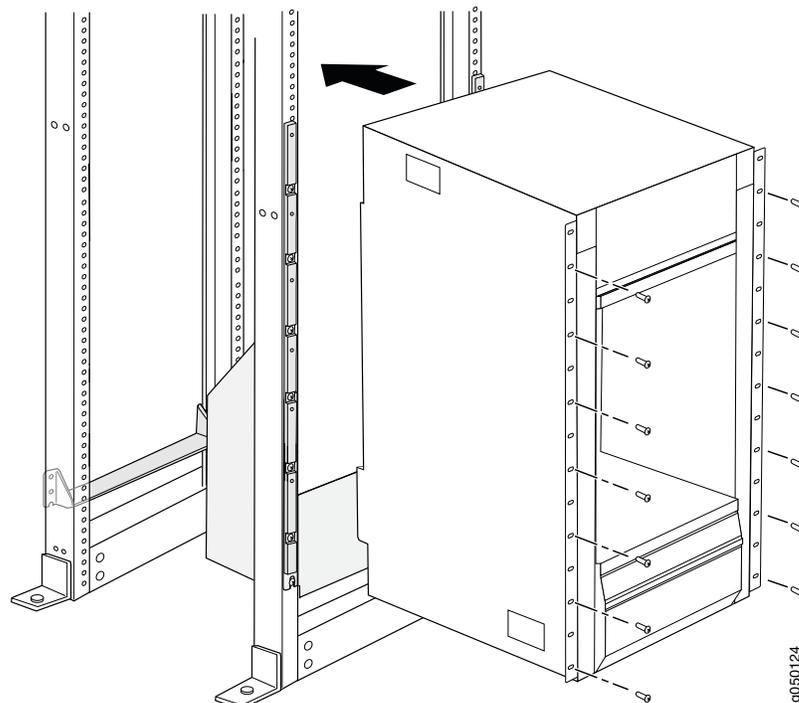
## Installing QFX3008-I Interconnect Device Mounting Hardware on Four-Post Racks or Cabinets

Before you install the QFX3008-I Interconnect device in a four-post rack or cabinet, you must first install mounting hardware and remove the center-mounting brackets from the chassis (see [Figure 60 on page 228](#)).



**NOTE:** In a rack, the device uses 21 U. You can mount two QFX3008-I Interconnect devices on a 42 U rack provided that the racks meet the strength requirements to support the combined weight of the devices. If you are mounting two QFX3008-I Interconnect devices on a rack, mount the first device on the bottom of the rack.

**Figure 60: Installing the Mounting Hardware for a Four-Post Rack or Cabinet**



For a four-post rack or cabinet, [Table 60 on page 228](#) specifies the holes in which you insert mounting screws (an X indicates a mounting hole location), and cage nuts if needed. The hole distances are relative to one of the standard “U” divisions on the rack. For reference, the bottom of all mounting shelves is at 0.04 in. (0.02 U) above a U division.

**Table 60: Four-Post Rack or Cabinet Mounting Hole Locations**

Hole	Distance Above U Division	Large Shelf	Spacer Bars	Small Shelf
51	29.51 in. (74.9 cm)	16.86 U	X	
42	24.26 in. (61.6 cm)	13.86 U	X	
33	19.01 in. (48.3 cm)	10.86 U	X	
30	17.26 in. (43.8 cm)	9.86 U		X

Table 60: Four-Post Rack or Cabinet Mounting Hole Locations (*continued*)

Hole	Distance Above U Division		Large Shelf	Spacer Bars	Small Shelf
24	13.76 in. (34.9 cm)	7.86 U		X	
15	8.51 in. (21.6 cm)	4.86 U		X	
6	3.26 in. (8.3 cm)	1.86 U		X	
3	1.51 in. (3.8 cm)	0.86 U			X
2	0.88 in. (2.2 cm)	0.50 U	X		X
1	0.25 in. (0.6 cm)	0.14 U			X

This topic describes these tasks:

1. [Installing Cage Nuts for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting on page 229](#)
2. [Installing the Small Mounting Shelf for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting on page 229](#)
3. [Installing the Large Mounting Shelf and Spacer Bars for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting on page 230](#)
4. [Removing the Adjustable Center-Mounting Brackets for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting on page 231](#)

### Installing Cage Nuts for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting

For racks without threaded holes, you must install cage nuts on the rack or cabinet rails in the locations specified in [Table 60 on page 228](#) (an X indicates a mounting hole location).

Before you begin, ensure that you have 22 cage nuts appropriate for your rack or cabinet.

To install the cage nuts in the proper locations:

1. On the front rack or cabinet, install cage nuts in the holes specified in [Table 60 on page 228](#) for the large shelf and the spacer bars.
2. On the rear rack or cabinet, install cage nuts in the holes specified in [Table 60 on page 228](#) for the small shelf.

### Installing the Small Mounting Shelf for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting

To mount the chassis on a four-post rack or cabinet, you must first install the mounting shelves and spacer bars on the rack or cabinet.

Before you begin, ensure that you have the following parts and tools available to install the small mounting shelf:

- A Phillips (+) screwdriver, number 2 or 3, depending on the size of your rack mounting screws
- Six mounting screws appropriate for your rack to attach the small mounting shelf to the rack

To install the small mounting shelf:

1. On the back of each rear rack rail, partially insert a mounting screw into the lowest hole specified in [Table 60 on page 228](#) for the small shelf.
2. Install the small shelf on the back rack rails. Rest the bottom slot of each ear on a mounting screw. The small shelf installs on the back of the rear rails, extending toward the center of the rack. The bottom of the small shelf should align with the bottom of the large shelf.
3. Partially insert screws into the open holes in the ears of the small shelf.
4. Tighten all the screws completely.

### Installing the Large Mounting Shelf and Spacer Bars for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting

To mount the chassis on a four-post rack or cabinet, you must first install the mounting shelves and spacer bars on the rack or cabinet.

Before you begin, ensure that you have the following parts and tools available to install the large mounting shelf and spacer bars:

- A Phillips (+) screwdriver, number 2 or 3, depending on the size of your rack mounting screws
- 16 mounting screws appropriate for your rack to attach the large mounting shelf and spacer bars to the rack

To install the large mounting shelf and spacer bars:

1. On the front of each front rack rail, partially insert a mounting screw into the lowest hole specified in [Table 60 on page 228](#) for the large shelf.
2. Install the large shelf on the front rack rails. Rest the bottom slot of each ear on a mounting screw.
3. Partially insert a mounting screw into the top hole in each ear of the large shelf.
4. Tighten all the screws completely.
5. The device is shipped with each spacer bar attached to the rear of each front-mounting flange. Remove each spacer bar by removing the seven screws that fasten the spacer bar to the front-mounting bracket.

6. Place one of the spacer bars over an ear of the installed large shelf. Position the notch in the rear of the spacer bar so the upper part of the bar is flush with the rack rail and the lower part is flush with the ear of the shelf.
7. Insert a mounting screw into each of the nonthreaded holes in the recesses of the spacer bar to secure the spacer bar.
8. Repeat Step 6 and Step 7 for the other spacer bar.
9. Tighten all the screws completely.

### Removing the Adjustable Center-Mounting Brackets for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting

Before you begin, ensure that you have a number 2 Phillips (+) screwdriver.

To remove the adjustable center-mounting brackets:

1. Loosen the three screws at the top and bottom of each bracket.
2. Remove the center-mounting brackets.



**TIP:** Save the center-mounting brackets and screws in case you need to move the device to a two-post rack at a later time.

#### Related Documentation

- [Site Preparation Checklist for a QFX3008-I Interconnect Device on page 84](#)

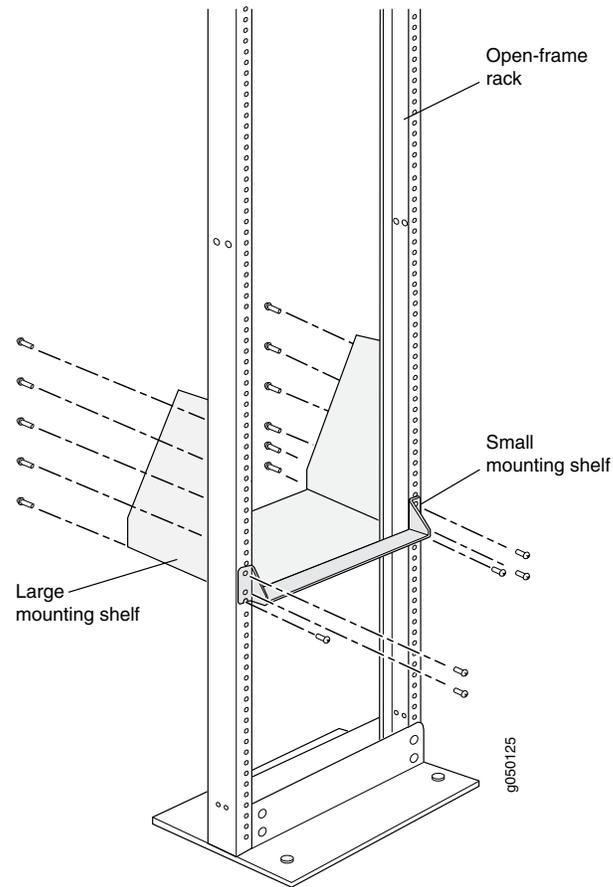
### Installing QFX3008-I Interconnect Device Mounting Hardware on Two-Post Racks

Before you install the QFX3008-I Interconnect device in a two-post rack, you must first install mounting hardware on the rack (see [Figure 61 on page 232](#)). The spacer bars are not needed for this mounting option; however, you can leave them attached to the front-mounting brackets.



**NOTE:** In a rack, the device uses 21 U. You can mount two QFX3008-I Interconnect devices on a 42 U rack provided that the racks meet the strength requirements to support the combined weight of the devices. If you are mounting two QFX3008-I Interconnect devices on a rack, mount the first device on the bottom of the rack.

Figure 61: Installing the Mounting Hardware for a Two-Post Rack



For a two-post rack, [Table 61 on page 232](#) specifies the holes in which you insert mounting screws (an X indicates a mounting hole location), and cage nuts if needed. The hole distances are relative to one of the standard “U” divisions on the rack. For reference, the bottom of all mounting shelves is at 0.04 in. (0.02 U) above a U division.

Table 61: Two-Post Rack Mounting Hole Locations

Hole	Distance Above “U” Division		Large Shelf	Small Shelf
30	17.26 in. (43.8 cm)	9.86 U	X	
27	15.51 in. (39.4 cm)	8.86 U	X	
24	13.76 in. (34.9 cm)	7.86 U	X	
21	12.01 in. (30.5 cm)	6.86 U	X	
18	10.26 in. (26.0 cm)	5.86 U	X	
15	8.51 in. (21.6 cm)	4.86 U	X	

Table 61: Two-Post Rack Mounting Hole Locations (*continued*)

Hole	Distance Above "U" Division		Large Shelf	Small Shelf
12	6.76 in. (17.1 cm)	3.86 U	X	
9	5.01 in. (12.7 cm)	2.86 U	X	
6	3.26 in. (8.3 cm)	1.86 U	X	
3	1.51 in. (3.8 cm)	0.86 U	X	X
2	0.88 in. (2.2 cm)	0.50 U	X	X
1	0.25 in. (0.6 cm)	0.14 U		X

This topic describes these tasks:

1. [Installing Cage Nuts for QFX3008-I Interconnect Device Two-Post Rack Mounting on page 233](#)
2. [Installing the Small Mounting Shelf for QFX3008-I Interconnect Device Two-Post Rack Mounting on page 233](#)
3. [Installing the Large Mounting Shelf for QFX3008-I Interconnect Device Two-Post Rack Mounting on page 234](#)

### Installing Cage Nuts for QFX3008-I Interconnect Device Two-Post Rack Mounting

For racks without threaded holes, you must install cage nuts on the rack rails in the locations specified in [Table 61 on page 232](#) (an X indicates a mounting hole location). The hole distances are relative to one of the standard "U" divisions on the rack rails. The bottom of all mounting shelves is at 0.04 in. (0.02 U) above a U division.

Before you begin, ensure that you have 28 cage nuts appropriate for your rack.

To install the cage nuts in the proper locations:

1. On the front rack rail, install cage nuts in the holes specified in [Table 61 on page 232](#) for the small shelf.
2. On the front rack rail, install cage nuts for the center-mounting brackets. The center-mounting brackets have holes for rack-mounting screws, spaced at 3.5 in. (8.89 cm).
3. On the rear rack rail, install cage nuts in the holes specified in [Table 61 on page 232](#) for the large shelf.

### Installing the Small Mounting Shelf for QFX3008-I Interconnect Device Two-Post Rack Mounting

To mount the chassis on a two-post rack, you must first install the mounting shelves on the rack.

Before you begin, ensure that you have the following parts and tools available to install the small mounting shelf:

- A Phillips (+) screwdriver, number 2 or 3, depending on the size of your rack mounting screws
  - Six mounting screws appropriate for your rack to attach the small mounting shelf to the rack
1. On the front of each rack rail, partially insert a mounting screw into the lowest hole specified in [Table 61 on page 232](#) for the small shelf.
  2. Install the small shelf on the rack. Rest the bottom slot of each ear on a mounting screw. The small shelf installs on the front of the rails, extending away from the rack. The bottom of the small shelf should align with the bottom of the large shelf
  3. Partially insert screws into the open holes in the ears of the small shelf.
  4. Tighten all the screws completely.

### Installing the Large Mounting Shelf for QFX3008-I Interconnect Device Two-Post Rack Mounting

To mount the chassis on a two-post rack, you must first install the mounting shelves on the rack.

Before you begin, ensure that you have the following parts and tools available to install the large mounting shelf:

- A Phillips (+) screwdriver, number 2 or 3, depending on the size of your rack mounting screws
- 22 mounting screws appropriate for your rack to attach the large mounting shelf to the rack

To install the large mounting shelf and spacer bars:

1. On the rear of each rack rail, partially insert a mounting screw into the lowest hole specified in [Table 61 on page 232](#) for the large shelf.
2. Install the large shelf on the rack. Rest the bottom slot of each ear on a mounting screw.
3. Partially insert screws into the open holes in the ears of the large shelf.
4. Tighten all the screws completely.

### Mounting a QFX3008-I Interconnect Device on a Rack or Cabinet Using a Mechanical Lift

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The QFX3008-I Interconnect device ships installed with front-mounting brackets and center-mounting brackets on the chassis for mounting the device on a 19-in. equipment rack or cabinet. (The remainder of this topic uses “rack” to mean “rack or cabinet.”) The chassis also comes with small and large mounting shelves to support it in the rack, and spacer bars to accommodate the installation of the mounting shelves in four-post racks.

Because of the chassis size and weight, we require using a mechanical lift to install the device.



**CAUTION:** Before mounting the device in a rack, have a qualified technician verify that the rack is strong enough to support the device's weight and is adequately supported at the installation site.



**NOTE:** In a rack, the chassis occupies 21 U. You can mount two devices on a 42 U rack provided that the racks meet the strength requirements to support the combined weight of the devices. If you are mounting two devices on a rack, mount the first device on the bottom of the rack.

Before mounting a QFX3008-I Interconnect device in a rack:

1. Verify that the site meets the requirements described in [“Site Preparation Checklist for a QFX3008-I Interconnect Device”](#) on page 84.
2. Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure. See [“Clearance Requirements for Airflow and Hardware Maintenance for a QFX3008-I Interconnect Device”](#) on page 100 for detailed information.
3. Read [“General Safety Guidelines and Warnings”](#) on page 161, with particular attention to [“Chassis Lifting Guidelines for a QFX3008-I Interconnect Device”](#) on page 175.
4. Unpack the device as described in [“Unpacking a QFX3008-I Interconnect Device”](#) on page 224.
5. In a four-post rack, install the mounting hardware at the desired position as described in [“Installing QFX3008-I Interconnect Device Mounting Hardware on Four-Post Racks or Cabinets”](#) on page 227. In a two-post rack, install the mounting hardware at the desired position as described in [“Installing QFX3008-I Interconnect Device Mounting Hardware on Two-Post Racks”](#) on page 231.

Before you begin, ensure that you have the following parts and tools available to mount the device in a rack:

- A mechanical lift with a load capacity of at least 750 lb (341 kg). If you do not have a lift rated for 750 lb (341 kg), you must remove all components from the chassis and use a lift rated for at least 250 lb (114 kg). The weight of an empty QFX3008-I Interconnect device and midplane is approximately 205 lb (93 kg).
- A Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mounting screws, for mounting the device in a rack
- 14 mounting screws appropriate for your rack if you are installing the device in a four-post rack
- 18 mounting screws appropriate for your rack if you are installing the device in a two-post rack

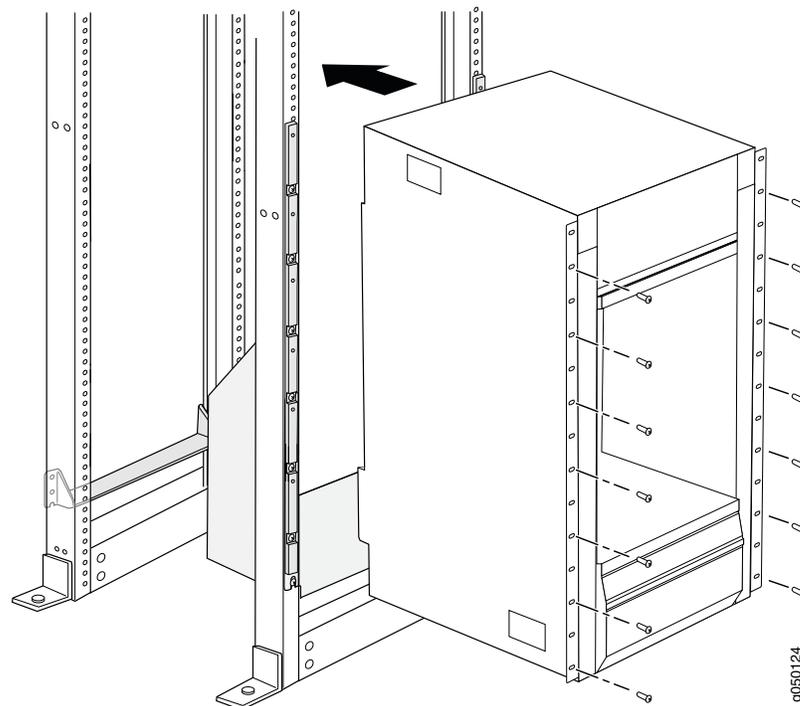
To mount the QFX3008-I Interconnect device in a rack using a mechanical lift (see [Figure 62 on page 237](#)):

1. Load the device onto the lift, making sure it rests securely on the lift platform.
2. Using the lift, position the device in front of the rack, centering it in front of the mounting shelves installed in the rack.
3. Lift the chassis approximately 0.75 in. (1.9 cm) above the surface of the mounting shelves. Position the chassis in the rack as close as possible to resting on the support that the mounting shelves provide.
4. In a four-post rack, carefully slide the device onto the mounting shelves until the front-mounting brackets (“ears”) attached to the chassis contact the rack rails. The spacer bars installed in the rack ensure that the holes in the front-mounting brackets align with the holes in the rack rails. The handles on the side of the chassis can be used to help position the Interconnect device in the rack.

In a two-post rack, carefully slide the device onto the mounting shelves until the center-mounting brackets (“ears”) attached to the chassis contact the rack rails. The handles on the side of the chassis can be used to help position the QFX3008-I Interconnect device in the rack.

5. Move the lift away from the rack.
6. Ensure the mounting brackets are flush with the front of the rack.
7. Install a mounting screw into each of the open front-mounting holes aligned with the rack, starting from the bottom.
8. Visually inspect the alignment of the device. If the device is installed properly in the rack, all the mounting screws on one side of the rack are aligned with the mounting screws on the opposite side, and the device is level.
9. After ensuring that the device is aligned properly, tighten the screws.

Figure 62: Installing a QFX3008-I Interconnect Device in a Four-Post Rack



#### Related Documentation

- [Connecting AC Power to a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 239](#)
- [Powering On a QFX3008-I Interconnect Device on page 253](#)
- [Rack Requirements for a QFX3008-I Interconnect Device on page 95](#)
- [Cabinet Requirements for a QFX3008-I Interconnect Device on page 98](#)

## Connecting Earth Ground to a QFX3008-I Interconnect Device

To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, we recommend that the QFX3008-I Interconnect device be adequately grounded before it is connected to power.

Two pairs of threaded inserts (PEM nuts) are provided on the QFX3008-I Interconnect device for connecting the device to earth ground. The first pair is sized for M6 screws and is located below the wiring tray on the bottom left corner at the rear of the chassis. The second pair is sized for UNC 1/4-20 screws and is located below the second wiring tray on the bottom right corner at the rear of the chassis. The grounding points are spaced 0.625 in. (15.86 mm) apart. The grounding lug required is a Panduit LCD2-14A-Q or equivalent.

The accessory box shipped with the device includes a cable lug and two UNC 1/4-20 screws with integrated washers. For power cord and grounding cable specifications, see “AC Power Cord Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays” on page 139, “AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays” on page 141, “AC Power Cord Specifications

for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays” on page 142, and “Grounding Cable and Lug Specifications for a QFX3008-I Interconnect Device” on page 57.

Before you begin to connect the QFX3008-I Interconnect device to earth ground:

- Ensure that you understand how to prevent ESD damage. See “Prevention of Electrostatic Discharge Damage” on page 192.
- Ensure that a licensed electrician has attached the grounding lug to an appropriate grounding cable (see “Grounding Cable and Lug Specifications for a QFX3008-I Interconnect Device” on page 57).



**CAUTION:** Using a grounding cable with an incorrectly attached lug can damage the device.

Ensure you have the following tools and parts available to connect a QFX3008-I Interconnect device to earth ground:

- Electrostatic discharge (ESD) grounding strap
- Grounding cable (not provided) with attached lug
- Screws and split washers to secure the grounding lug to the protective earthing terminal (two UNC ¼-20 screws with integrated washers are provided)
- Phillips (+) torque screwdriver, number 2



**CAUTION:** You must use an appropriate torque-controlled tool to tighten the screws on the grounding lug. Applying excessive torque damages the grounding lug or chassis. Ground lugs should be installed with SAE Grade 5 screws or better at no more than 72 in-lb (8 Nm).

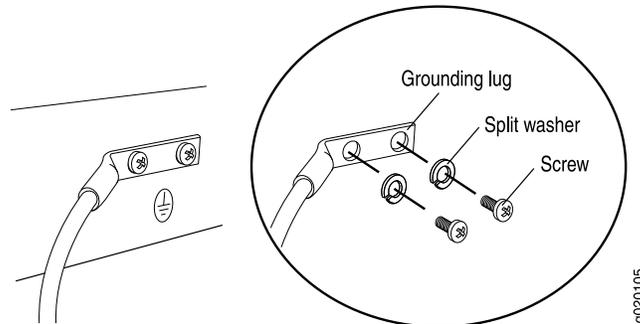
To connect a QFX3008-I Interconnect device to earth ground (see [Figure 63 on page 239](#)):

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the approved ESD site grounding point.
2. Connect one end of the grounding cable to a proper earth ground, such as the rack in which the device is installed.
3. Detach the ESD grounding strap from the site ESD grounding point.
4. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
5. Place the grounding cable lug over the grounding points on the bottom rear of the chassis below the wiring trays, as shown in [Figure 63 on page 239](#). The left pair is sized for M6 screws, and the right pair is sized for UNC ¼-20 screws.
6. Using the torque screwdriver, secure the grounding lug to the protective earthing terminal, first with the washers, then with the screws.



**NOTE:** The UNC ¼-20 screws included in the accessory box have integrated washers, instead of the separate washers shown below. You do not need to provide separate washers for these screws.

Figure 63: Connecting a Grounding Cable to a QFX3008-I Interconnect Device



**Related Documentation**

- [Site Preparation Checklist for a QFX3008-I Interconnect Device on page 84](#)

## Connecting AC Power to a QFX3008-I Interconnect Device with Single-Phase Wiring Trays

A QFX3008-I Interconnect device is configured with six AC power supplies and two wiring trays.



**CAUTION:** Mixing different types of wiring trays in the same chassis is not a supported configuration.



**CAUTION:** To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, the QFX3008-I Interconnect device must be adequately grounded before it is connected to power.

For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the QFX3008-I Interconnect device to connect to earth ground. For instructions on connecting a QFX3008-I Interconnect device to ground using a separate grounding conductor, see [“Connecting Earth Ground to a QFX3008-I Interconnect Device” on page 237](#).

A QFX3008-I Interconnect device receives additional grounding when you plug the power supply in the device into a grounded AC power outlet by using the AC power cord appropriate for your geographical location. See [“AC Power Cord Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays” on page 139](#).



**NOTE:** Each wiring tray AC appliance inlet must be connected to a dedicated AC power source outlet.

Before you begin to connect power to the device:

- Ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 192.](#)
- Install power supplies in the device. See [“Installing an AC Power Supply in a QFX3008-I Interconnect Device” on page 324.](#)
- Install single-phase wiring trays in the device. See [“Installing a Wiring Tray in a QFX3008-I Interconnect Device” on page 328.](#)

Ensure that you have the following parts and tools available to connect power to the device:

- Electrostatic discharge (ESD) grounding strap
- Power cords appropriate for your geographical location. See [“AC Power Cord Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays” on page 139.](#)

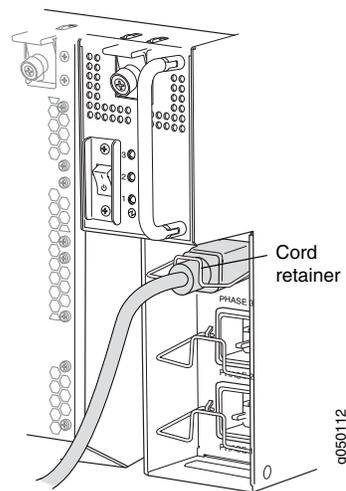


**WARNING:** Ensure that the power cords do not block access to device components or drape where people can trip on them.

To connect AC power to a QFX3008-I Interconnect device with single-phase wiring trays (see [Figure 64 on page 241](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Ensure that the wiring tray is fully inserted and latched securely in the chassis. See [“Installing a Wiring Tray in a QFX3008-I Interconnect Device” on page 328.](#)
3. Set the switch, which is near the top of the wiring tray faceplate, to the OFF (O) position.
4. Locate the power cord or cords shipped with the device; the cords have plugs appropriate for your geographical location.
5. Insert the coupler end of the power cord into the AC appliance inlet on the wiring tray faceplate. See [Figure 64 on page 241.](#)

Figure 64: Connecting an AC Power Cord to a Single-Phase Wiring Tray



6. If the AC power source outlet has a power device, set it to the OFF (O) position.
7. Insert the power cord plug into an AC power source outlet.
8. Repeat Step 5 through Step 7 for each AC appliance inlet on the wiring tray faceplate.
9. If the AC power source outlet has a power device, set it to the ON (I) position.
10. Verify that each LED on the wiring tray faceplate is lit solid green. Verify that each LED on the power supply faceplate is lit solid green.

**Related Documentation**

- [Powering On a QFX3008-I Interconnect Device on page 253](#)
- [Wiring Tray in a QFX3008-I Interconnect Device on page 54](#)
- [Wiring Tray LEDs on a QFX3008-I Interconnect Device on page 395](#)

## Preparing Delta and Wye Three-Phase Power Cords

A QFX3008-I Interconnect device can be configured with two three-phase wiring trays. Delta and wye wiring configurations are available. A licensed electrician must prepare the power cords that you provide for installation in the wiring tray. Several parts included with the wiring trays enable the power cords to be dressed in different positions. If you need the power cable to be routed up to the top of a rack, you must use the included 90° connector to enable the power cord to be routed upward (see [Figure 65 on page 242](#)). The 90° connector provides more flexibility to position the power cord outside the width of the chassis. Alternatively, if the power cords will be routed down to the bottom of the rack, or space limitations prevent you from extending the width of the chassis footprint, you can use the flat connector to install the power cord (see [Figure 66 on page 242](#)). [Figure 67 on page 243](#) and [Figure 68 on page 243](#) show the power cords installed on the wiring trays in the two different positions. [Figure 69 on page 244](#) shows the wiring tray being installed in the chassis, using the flat connector.

Figure 65: Assembling a Power Cord Using a 90° Connector

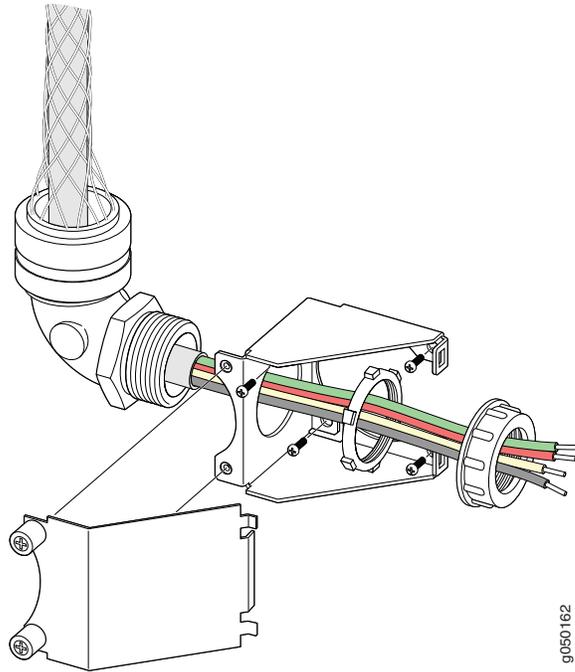


Figure 66: Assembling a Power Cord Using a Flat Connector

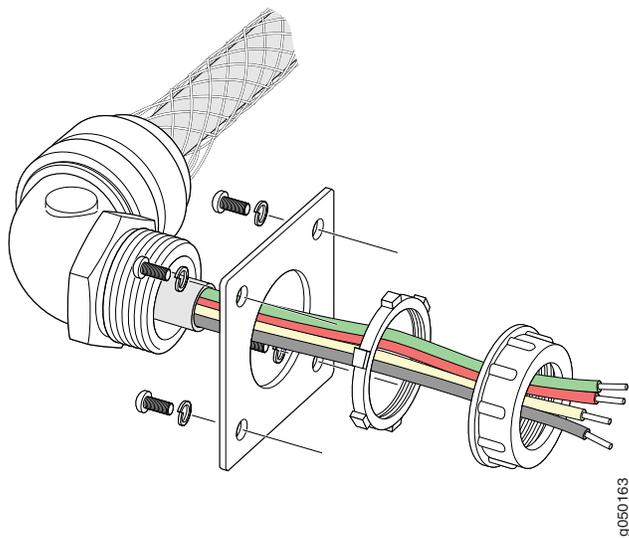


Figure 67: Wye Wiring Tray with a 90° Connector Installed

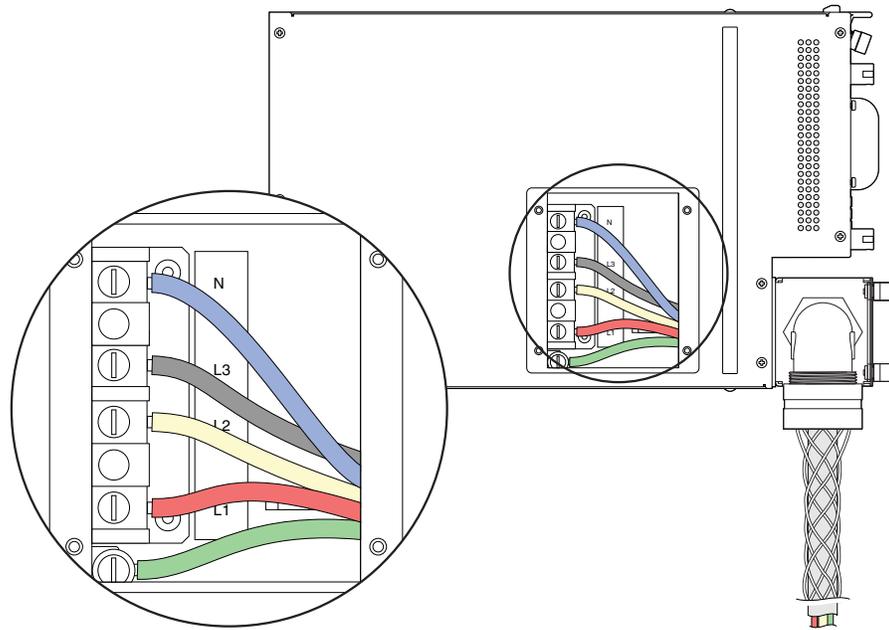


Figure 68: Delta Wiring Tray with a Flat Connector Installed

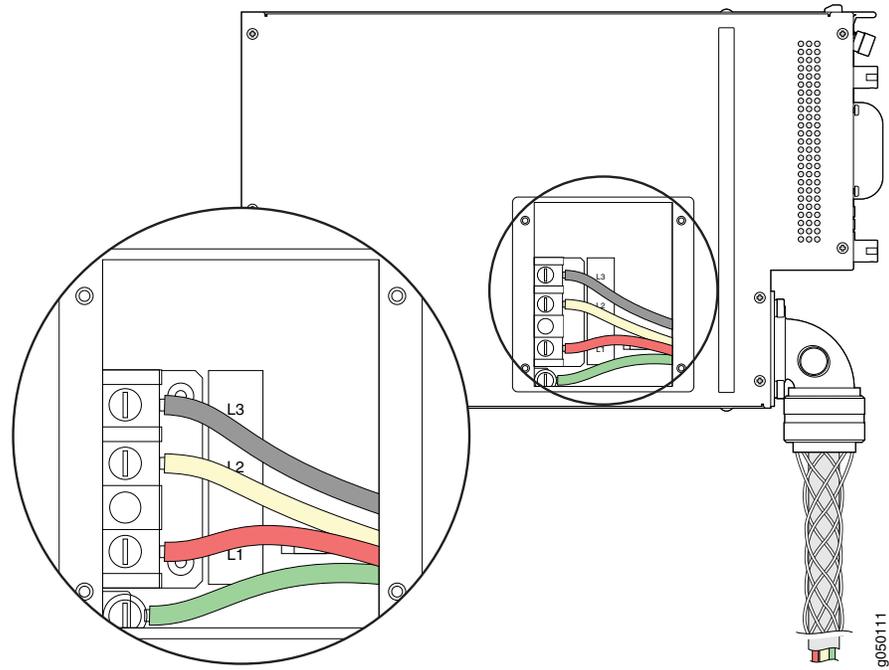
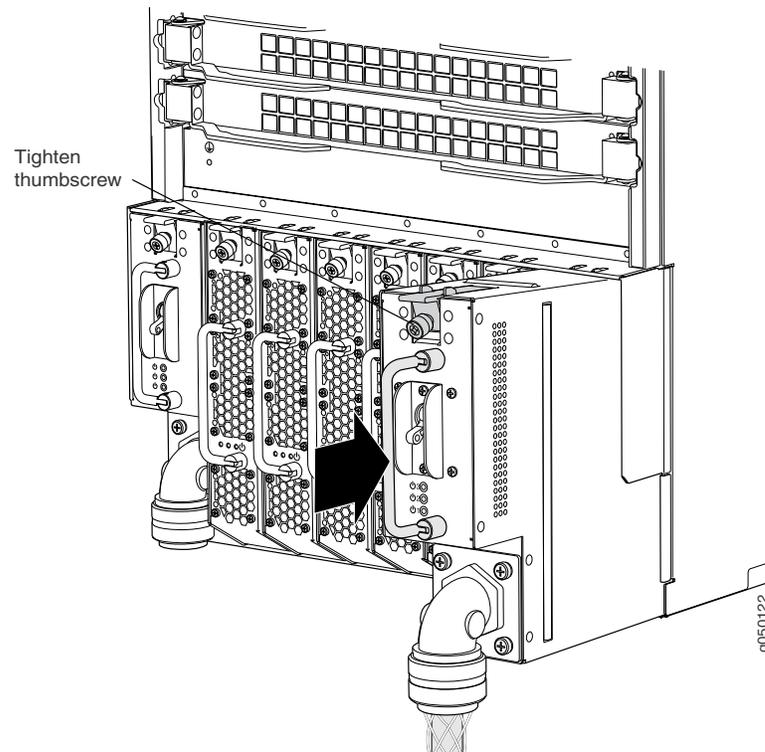


Figure 69: Installing a Three-Phase Wiring Tray with a Power Cord Installed



**CAUTION:** Mixing different types of wiring trays in the same chassis is not a supported configuration.



**CAUTION:** To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, a QFX3008-I Interconnect device must be adequately grounded before it is connected to power.

For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the QFX3008-I Interconnect device to connect to earth ground. For instructions on connecting a QFX3008-I Interconnect device to ground using a separate grounding conductor, see [“Connecting Earth Ground to a QFX3008-I Interconnect Device” on page 237](#).

A QFX3008-I Interconnect device receives additional grounding when you plug the wiring tray in the device into a grounded AC power outlet by using the AC power cord appropriate for your geographical location. See [“AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays” on page 141](#) or [“AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays” on page 142](#).



**NOTE:** Each wiring tray must be connected to a dedicated AC power source outlet.

Before you begin to prepare the wiring trays for installation:

- Ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 192.](#)

Ensure that you have the following parts and tools available to prepare the wiring trays for installation:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 2
- Power cords appropriate for your wiring trays and geographical location. See [“AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays” on page 141](#) or [“AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays” on page 142.](#)



**WARNING:** Ensure that the power cords do not block access to device components or drape where people can trip on them.

To prepare three-phase power cords for installation:

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Ensure that the power cords are not connected to power outlets. Switch off the customer site circuit breakers. Ensure that the voltage across the AC power source is 0 V and that there is no chance that the voltage might become active during installation.
3. Remove a wiring tray from the chassis. See [“Removing a Wiring Tray from a QFX3008-I Interconnect Device” on page 326.](#)
4. Flip the breaker on the wiring tray faceplate to the OFF (O) position.
5. Using a number 2 Phillips (+) screwdriver, loosen and remove the screws and washers that hold the square flat connector to the wiring tray. Keep the screws and washers.
6. Depending on how you want to dress the power cords, decide whether to use the 90° connector to attach the power cord to the wiring tray or the square flat connector that you removed in Step 5.
7. Insert the power cord in the wire strain relief by compressing the wire strain relief to enlarge the opening. Pull enough cord through the strain relief to allow easy wiring connections to the terminal block.

8. Remove first the plastic, then the metal retaining nuts from the wire strain relief, and place either the 90° connector or flat connector over the threaded portion of the wire strain relief as shown in [Figure 65 on page 242](#) or [Figure 66 on page 242](#).
9. Screw first the metal, then the plastic retaining nuts on the threaded portion of the wire strain relief to complete the assembly.
10. Route the wiring through the hole in the wiring tray, and using a number 2 Phillips (+) screwdriver, attach the connector to the wiring tray using the screws and washers you removed in Step 5.



**TIP:** If you are ready to make the wiring connections to the terminal block, see [“Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays” on page 246](#) or [“Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays” on page 250](#).

11. Repeat Step 3 through Step 10 for the other wiring tray.

#### Related Documentation

- [Powering On a QFX3008-I Interconnect Device on page 253](#)
- [Wiring Tray in a QFX3008-I Interconnect Device on page 54](#)
- [Wiring Tray LEDs on a QFX3008-I Interconnect Device on page 395](#)

## Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays

A QFX3008-I Interconnect device is configured with six AC power supplies and two wiring trays.



**CAUTION:** Mixing different types of wiring trays in the same chassis is not a supported configuration.



**CAUTION:** To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, the QFX3008-I Interconnect device must be adequately grounded before it is connected to power.

For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the QFX3008-I Interconnect device to connect to earth ground. For instructions on connecting a QFX3008-I Interconnect device to ground using a separate grounding conductor, see [“Connecting Earth Ground to a QFX3008-I Interconnect Device” on page 237](#).

A QFX3008-I Interconnect device receives additional grounding when you plug the power supply in the device into a grounded AC power outlet by using the AC power cord appropriate for your geographical location. See [“AC Power](#)

[Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays](#) on page 141.



**NOTE:** Each wiring tray must be connected to a dedicated AC power source outlet.

Before you begin to connect power to the device:

- Ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage”](#) on page 192.
- Ensure that a licensed electrician has prepared the power cords. See [“Preparing Delta and Wye Three-Phase Power Cords”](#) on page 241.

Ensure that you have the following parts and tools available to connect power to the device:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1
- Slotted (–) screwdriver, 1/4 inch, with a torque range between 23 in-lb (2.6 Nm) and 25 in-lb (2.8 Nm)



**CAUTION:** You must use an appropriate torque-controlled tool to tighten the screws on the terminal block. Applying excessive torque damages the terminal block and the wiring tray. The absolute maximum torque that may be applied to this screw is 50 in-lb (5.6 Nm).



**WARNING:** Ensure that the power cords do not block access to device components or drape where people can trip on them.

To connect AC power to three-phase delta wiring trays:

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Ensure that the power cords are not connected to power outlets. Switch off the customer site circuit breakers. Ensure that the voltage across the AC power source is 0 V and that there is no chance that the voltage might become active during installation.
3. If the wiring tray is installed in the chassis, remove it. See [“Removing a Wiring Tray from a QFX3008-I Interconnect Device”](#) on page 326. The power cord must be attached to the wiring tray as described in [“Preparing Delta and Wye Three-Phase Power Cords”](#) on page 241.

4. Ensure that the power switch on the wiring tray faceplate is in the OFF (O) position.
5. Using a number 1 Phillips (+) screwdriver, loosen the four screws on the metal AC wiring compartment on the side of the wiring tray (see [Figure 70 on page 249](#)).
6. Open the metal door of the wiring tray compartment.

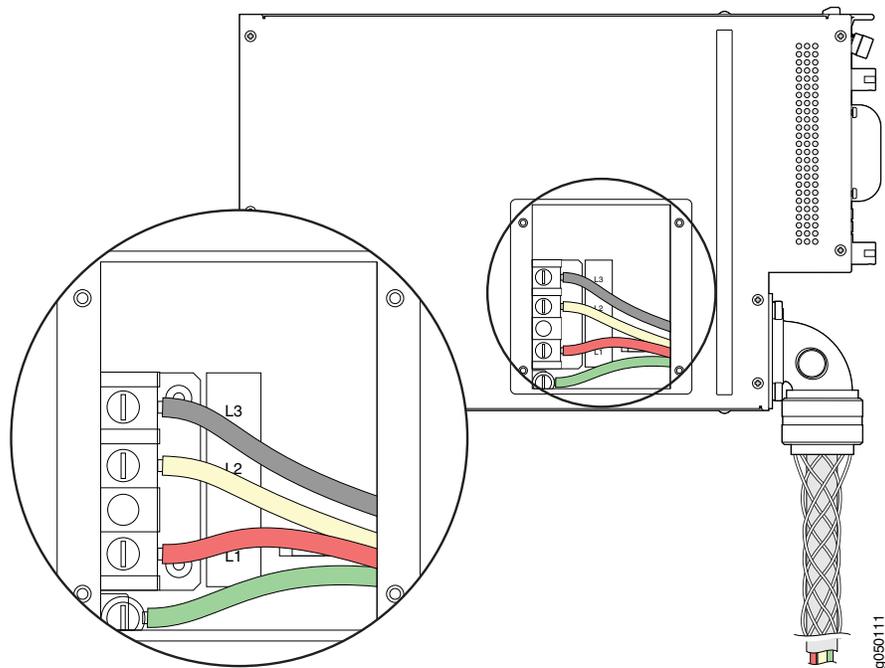
7. Connect the wires to the AC terminal block on the three-phase delta wiring tray (Figure 70 on page 249). Use a 1/4-in. slotted screwdriver to loosen the input terminal or grounding point screw, insert each wire into the grounding point or input terminal, and tighten the screw to between 23 in-lb (2.6 Nm) and 25 in-lb (2.8 Nm).



**CAUTION:** You must use an appropriate torque-controlled tool to tighten the screws on the terminal block. Applying excessive torque damages the terminal block and the wiring tray. The absolute maximum torque that may be applied to this screw is 50 in-lb (5.6 Nm).

- a. Insert the wire labeled **GND** into the grounding point labeled **GND**.
- b. Insert the wire labeled **L1** into the **L1** input terminal.
- c. Insert the wire labeled **L2** into the **L2** input terminal.
- d. Insert the wire labeled **L3** into the **L3** input terminal.

Figure 70: Connecting Power to a Three-Phase Delta AC Power Supply



**NOTE:** The color of each AC power wire might vary.

8. Verify that the power cable connections are correct.

9. Replace the cover on the wiring compartment, and using a number 1 Phillips (+) screwdriver, tighten the four screws.
10. Repeat Step 3 through Step 9 for the other wiring tray.

**Related Documentation**

- [Powering On a QFX3008-I Interconnect Device on page 253](#)
- [Wiring Tray in a QFX3008-I Interconnect Device on page 54](#)
- [Wiring Tray LEDs on a QFX3008-I Interconnect Device on page 395](#)

## Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays

A QFX3008-I Interconnect device is configured with six AC power supplies and two wiring trays.



**CAUTION:** Mixing different types of wiring trays in the same chassis is not a supported configuration.



**CAUTION:** To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, the QFX3008-I Interconnect device must be adequately grounded before it is connected to power.

For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the QFX3008-I Interconnect device to connect to earth ground. For instructions on connecting a QFX3008-I Interconnect device to ground using a separate grounding conductor, see [“Connecting Earth Ground to a QFX3008-I Interconnect Device” on page 237](#).

A QFX3008-I Interconnect device receives additional grounding when you plug the power supply in the device into a grounded AC power outlet by using the AC power cord appropriate for your geographical location. See [“AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays” on page 142](#).



**NOTE:** Each wiring tray must be connected to a dedicated AC power source outlet.

Before you begin to connect power to the device:

- Ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).
- Ensure that a licensed electrician has prepared the power cords. See [“Preparing Delta and Wye Three-Phase Power Cords” on page 241](#).

Ensure that you have the following parts and tools available to connect power to the device:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1
- Slotted (–) screwdriver, 1/4 inch, with a torque range between 23 in-lb (2.6 Nm) and 25 in-lb (2.8 Nm)



**CAUTION:** You must use an appropriate torque-controlled tool to tighten the screws on the terminal block. Applying excessive torque damages the terminal block and the wiring tray. The absolute maximum torque that may be applied to this screw is 50 in-lb (5.6 Nm).



**WARNING:** Ensure that the power cords do not block access to device components or drape where people can trip on them.

To connect AC power to three-phase wye wiring trays:

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Ensure that the power cords are not connected to power outlets. Switch off the customer site circuit breakers. Ensure that the voltage across the AC power source is 0 V and that there is no chance that the voltage might become active during installation.
3. If the wiring tray is installed in the chassis, remove it. See [“Removing a Wiring Tray from a QFX3008-I Interconnect Device” on page 326](#). The power cord must be attached to the wiring tray as described in [“Preparing Delta and Wye Three-Phase Power Cords” on page 241](#).
4. Ensure that the power switch on the wiring tray faceplate is in the OFF (O) position.
5. Using a number 1 Phillips (+) screwdriver, loosen the four screws on the metal AC wiring compartment on the side of the wiring tray (see [Figure 71 on page 252](#)).
6. Open the metal door of the wiring tray compartment.

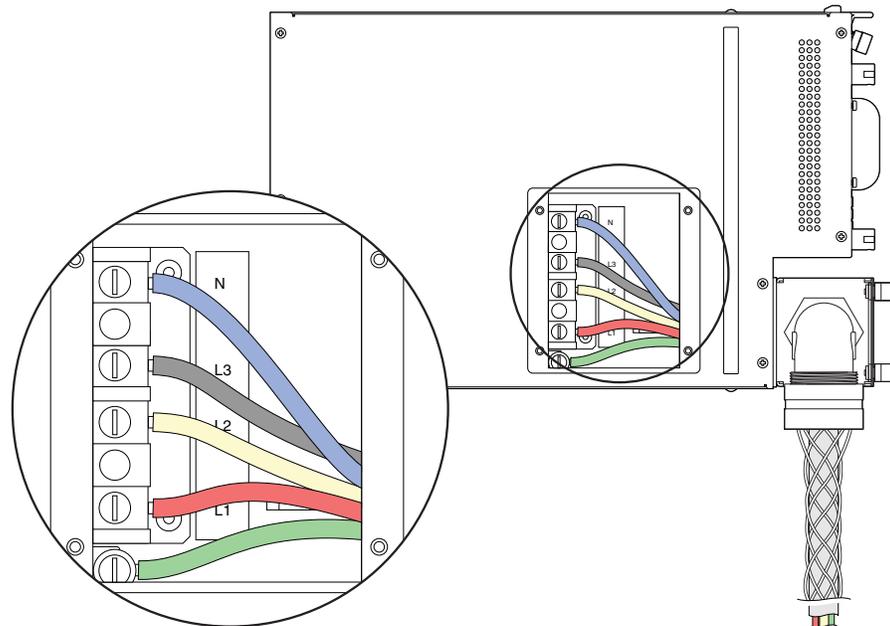
7. Connect the wires to the AC terminal block on the three-phase wye wiring tray (Figure 71 on page 252). Use a 1/4-in. slotted screwdriver to loosen the input terminal or grounding point screw, insert each wire into the grounding point or input terminal, and tighten the screw to between 23 in-lb (2.6 Nm) and 25 in-lb (2.8 Nm).



**CAUTION:** You must use an appropriate torque-controlled tool to tighten the screws on the terminal block. Applying excessive torque damages the terminal block and the wiring tray. The absolute maximum torque that may be applied to this screw is 50 in-lb (5.6 Nm).

- a. Insert the wire labeled **GND** into the grounding point labeled **GND**.
- b. Insert the wire labeled **L1** into the **L1** input terminal.
- c. Insert the wire labeled **L2** into the **L2** input terminal.
- d. Insert the wire labeled **L3** into the **L3** input terminal.
- e. Insert the wire labeled **N** into the **N** input terminal

Figure 71: Connecting Power to the Three-Phase Wye Wiring Tray



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**NOTE:** The color of each AC power wire might vary.

8. Verify that the power cable connections are correct.

9. Replace the cover on the wiring compartment, and using a number 1 Phillips (+) screwdriver, tighten the four screws.
10. Repeat Step 3 through Step 9 for the other wiring tray.

**Related Documentation**

- [Powering On a QFX3008-I Interconnect Device on page 253](#)
- [Wiring Tray in a QFX3008-I Interconnect Device on page 54](#)
- [Wiring Tray LEDs on a QFX3008-I Interconnect Device on page 395](#)

## Powering On a QFX3008-I Interconnect Device

Before you power on the QFX3008-I Interconnect device, ensure that:

- You understand how to protect the device from electrostatic damage. See “[Prevention of Electrostatic Discharge Damage](#)” on page 192.
- You have connected the QFX3008-I Interconnect device to the QFabric system control plane and management network. See “[QFX3000-G QFabric System Installation Overview](#)” on page 209.

Ensure that you have the following parts and tools available to power on the device:

- An electrostatic discharge (ESD) grounding strap.

To power on the device:

1. Attach the ESD grounding strap to your bare wrist and connect the strap to the ESD point on the chassis.
2. Ensure that the power supplies are fully inserted in the chassis.
3. Ensure that the source power cords are installed correctly for each wiring tray, and the wiring trays are fully inserted in the chassis.
4. Switch on the site circuit breakers.
5. Set a wiring tray's switch to the ON (I) position. Observe the power supply and wiring tray faceplate LEDs. If the wiring trays are installed correctly and functioning normally, the LEDs light green and remain constantly lit.
6. Repeat Step 5 for the second wiring tray installed in the device.

**Related Documentation**

- [Installing an AC Power Supply in a QFX3008-I Interconnect Device on page 324](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 239](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays on page 246](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays on page 250](#)
- [Powering Off a QFX3008-I Interconnect Device on page 296](#)



## CHAPTER 20

# Installing QFX3008-I Optional Components

- [Installing the Cable Management System on a QFX3008-I Interconnect Device on page 255](#)
- [Installing the Lockable Front Doors on a QFX3008-I Interconnect Device on page 256](#)

## Installing the Cable Management System on a QFX3008-I Interconnect Device

The cable management system is located at the top front of the chassis, above the card cage. The cable management system is an optional field-replaceable unit (FRU).

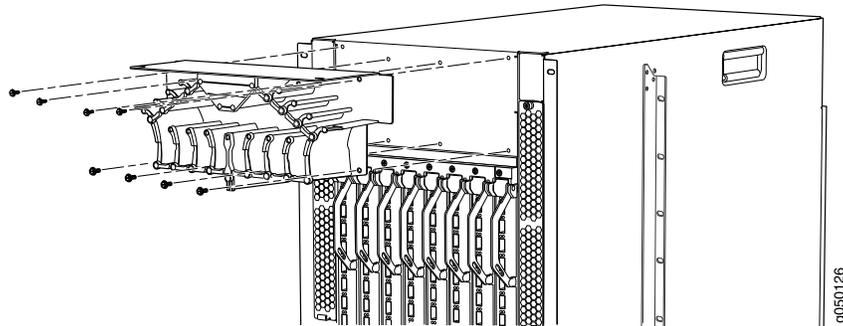
Before you begin, ensure that you have the following parts and tools available to install the cable management system on a QFX3008-I Interconnect device:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1
- Eight mounting screws, size 6-32 x 3/8" (included with the cable management system)

To install the cable management system on a QFX3008-I Interconnect device (see [Figure 72 on page 256](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Place the cable management system on the chassis, aligning the holes on its faceplate with the mounting holes on the chassis.
3. Install each of the mounting screws, tightening them by turning them clockwise using the Phillips (+) screwdriver, number 1.

Figure 72: Installing the Cable Management System on a QFX3008-I Interconnect Device



## Installing the Lockable Front Doors on a QFX3008-I Interconnect Device

The lockable front doors cover the front card cage. A captive thumbscrew at the base where the doors meet secures the doors in a closed position. You can also lock these doors in the closed position to prevent cables, transceivers, or front cards from being removed. You must provide the lock. The lockable front doors are an optional field-replaceable unit (FRU).

Before you begin, ensure that you have the following parts and tools available to install the lockable front doors on a QFX3008-I Interconnect device:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1
- Eight mounting screws—These screws are already installed on the chassis, in each corner of the top and bottom front card cage ejector lever receptacle bars.

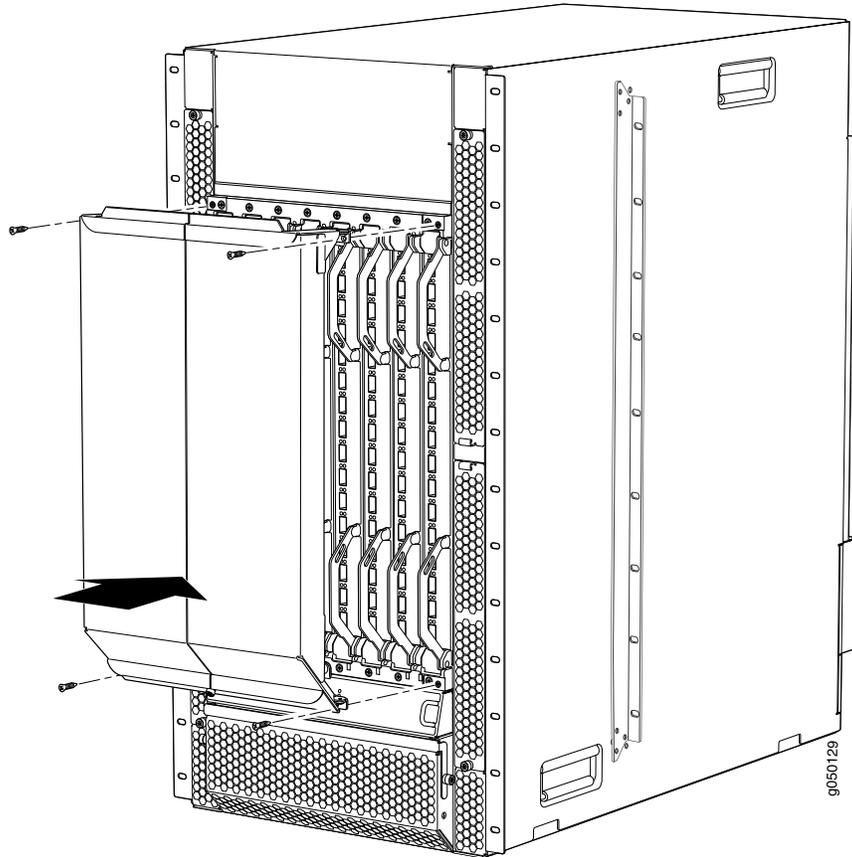
To install the lockable front doors on a QFX3008-I Interconnect device (see [Figure 73 on page 257](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Remove the two screws at each corner of the top and bottom front card cage ejector lever receptacle bars. The screws are located in the inset portion of the bar.
3. Place one of the doors on the chassis, aligning the holes on its faceplate with the mounting holes on the chassis.
4. Install the four mounting screws, tightening them by turning them clockwise using the Phillips (+) screwdriver, number 1.
5. Repeat Step 2 through Step 4 for the other door.



**NOTE:** The doors must be in the open position to remove or install the bottom fan tray and front panel display.

Figure 73: Installing the Lockable Front Doors on a QFX3008-I Interconnect Device





## CHAPTER 21

# Installing a QFX3500 Node Device

- [Installing and Connecting a QFX3500 Device on page 259](#)
- [Unpacking a QFX3500 Device on page 260](#)
- [Mounting a QFX3500 Device in a Rack or Cabinet on page 261](#)
- [Connecting Earth Ground to a QFX3500 Device on page 264](#)
- [Connecting AC Power to a QFX3500 Device on page 265](#)
- [Connecting DC Power to a QFX3500 Device on page 267](#)

## Installing and Connecting a QFX3500 Device

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To install and connect a QFX3500 device:

1. Follow the instructions in [“Unpacking a QFX3500 Device” on page 260](#).
2. Mount the device by following the instructions in [“Mounting a QFX3500 Device in a Rack or Cabinet” on page 261](#).
3. Follow the instructions in [“Connecting Earth Ground to a QFX3500 Device” on page 264](#).
4. Follow the instructions in [“Connecting AC Power to a QFX3500 Device” on page 265](#).
5. Depending on how you will be using the QFX3500 device, do one of the following:
  - If you are using the QFX3500 device as a standalone switch, follow the instructions in [Configuring a QFX3500 Device](#).
  - If you are using the QFX3500 device as a Node device in a QFX3000 QFabric system, see [“QFX3000-G QFabric System Installation Overview” on page 209](#) for information about the steps to install and configure your QFX3000 QFabric system.

### **Related Documentation**

- [Rack Requirements for a QFX3500 Device on page 96](#)
- [Cabinet Requirements for a QFX3500 Device on page 99](#)
- [Clearance Requirements for Airflow and Hardware Maintenance for a QFX3500 Device on page 102](#)

## Unpacking a QFX3500 Device

The QFX3500 device chassis is a rigid sheet-metal structure that houses the hardware components. A QFX3500 device is shipped in a cardboard carton, secured with foam packing material. The carton also contains an accessory box and quick start instructions.



**CAUTION:** QFX3500 devices are maximally protected inside the shipping carton. Do not unpack the device until you are ready to begin installation.

To unpack a QFX3500 device:

1. Move the shipping carton to a staging area as close to the installation site as possible, but where you have enough room to remove the system components.
2. Position the carton so that the arrows are pointing up.
3. Open the top flaps on the shipping carton.
4. Remove the accessory box and verify the contents against the inventory included in the box. [Table 62 on page 260](#) lists the inventory of components supplied with a QFX3500 device.
5. Pull out the packing material holding the device in place.
6. Verify the chassis components received:
  - Management board
  - Two fan trays
  - One or two power supplies, depending on your order. If only one power supply is installed, a blank panel should be installed on the second power supply slot.
7. Save the shipping carton and packing materials in case you need to move or ship the device later.

**Table 62: Inventory of Components Supplied with a QFX3500 Device**

Component	Quantity
Chassis with management board, two fan trays, and one or two power supplies	1
Rear installation blades	2
RJ-45 cable and RJ-45 to DB-9 adapter	1
SFP/SFP+ port dust covers	48
QSFP+ port dust covers	4
Electrostatic discharge (ESD) grounding strap	1

- Related Documentation**
- [Mounting a QFX3500 Device in a Rack or Cabinet on page 261](#)
  - [Installing and Connecting a QFX3500 Device on page 259](#)

## Mounting a QFX3500 Device in a Rack or Cabinet

You can mount a QFX3500 device on four posts in a 19-in. rack or cabinet by using the mounting brackets and installation blades provided with the device. (The remainder of this topic uses “rack” to mean “rack or cabinet.”) The front and rear rack rails must be spaced between 28 in. (71.1 cm) and 36 in. (91.4 cm) front to back.

The holes in the mounting brackets and installation blades are placed at 1 U (1.75 in., or 4.45 cm.) apart so that the device can be mounted in any rack that provides holes spaced at that distance.

Before you begin mounting a QFX3500 device on the rack or cabinet:

- Ensure that you understand how to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).
- Verify that the site meets the requirements described in [“Site Preparation Checklist for a QFX3500 Device” on page 86](#).
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure.
- Read [“General Site Guidelines” on page 87](#), with particular attention to [“Chassis Lifting Guidelines for a QFX3500 Device” on page 176](#).
- Remove the device from the shipping carton (see [“Unpacking a QFX3500 Device” on page 260](#)).

Ensure that you have the following parts and tools available to mount the device on four posts in a rack:

- ESD grounding strap (provided).
- One pair of rear installation blades. These installation blades support the rear of the chassis, and must be installed (provided).
- Eight screws to secure the chassis and rear installation blades to the rack (not provided).
- Appropriate screwdriver for the mounting screws (not provided).



**WARNING:** The QFX3500 device must be supported at all four corners. Mounting the chassis using only the front brackets will damage the chassis and can result in serious bodily injury.



**CAUTION:** If you are installing the QFX3500 device above 60 in. (152.4 cm) from the floor, you must remove the power supplies, fan trays, and

management board before attempting to install the device, or ask someone to assist you during the installation.

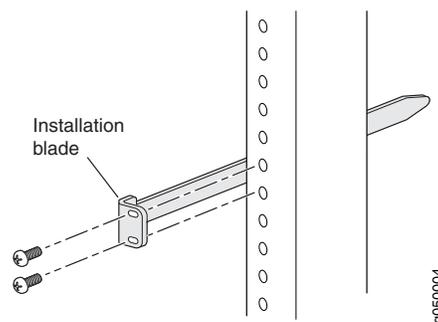


**CAUTION:** If you are mounting multiple devices on a rack, mount the device in the lowest position of the rack first and proceed to mount the rest of the devices from bottom to top.

To mount the device on four posts in a rack:

1. Attach the ESD grounding strap to your bare wrist and to a site ESD point.
2. With two mounting screws—and cage nuts and washers if your rack requires them—attach one of the rear installation blades to the rear of the rack at the point where you want to mount the device. Tighten the screws. The blade helps support the rear of the chassis. You install the second rear installation blade after securing both front mounting brackets. See [Figure 74 on page 262](#).

**Figure 74: Installing an Installation Blade in a Rack**

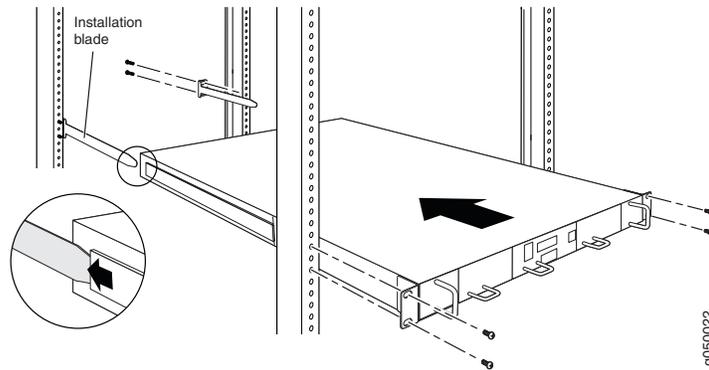


3. Grasp both sides of the device, lift it, and position it in the rack so that the blade receptacle at the rear of the chassis catches and slides onto the installation blade. See [Figure 75 on page 263](#).



**TIP:** If someone is assisting you, have one person stand at the rear of the rack where the installation blade is installed, to help guide the device onto the installation blade.

Figure 75: Mounting the QFX3500 Device on Four Posts in a Rack



4. Align the holes in the front brackets on the chassis with the holes in the rack. Ensure that the chassis is level.
5. With four mounting screws—and cage nuts and washers if your rack requires them—secure the front of the device to the rack. Insert the first screw on the opposite corner from the rear installation blade you installed. Tighten the screws.
6. Ensure that the device chassis is level by verifying that all the screws on the front of the rack are aligned with the screws at the back of the rack.
7. With two mounting screws—and cage nuts and washers if your rack requires them—slide the second rear installation blade into the blade receptacle on the chassis, and secure it to the rear of the rack by tightening the screws. You might need to loosen and adjust the first installation blade to install the second blade.

**Related Documentation**

- [Rack-Mounting and Cabinet-Mounting Warnings on page 179](#)
- [Connecting AC Power to a QFX3500 Device on page 265](#)
- [Configuring a QFX3500 Device](#)

## Connecting Earth Ground to a QFX3500 Device

To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the QFX3500 device to earth ground before you connect it to power.

For installations that require a separate grounding conductor to the chassis, you must attach a protective earthing terminal bracket on the QFX3500 device left front mounting bracket to connect to the earth ground (see [Figure 76 on page 265](#)).

Before you connect earth ground to the protective earthing terminal of a QFX3500 device, ensure that a licensed electrician has attached an appropriate grounding lug to the grounding cable.



**CAUTION:** Using a grounding cable with an incorrectly attached lug can damage the device.



**NOTE:** Mount your device in the rack or cabinet before attaching the grounding lug to the device. See [“Mounting a QFX3500 Device in a Rack or Cabinet” on page 261](#).

Ensure that you have the following parts and tools available:

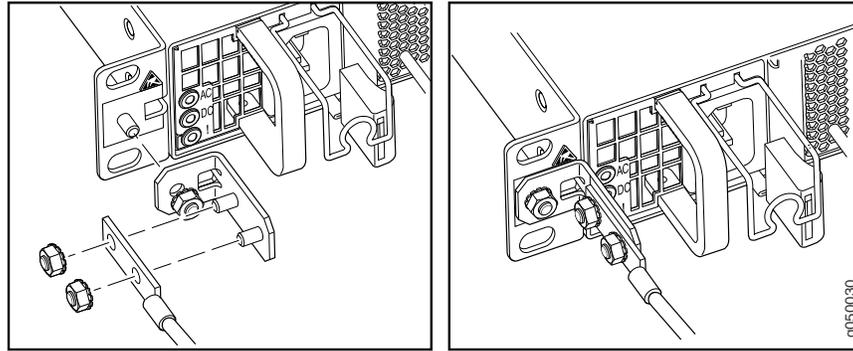
- Protective earthing terminal bracket—This L-shaped bracket attaches to a post on the QFX3500 device left front mounting bracket, providing a protective earthing terminal for the device. This bracket is provided in the accessory kit.
- Grounding cable for your QFX3500 device—The grounding cable must be 14 AWG (2 mm<sup>2</sup>), minimum 90° C wire, or as permitted by the local code.
- Grounding lug for your grounding cable—The grounding lug required is a Panduit LCD10-10A-L or equivalent. This grounding lug is provided in the accessory kit.
- Three M4 hex nuts with integrated washers—One nut and washer are required to secure the grounding lug bracket to the left front mounting bracket, and two nuts and washers are used to secure the grounding lug to the grounding lug bracket protective earthing terminal. Four nuts are provided in the accessory kit.
- 7-mm wrench or socket with driver to attach all three nuts.

An AC-powered QFX3500 device chassis gains additional grounding when you plug the power supply in the device into a grounded AC power outlet by using an AC power cord appropriate for your geographical location. See [“AC Power Cord Specifications for a QFX3500 Device” on page 147](#).

To connect earth ground to a QFX3500 device:

1. Secure the provided protective earthing terminal bracket to the threaded post on the QFX3500 device left front mounting bracket with the nut provided. The posts on the protective earthing terminal bracket should point to the left. See [Figure 76 on page 265](#).

**Figure 76: Connecting a Grounding Cable to a QFX3500 Device**



2. Connect one end of the grounding cable to a proper earth ground, such as the rack in which the device is mounted.
3. Place the grounding lug attached to the grounding cable over the protective earthing terminal on the protective earthing terminal bracket.
4. Secure the grounding lug to the protective earthing terminal with two nuts.
5. Dress the grounding cable and ensure that it does not touch or block access to other device components and that it does not drape where people could trip over it.

**Related Documentation**

- [General Safety Guidelines and Warnings on page 161](#)
- [Grounded Equipment Warning on page 183](#)
- [Connecting AC Power to a QFX3500 Device on page 265](#)
- [Connecting DC Power to a QFX3500 Device on page 267](#)

## Connecting AC Power to a QFX3500 Device

The power supply in a QFX3500 device is a hot-removable and hot-insertable field-replaceable unit (FRU) located on the front panel. You can remove and replace it without powering off the device or disrupting device functions.

Ensure that you have a power cord appropriate for your geographical location available to connect AC power to a QFX3500 device.

Before you begin connecting AC power to a QFX3500 device:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [“Prevention of Electrostatic Discharge Damage” on page 192](#)).
- Ensure that you have connected the device chassis to earth ground.



**CAUTION:** Before you connect power to the device, a licensed electrician must attach a cable lug to the grounding and power cables that you supply. A cable with an incorrectly attached lug can damage the device (for example, by causing a short circuit).

To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the chassis to earth ground before you connect it to power. For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the device chassis to connect to the earth ground. For instructions on connecting earth ground, see [“Connecting Earth Ground to a QFX3500 Device” on page 264](#). A QFX3500 device gains additional grounding when you plug the power supply in the device into a grounded AC power outlet by using the AC power cord appropriate for your geographical location (see [“AC Power Cord Specifications for a QFX3500 Device” on page 147](#)).

- Install the power supply in the chassis. For instructions on installing a power supply in a QFX3500 device, see [“Installing a Power Supply in a QFX3500 Device” on page 362](#).



**NOTE:** Each power supply must be connected to a dedicated power source outlet.

To connect AC power to a QFX3500 device:

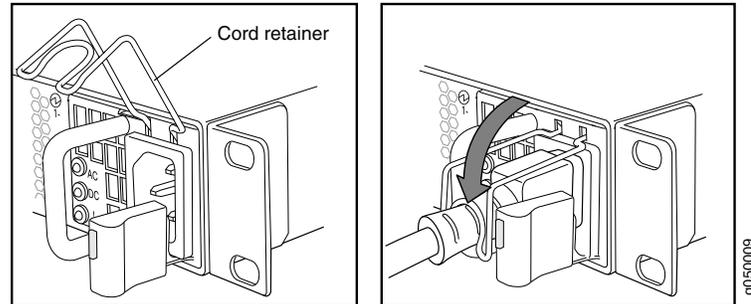
1. Attach the grounding strap to your bare wrist and to a site ESD point.
2. Ensure that the power supplies are fully inserted in the chassis and the latches are secure. If only one power supply is installed, ensure that a blank cover panel is installed over the second power supply slot.
3. Locate the power cord or cords shipped with the device; the cords have plugs appropriate for your geographical location. See [“AC Power Cord Specifications for a QFX3500 Device” on page 147](#).



**WARNING:** Ensure that the power cord does not block access to device components or drape where people can trip on it.

4. Insert the coupler end of the power cord into the AC power cord inlet on the AC power supply faceplate.
5. Push the power cord retainer onto the power cord (see [Figure 77 on page 267](#)).

**Figure 77: Connecting an AC Power Cord to an AC Power Supply in a QFX3500 Device**



6. If the AC power source outlet has a power switch, set it to the OFF (O) position.



**NOTE:** The device powers on as soon as power is provided to the power supply. There is no power switch on a QFX3500 device.

7. Insert the power cord plug into an AC power source outlet.
8. If the AC power source outlet has a power switch, set it to the ON (I) position.
9. Repeat these steps for the second AC power supply, if one is installed.
10. Verify that the AC and DC LEDs on each power supply are lit green.

If the amber fault LED is lit, remove power from the power supply, and replace the power supply (see [“Removing a Power Supply from a QFX3500 Device”](#) on page 364). Do not remove the power supply until you have a replacement power supply ready: the power supplies or a blank cover panel must be installed in the device to ensure proper airflow.



**CAUTION:** Replace a failed power supply with a blank panel or new power supply within 1 minute of removal to prevent chassis overheating.

**Related Documentation**

- [AC Power Supply for a QFX3500 Device on page 73](#)
- [AC Power Supply LEDs on a QFX3500 Device on page 402](#)

## Connecting DC Power to a QFX3500 Device

The power supply in a QFX3500 device is a hot-removable and hot-insertable field-replaceable unit (FRU). You can remove and replace it without powering off the device or disrupting device functions.



**WARNING:** DC-powered QFX3500 devices are intended for installation only in a restricted access location.



**NOTE:** The battery returns of the DC power supply should be connected as an isolated DC return (DC-I).

Before you begin connecting DC power to a QFX3500 device:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [“Prevention of Electrostatic Discharge Damage” on page 192](#)).
- Ensure that you have connected the device chassis to earth ground.



**CAUTION:** Before you connect power to the device, a licensed electrician must attach a cable lug to the grounding and power cables that you supply. A cable with an incorrectly attached lug can damage the device (for example, by causing a short circuit).

To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the chassis to earth ground before you connect it to power. For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the device chassis to connect to the earth ground. For instructions on connecting earth ground, see [“Connecting Earth Ground to a QFX3500 Device” on page 264](#).

- Install the power supply in the chassis. For instructions on installing a power supply in a QFX3500 device, see [“Installing a Power Supply in a QFX3500 Device” on page 362](#).

Ensure that you have the following parts and tools available:

- DC power source cables (14–16 AWG) with ring lug (Molex 190700069 or equivalent) (not provided)
- Phillips (+) screwdriver, number 2 (not provided)
- Multimeter (not provided)

To connect DC power to a QFX3500 device:

1. Attach the grounding strap to your bare wrist and to a site ESD point.
2. Verify that the DC power cables are correctly labeled before making connections to the power supply. In a typical power distribution scheme where the return is connected to chassis ground at the battery plant, you can use a multimeter to verify the resistance of the –48V and RTN DC cables to chassis ground:
  - The cable with very low resistance (indicating a closed circuit) to chassis ground is positive (+) and will be installed on the V+ (return) DC power input terminal.
  - The cable with very high resistance (indicating an open circuit) to chassis ground is negative (–) and will be installed on the V– (input) DC power input terminal.



**CAUTION:** You must ensure that power connections maintain the proper polarity. The power source cables might be labeled (+) and (–) to indicate their polarity. There is no standard color coding for DC power cables. The color coding used by the external DC power source at your site determines the color coding for the leads on the power cables that attach to the DC power input terminals on each power supply.

3. Ensure that the input circuit breaker is open so that the voltage across the DC power source cable leads is 0 V and that the cable leads will not become active while you are connecting DC power.



**NOTE:** The V+ terminals are referred to as +RTN and V– terminals are referred to as –48 V in “DC Power Wiring Sequence Warning” on page 201 and “DC Power Electrical Safety Guidelines” on page 197.

4. Ensure that the power supplies are fully inserted in the chassis.
5. Remove the terminal block cover. The terminal block cover is a piece of clear plastic that snaps into place over the terminal block.
6. Remove the screws on the terminals using the screwdriver. Save the screws.



**WARNING:** Ensure that the power cables do not block access to device components or drape where people can trip on them.

7. Connect each power supply to the power sources. Secure power source cables to the power supplies by screwing the ring lugs attached to the cables to the appropriate terminals by using the screw from the terminals (see [Figure 79 on page 270](#) and [Figure 78 on page 270](#)).

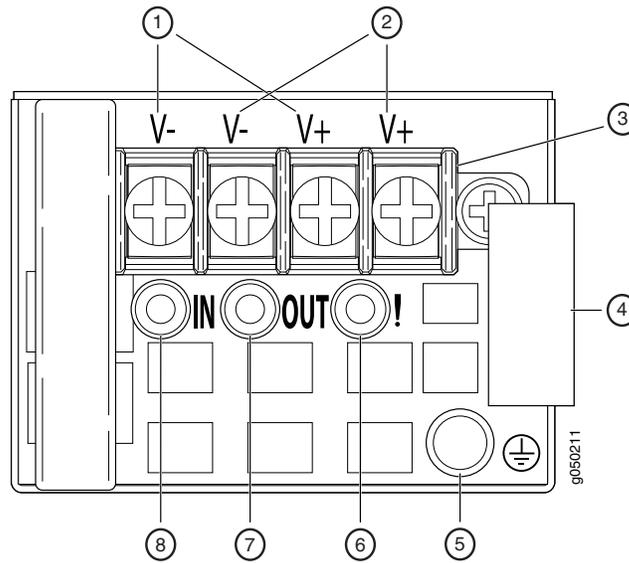


**NOTE:** The DC power supply has four terminals labeled V+, V+, V–, and V– for connecting DC power source cables labeled positive (+) and negative (–). To provide *power feed* redundancy, the first set of terminals should be powered by a dedicated power feed derived from feed A, and the second set of terminals should be powered by a dedicated power feed derived from feed B. This configuration provides the commonly deployed A/B feed redundancy for the system.

- a. Secure the ring lug of the positive (+) DC power source cable to the V+ terminal on the DC power supply.
- b. Secure the ring lug of the negative (–) DC power source cable to the V– terminal on the DC power supply.

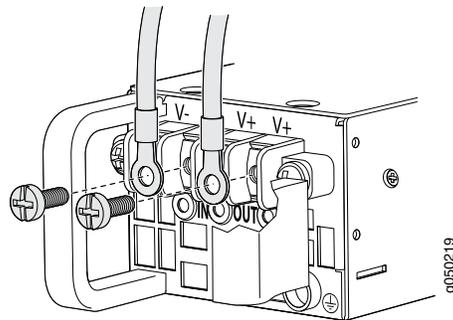
- c. Tighten the screws on the power supply terminals until snug using the screwdriver. Do not overtighten—apply between 5 in-lb (0.56 Nm) and 6 in-lb (0.68 Nm) of torque to the screws.

Figure 78: DC Power Supply Faceplate for a QFX3500 Device



1—Feed A input terminals	5—ESD grounding point
2—Feed B input terminals	6—Fault LED
3—Terminal block	7—Output LED
4—Ejector lever	8—Input LED

Figure 79: Securing Ring Lugs to the Terminals on the DC Power Supply



8. Replace the terminal block cover.
9. Close the input circuit breaker.
10. Verify that the IN and OUT LEDs on the power supply are lit green and are on steadily.

**Related Documentation**

- [DC Power Supply for a QFX3500 Device on page 75](#)
- [DC Power Supply LEDs on a QFX3500 Device on page 403](#)

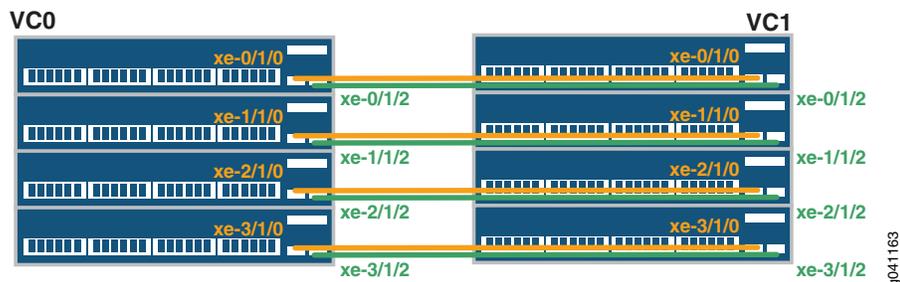
# Cabling the QFabric Switch

- Interconnecting Two Virtual Chassis for QFabric System Control Plane Redundancy on page 271
- Connecting QFX3100 Director Devices in a Director Group on page 274
- Connecting QFX3100 Director Devices to the Control Plane Network on page 275
- Connecting a QFX3100 Director Device to a Network for Out-of-Band Management on page 277
- Connecting a QFX3008-I Interconnect Device to the Control Plane Network on page 278
- Connecting a QFX3500 Node Device to the Control Plane Network on page 282
- Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device on page 284
- Connecting a QFX Series Device to a Management Console on page 285

## Interconnecting Two Virtual Chassis for QFabric System Control Plane Redundancy

A QFX3000 QFabric system control plane and management network is formed by connecting the QFX series devices in your network to two Virtual Chassis composed of four EX4200 switches each. For redundancy and communication, you must connect the two Virtual Chassis using the 10-Gigabit Ethernet uplink module ports configured as a link aggregation group (LAG) (see [Figure 80 on page 271](#)).

**Figure 80: QFabric System Control Plane—Inter-Virtual Chassis LAG Connections**



Before you begin to interconnect two Virtual Chassis for QFabric system control plane redundancy:

- Install your QFabric system hardware (Director group, Interconnect devices, and Node devices). See [“Installing and Connecting a QFX3100 Director Device” on page 213](#), [“Installing and Connecting a QFX3008-I Interconnect Device” on page 223](#), and [“Installing and Connecting a QFX3500 Device” on page 259](#).
- Install your Virtual Chassis hardware (EX4200 switches). See [Installing and Connecting an EX4200 Switch](#).
- Create two Virtual Chassis of four members each. See [Configuring an EX4200 or EX4500 Virtual Chassis \(CLI Procedure\)](#).
- Ensure that you have installed 16 10-Gigabit Ethernet SFP+ transceivers in ports **0** and **2** on each Virtual Chassis member uplink module (see [Installing a Transceiver in an EX Series Switch](#)). EX4200 uplink modules only support SFP+ transceivers installed in ports **0** and **2**. For a list of supported transceivers, see [Optical Interface Support in EX4200 Switches](#).

Instead of using optical transceivers, you can use eight 10-Gigabit Ethernet SFP+ direct-attach (DAC) cables. For a list of supported DAC cables, see [SFP+ Direct Attach Cables for EX Series Switches](#). The procedure below assumes you are using optical transceivers, but the port mappings in [Table 63 on page 272](#) also apply to DAC cables.

- Ensure that you have appropriate fiber-optic cables (see [Optical Interface Support in EX4200 Switches](#)).
- Ensure that you have taken the necessary precautions for safe handling of lasers (see [Laser and LED Safety Guidelines and Warnings for EX Series Switches](#)).
- Use [Table 63 on page 272](#) to determine the Virtual Chassis-to-Virtual Chassis port mappings. Specific ports have been reserved on the Virtual Chassis to connect to each of the QFabric system device types. Such design simplifies installation and facilitates timely deployment of a QFabric system. It also permits the use of a standard Virtual Chassis configuration (see [Example: Configuring the Virtual Chassis for the QFabric Switch Control Plane](#)).

**Table 63: Virtual Chassis-to-Virtual Chassis Control Plane Port Assignments**

Member 0	Member 1	Member 2	Member 3
Connect xe-0/1/0 to xe-0/1/0	Connect xe-1/1/0 to xe-1/1/0	Connect xe-2/1/0 to xe-2/1/0	Connect xe-3/1/0 to xe-3/1/0
Connect xe-0/1/2 to xe-0/1/2	Connect xe-1/1/2 to xe-1/1/2	Connect xe-2/1/2 to xe-2/1/2	Connect xe-3/1/2 to xe-3/1/2

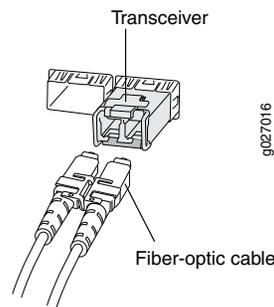
To interconnect two Virtual Chassis for QFabric system control plane redundancy (see [Figure 80 on page 271](#)):



**WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

1. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
2. Remove the rubber safety cap from the SFP+ optical transceiver in port **0** on member **0** of the first Virtual Chassis. Save the cap.
3. Insert the cable connector into the optical transceiver (see [Figure 81 on page 273](#)).

**Figure 81: Connecting a Fiber-Optic Cable to an Optical Transceiver Installed in an EX Series Switch**



4. If the connector at the other end of the fiber-optic cable is covered by a rubber safety cap, remove the cap. Save the cap.
5. Remove the rubber safety cap from the SFP+ optical transceiver in port **0** on member **0** of the *second* Virtual Chassis. Save the cap.
6. Insert the cable connector into the optical transceiver.
7. Repeat Step 1 through Step 6 for each uplink module port, following the port assignments in [Table 63 on page 272](#).
8. Secure the cables so that they are not supporting their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.



**CAUTION:** Do not bend fiber-optic cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

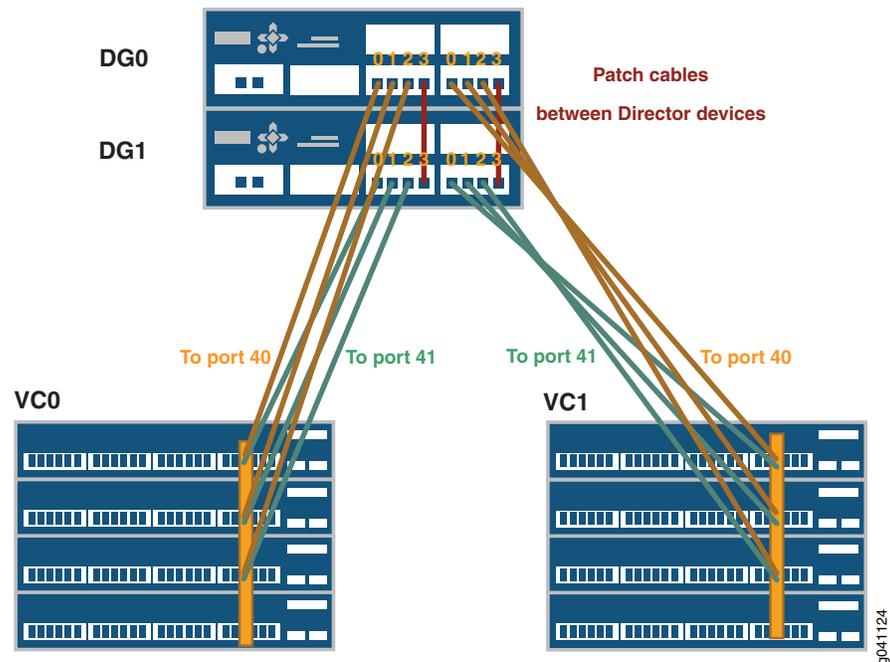
Do not let fiber-optic cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

- Related Documentation**
- [Installing and Connecting a QFX3100 Director Device on page 213](#)

## Connecting QFX3100 Director Devices in a Director Group

A QFX3000 QFabric system requires two QFX3100 Director devices interconnected as a QFX3100 Director *group* (see [Figure 82 on page 274](#)).

Figure 82: QFX3100 Director Group Control Plane Connections



The second QFX3100 Director device provides redundancy for the control plane and management network.

Before you begin to connect QFX3100 Director devices in a Director group:

- Install your QFabric system hardware (Director group, Interconnect devices, and Node devices). For more information, see [“Installing and Connecting a QFX3100 Director Device” on page 213](#), [“Installing and Connecting a QFX3008-I Interconnect Device” on page 223](#), and [“Installing and Connecting a QFX3500 Device” on page 259](#).
- Ensure that you have appropriate transceivers and cables available. For cable specifications, see [“Cable Specifications for Control Plane Connections for the QFX Series” on page 129](#) and [“Interface Specifications for Control Plane Connections for the QFabric System” on page 124](#).

To connect QFX3100 Director devices in a Director group (see [Figure 82 on page 274](#)):



**WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

1. Connect the port labeled **3** on the first network module on one of the Director devices to the corresponding port (labeled **3**) on the first network module on the second Director device.
2. Connect the port labeled **3** on the *second* network module on one of the Director devices to the corresponding port (labeled **3**) on the *second* network module on the second Director device.

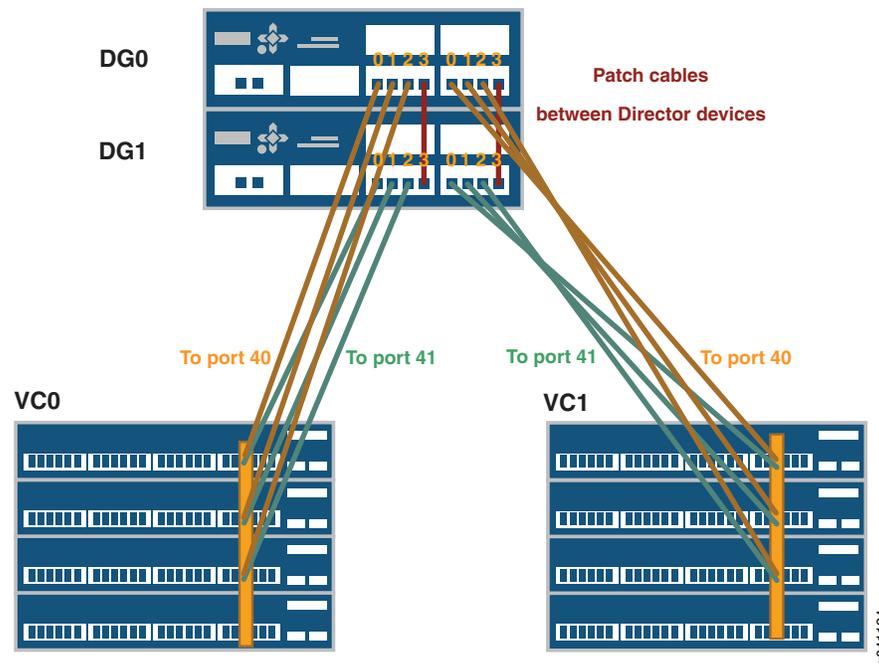
**Related  
Documentation**

- [Connecting QFX3100 Director Devices to the Control Plane Network on page 275](#)
- [Connecting a QFX3008-I Interconnect Device to the Control Plane Network on page 278](#)
- [Connecting a QFX3500 Node Device to the Control Plane Network on page 282](#)

## Connecting QFX3100 Director Devices to the Control Plane Network

A QFX3000 QFabric system control plane and management network is formed by connecting the QFX series devices in your network to two Virtual Chassis composed of four EX4200 switches each. QFX3100 Director devices have two 4-port Gigabit Ethernet network modules with RJ-45 connectors. Use the network module ports to connect the QFX3100 Director group to each Virtual Chassis (see [Figure 83 on page 276](#)).

Figure 83: QFX3100 Director Group to Virtual Chassis Connections



Specific ports have been reserved on the Virtual Chassis to connect to each of the QFabric system device types. Such design simplifies installation and facilitates timely deployment of a QFabric system. It also permits the use of a standard Virtual Chassis configuration (see Example: Configuring the Virtual Chassis for the QFabric Switch Control Plane).

Before you begin to connect a QFX3100 Director device to the control plane network:

- Install your QFabric system hardware (Director group, Interconnect devices, and Node devices). See [“Installing and Connecting a QFX3100 Director Device”](#) on page 213, [“Installing and Connecting a QFX3008-I Interconnect Device”](#) on page 223, and [“Installing and Connecting a QFX3500 Device”](#) on page 259.
- Install your Virtual Chassis hardware (EX4200 switches). See [Installing and Connecting an EX4200 Switch](#).
- Create two Virtual Chassis switches of four members each. See [Configuring an EX4200 or EX4500 Virtual Chassis \(CLI Procedure\)](#).
- Interconnect the two Virtual Chassis switches using the 10-Gigabit Ethernet SFP+ uplink ports. See [“Interconnecting Two Virtual Chassis for QFabric System Control Plane Redundancy”](#) on page 271.
- Connect the two QFX3100 Director devices to create a Director group. See [“Connecting QFX3100 Director Devices in a Director Group”](#) on page 274.
- Ensure that you have 12 RJ-45 patch cables available. For cable specifications, see [“Cable Specifications for Control Plane Connections for the QFX Series”](#) on page 129.

To connect a QFX3100 Director device to the control plane network (see [Figure 83 on page 276](#)):

1. Connect both network modules on the first Director device (labeled **DG0** in [Figure 83 on page 276](#)) to the two Virtual Chassis (labeled **VC0** and **VC1** in [Figure 83 on page 276](#)). You connect the first three ports (labeled **0** through **3**) on the first network module to the first Virtual Chassis (**VC0**). You connect the first three ports on the second network module (also labeled **0** through **3**) to the second Virtual Chassis (**VC1**). The ports used are the same on each Virtual Chassis.

**Table 64: QFX3100 Director Device-to-Virtual Chassis Control Plane Port Assignments for DG0**

Network Module Port 0	Network Module Port 1	Network Module Port 2	Network Module Port 3
Virtual Chassis port <b>ge-0/0/47</b>	Virtual Chassis port <b>ge-1/0/47</b>	Virtual Chassis port <b>ge-2/0/47</b>	Connect this port to the identical port on the other Director device. See “ <a href="#">Connecting QFX3100 Director Devices in a Director Group</a> ” on page 274 .

2. Connect both network modules on the *second* Director device (labeled **DG1** in [Figure 83 on page 276](#)) to the two Virtual Chassis (labeled **VC0** and **VC1** in [Figure 83 on page 276](#)). You connect the first three ports on the first network module to the first Virtual Chassis (**VC0**). You connect the first three ports on the second network module to the second Virtual Chassis (**VC1**). The ports used are the same on each Virtual Chassis.

**Table 65: Second QFX3100 Director Device-to-Virtual Chassis Control Plane Port Assignments for DG1**

Network Module Port 0	Network Module Port 1	Network Module Port 2	Network Module Port 3
Virtual Chassis port <b>ge-0/0/46</b>	Virtual Chassis port <b>ge-1/0/46</b>	Virtual Chassis port <b>ge-2/0/46</b>	Connect this port to the identical port on the other Director device. See “ <a href="#">Connecting QFX3100 Director Devices in a Director Group</a> ” on page 274 .

**Related Documentation**

- [Installing and Connecting a QFX3100 Director Device on page 213](#)

## Connecting a QFX3100 Director Device to a Network for Out-of-Band Management

Use the management port on your QFX3100 Director device to connect each Director device in your Director group to your out-of-band management network.



**NOTE:** You cannot use the management port to perform the initial configuration of the QFX3100 Director device. You must configure the management port before you can successfully connect to the QFX3100 Director device using this port. See [“Configuring the QFabric System Initial Setup on a QFX3100 Director Group” on page 287.](#)

Ensure that you have an RJ-45 patch cable available.

To connect a QFX3100 Director device to a network for out-of-band management:

1. Connect one end of the Ethernet cable to the management port (labeled **MGMT** on the Director device front panel).
2. Connect the other end of the Ethernet cable to your management device or management network.
3. (Optional) Repeat these steps for the second Director device.

**Related Documentation**

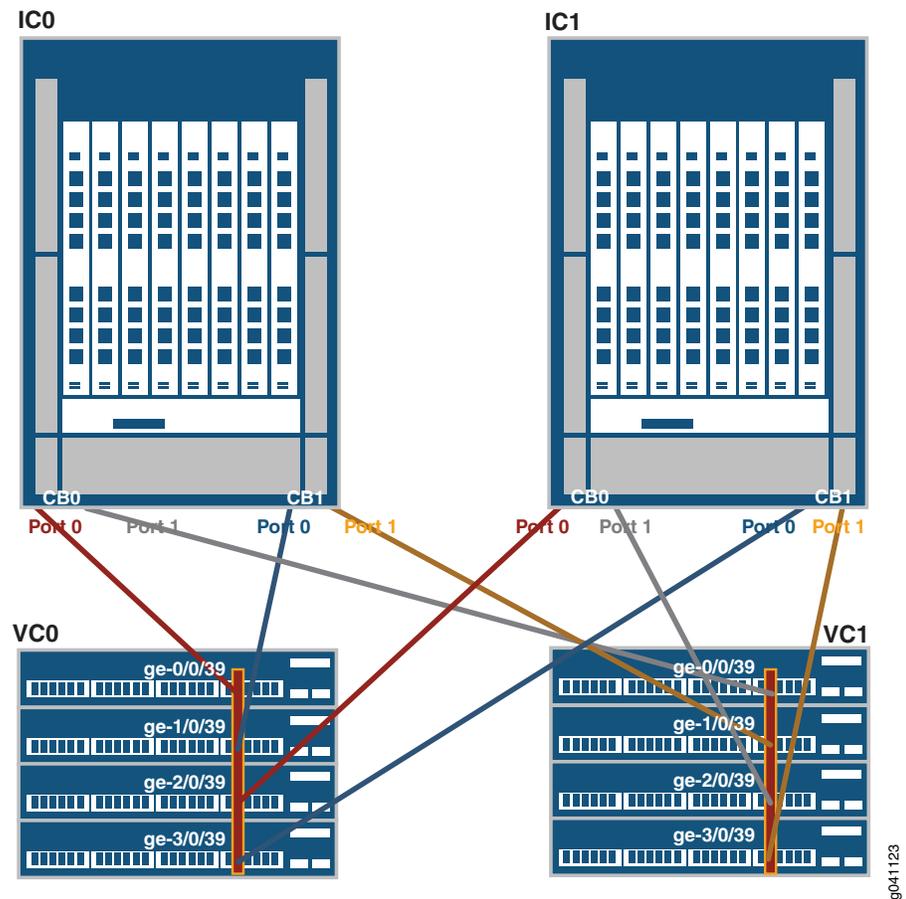
- [Management Port Connector Pinouts for a QFX3100 Director Device](#)
- [Cable Specifications for Console and Management Connections for the QFX Series on page 130](#)
- [Connecting QFX3100 Director Devices to the Control Plane Network on page 275](#)
- [Connecting a QFX Series Device to a Management Console on page 285](#)

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## Connecting a QFX3008-I Interconnect Device to the Control Plane Network

A QFX3000 QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two Virtual Chassis composed of four EX4200 switches each. QFX3008-I Interconnect Devices have four small form factor pluggable plus (SFP+) management ports on each Control Board. Use the SFP+ management ports to connect the QFX3008-I Interconnect Devices to each Virtual Chassis (see [Figure 84 on page 279.](#)

Figure 84: QFX3008-I Interconnect Device Control Plane Connections



Specific ports have been reserved on the Virtual Chassis to connect to the Interconnect devices, QFX3500 Node devices, and QFX3100 Director devices in your QFabric system. Such design simplifies installation and facilitates timely deployment of a QFabric system. It also enables the use of a standard Virtual Chassis configuration (see Example: Configuring the Virtual Chassis for the QFabric Switch Control Plane).

Before you begin to connect a QFX3008-I Interconnect Device to the control plane network:

- Install your QFabric system hardware. For more information, see [“Installing and Connecting a QFX3100 Director Device” on page 213](#), [“Installing and Connecting a QFX3008-I Interconnect Device” on page 223](#), and [“Installing and Connecting a QFX3500 Device” on page 259](#).
- Install your Virtual Chassis hardware. For more information, see [Installing and Connecting an EX4200 Switch](#).
- Create two Virtual Chassis of four EX4200 switches each. For more information, see [Configuring an EX4200 or EX4500 Virtual Chassis \(CLI Procedure\)](#).

- Interconnect the two Virtual Chassis switches using the 10-Gigabit Ethernet SFP+ uplink ports. For more information, see [“Interconnecting Two Virtual Chassis for QFabric System Control Plane Redundancy”](#) on page 271.
- Ensure that 1000BASE-T SFP transceivers are installed in port 0 and port 1 on both Control Boards for each QFX3008-I Interconnect Device. See [“Interface Specifications for Control Plane Connections for the QFabric System”](#) on page 124 and [“Installing a Transceiver in a QFX Series Device”](#) on page 374.
- Ensure that you have four RJ-45 patch cables available for each Interconnect device. For cable specifications, see [“Cable Specifications for Control Plane Connections for the QFX Series”](#) on page 129.

To connect each QFX3008-I Interconnect Device to the control plane network (see [Figure 84 on page 279](#)):

1. Connect the first Interconnect device.
  - a. Connect one end of the first RJ-45 patch cable to the first SFP management port (labeled **0**) on the first Control Board (labeled **CB 0**).
  - b. Connect the other end of that cable to port **ge-0/0/39** on the first Virtual Chassis.
  - c. Connect one end of the second RJ-45 patch cable to the second SFP management port (labeled **1**) on the first Control Board (labeled **CB 0**).
  - d. Connect the other end of that cable to port **ge-0/0/39** on the *second* Virtual Chassis.
  - e. Connect one end of the third RJ-45 patch cable to the first SFP management port (labeled **0**) on the second Control Board (labeled **CB 1**).
  - f. Connect the other end of that cable to port **ge-1/0/39** on the first Virtual Chassis.
  - g. Connect one end of the fourth RJ-45 patch cable to the second SFP management port (labeled **1**) on the second Control Board (labeled **CB 1**).
  - h. Connect the other end of that cable to port **ge-1/0/39** on the *second* Virtual Chassis.
2. Connect the second Interconnect device.
  - a. Connect one end of the first RJ-45 patch cable to the first SFP management port (labeled **0**) on the first Control Board (labeled **CB 0**).
  - b. Connect the other end of that cable to port **ge-2/0/39** on the first Virtual Chassis.
  - c. Connect one end of the second RJ-45 patch cable to the second SFP management port (labeled **1**) on the first Control Board (labeled **CB 0**).
  - d. Connect the other end of that cable to port **ge-2/0/39** on the *second* Virtual Chassis.
  - e. Connect one end of the third RJ-45 patch cable to the first SFP management port (labeled **0**) on the second Control Board (labeled **CB 1**).
  - f. Connect the other end of that cable to port **ge-3/0/39** on the first Virtual Chassis.
  - g. Connect one end of the fourth RJ-45 patch cable to the second SFP management port (labeled **1**) on the second Control Board (labeled **CB 1**).
  - h. Connect the other end of that cable to port **ge-3/0/39** on the *second* Virtual Chassis.

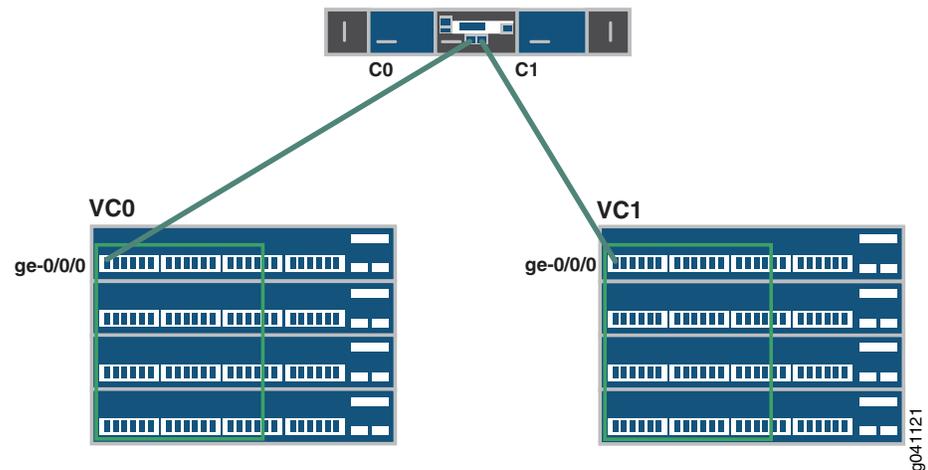
**Related Documentation**

- [Connecting a QFX3500 Node Device to the Control Plane Network on page 282](#)
- [Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device on page 284](#)
- [Connecting QFX3100 Director Devices to the Control Plane Network on page 275](#)
- [Connecting QFX3100 Director Devices in a Director Group on page 274](#)

## Connecting a QFX3500 Node Device to the Control Plane Network

A QFX3000 QFabric system control plane and management network is formed by connecting the QFX series devices in your network to two Virtual Chassis composed of four EX4200 switches each. QFX3500 Node devices have two management ports with RJ-45 connectors. Use the management ports to connect the QFX3500 Node device to each Virtual Chassis (see [Figure 85 on page 282](#)).

Figure 85: QFX3500 Node Device Control Plane Connections



Before you begin to connect a QFX3500 Node device to the control plane network:

- Install your QFabric system hardware (Director group, Interconnect devices, and Node devices). For more information, see [“Installing and Connecting a QFX3100 Director Device” on page 213](#), [“Installing and Connecting a QFX3008-I Interconnect Device” on page 223](#), and [“Installing and Connecting a QFX3500 Device” on page 259](#).
- Install your Virtual Chassis hardware (EX4200 switches). For more information, see [Installing and Connecting an EX4200 Switch](#).
- Create two Virtual Chassis switches of four members each. For more information, see [Configuring an EX4200 or EX4500 Virtual Chassis \(CLI Procedure\)](#).
- Interconnect the two Virtual Chassis switches using the 10-Gigabit Ethernet SFP+ uplink ports. For more information, see [“Interconnecting Two Virtual Chassis for QFabric System Control Plane Redundancy” on page 271](#).
- Ensure that you have two RJ-45 patch cables available. For cable specifications, see [“Cable Specifications for Control Plane Connections for the QFX Series” on page 129](#).
- Use [Table 66 on page 283](#) to determine the QFX3500 Node device-to-Virtual Chassis port mappings. Specific ports have been reserved on the Virtual Chassis to connect to each of the QFabric system device types. Such design simplifies installation and facilitates timely deployment of a QFabric system. It also permits the use of a standard Virtual Chassis configuration (see [Example: Configuring the Virtual Chassis for the QFabric Switch Control Plane](#)).



**NOTE:** The numerical identifiers for each Node device below are not preassigned to the Node devices that are shipped to you. They represent the order in which you connect the Node devices. For example, the first Node device port you connect (Node 0) will be connected to port `ge-0/0/0` on Virtual Chassis member 0.

**Table 66: QFX3500 Node Device-to-Virtual Chassis Control Plane Port Assignments**

Member 0	Member 1	Member 2	Member 3
Node 0: <code>ge-0/0/0</code>	Node 32: <code>ge-1/0/0</code>	Node 64: <code>ge-2/0/0</code>	Node 96: <code>ge-3/0/0</code>
Node 1: <code>ge-0/0/1</code>	Node 33: <code>ge-1/0/1</code>	Node 65: <code>ge-2/0/1</code>	Node 97: <code>ge-3/0/1</code>
...	...	...	...
Node 30: <code>ge-0/0/30</code>	Node 62: <code>ge-1/0/30</code>	Node 94: <code>ge-2/0/30</code>	Node 126: <code>ge-3/0/30</code>
Node 31: <code>ge-0/0/31</code>	Node 63: <code>ge-1/0/31</code>	Node 95: <code>ge-2/0/31</code>	Node 127: <code>ge-3/0/31</code>

To connect a QFX3500 Node device to the control plane network (see [Figure 85 on page 282](#)):

1. Connect one end of the first RJ-45 patch cable to the first management port (labeled **C0**) on the Node device management board.
2. Connect the other end of that cable to the appropriate member and port on the Virtual Chassis. See [Table 66 on page 283](#).
3. Connect one end of the second RJ-45 patch cable to the second management port (labeled **C1**) on the Node device management board.
4. Connect the other end of that cable to the appropriate member and port on the *second* Virtual Chassis. This should be the same member number and port number that you connected to in Step 2. For example, if you connected the first cable to `ge-0/0/0` on Member 0 on the first Virtual Chassis, you connect the second cable to `ge-0/0/0` on Member 0 on the second Virtual Chassis.
5. Repeat this procedure for each QFX3500 Node device.

**Related Documentation**

- [Connecting a QFX3008-I Interconnect Device to the Control Plane Network on page 278](#)
- [Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device on page 284](#)
- [Connecting QFX3100 Director Devices to the Control Plane Network on page 275](#)

## Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device

To form the data plane in a QFX3000 QFabric system, you connect the QSFP+ uplink ports on the QFX3500 Node device to the QSFP+ ports on the 16-port QSFP+ front cards in a QFX3008-I Interconnect device.



**CAUTION:** For redundancy, each QFX3500 Node device must be connected to each QFX3008-I Interconnect Device. For example, if you have two QFX3008-I Interconnect Devices, then at least one uplink port on each QFX3500 Node device must be connected to each QFX3008-I Interconnect Device. If you are connecting all four uplink ports to two QFX3008-I Interconnect Devices, we recommend connecting two uplink ports to each Interconnect device, each to a different front card.

Before you begin to cable the QFX3000 QFabric system data plane:

- Review “[Interface Specifications for Data Plane Connections for the QFabric System](#)” on page 127 for information about the optical interface characteristics.
- Ensure that you have taken the necessary precautions for safe handling of lasers (see “[Laser and LED Safety Guidelines and Warnings for the QFX Series](#)” on page 168).
- Ensure you have installed QSFP+ transceivers in each port you are using. See “[Installing a Transceiver in a QFX Series Device](#)” on page 374.
- Ensure that you have appropriate fiber-optic cables (see “[Interface Specifications for Data Plane Connections for the QFabric System](#)” on page 127).

To connect a QFX3500 Node device to a QFX3008-I Interconnect device:



**WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

1. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
2. Remove the rubber safety cap from the QSFP+ optical transceiver on the QFX3500 Node device. Save the cap.
3. Insert the cable connector into the optical transceiver.
4. If the connector at the other end of the fiber-optic cable is covered by a rubber safety cap, remove the cap. Save the cap.
5. Remove the rubber safety cap from the QSFP+ optical transceiver on the 16-port QSFP+ front card on the QFX3008-I Interconnect device. Save the cap.

6. Insert the cable connector into the optical transceiver.
7. Secure the cables so that they are not supporting their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.



**CAUTION:** Do not bend fiber-optic cables beyond their minimum bend radius. Bending the cables beyond their minimum bend radius can damage the cables and cause problems that are difficult to diagnose.

Do not let fiber-optic cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

**Related Documentation**

- [Interface Specifications for SFP+ Transceivers for QFX3500 Device Access Ports on page 108](#)

## Connecting a QFX Series Device to a Management Console

QFX Series devices have a console port with an RJ-45 connector. Use the console port to connect the device to a management console or to a console server.

Ensure that you have an RJ-45 to DB-9 rollover cable available. An RJ-45 cable with an RJ-45 to DB-9 adapter is provided with the device.

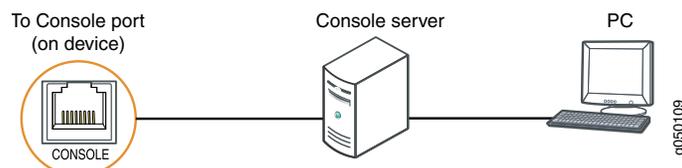


**NOTE:** If your laptop or PC does not have a DB-9 male connector pin and you want to connect your laptop or PC directly to a QFX Series device, use a combination of the RJ-45 cable and RJ-45 to DB-9 adapter supplied with the device and a USB to DB-9 male adapter. You must provide the USB to DB-9 male adapter.

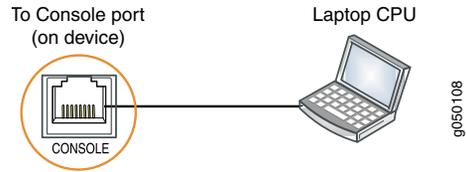
To connect a QFX Series device to a management console (see [Figure 86 on page 285](#) and [Figure 87 on page 286](#)):

1. Connect one end of the Ethernet cable to the console port (labeled **CON** or **CONSOLE**).
2. Connect the other end of the Ethernet cable into the console server (see [Figure 86 on page 285](#)) or management console (see [Figure 87 on page 286](#)).

**Figure 86: Connecting a QFX Series Device to a Management Console Through a Console Server**



**Figure 87: Connecting a QFX Series Device Directly to a Management Console**



**Related Documentation**

- [Console Port Connector Pinouts for the QFX Series on page 106](#)

# Performing the Initial Configuration

- [Configuring the QFabric System Initial Setup on a QFX3100 Director Group on page 287](#)

## Configuring the QFabric System Initial Setup on a QFX3100 Director Group

You must perform the initial setup of the QFX3100 Director group through the console port. (Before configuring the QFX3100 Director group, see [“Installing and Connecting a QFX3100 Director Device” on page 213](#).

Before you begin connecting and configuring a QFX3100 Director group, set the following parameter values on the console server or PC:

- Baud Rate—9600
- Flow Control—None
- Data—8
- Parity—None
- Stop Bits—1
- DCD State—Disregard

The initial setup requires that you specify certain values for your QFabric system. These include:

- Serial ID (found on your purchase order)
- IP addresses and a default gateway IP address for your QFabric system default partition
- IP addresses for your Director group device management ports
- Range of reserved MAC addresses for your QFabric system (at least 4000)
- Root password for your Director group
- Root password for the QFabric system components such as the Node devices, Interconnect devices, and infrastructure



**NOTE:** To request your MAC address block for your QFabric system, contact your Juniper Networks sales representative or Professional Services team member.

- [Initial Setup on page 288](#)
- [Restoring a Backup Configuration on page 291](#)

## Initial Setup

The initial setup can be performed either manually or by using a previously saved backup configuration.

To connect and configure the QFX3100 Director group manually from the console:

1. Connect the console port of one of the Director devices to a laptop or PC using an RJ-45 to DB-9 rollover cable. An RJ-45 to DB-9 rollover cable is supplied with each QFX3100 Director device. The console (**CONSOLE**) port is located on the front panel of the device.
2. Log in as **root**. If the software booted before you connected to the console port, you might need to press the Enter key for the prompt to appear.

```
dg0 login: root
```



**NOTE:** The prompt is either **dg0 login** or **dg1 login** depending on the Director device to which you connected your cable.

3. For manual configuration or for initial installation, enter **no** when prompted to specify the backup file. The current Director device configuration is displayed.

```
Initial Configuration
```

```
Before you can access the QFabric system, you must complete the initial
setup of the Director group by using the steps that follow. If the initial
setup procedure does not complete successfully, log out of the Director
device and then log back in to restart this setup menu.
```

```
Continue? [y/n]: yes
```

```
You may enter the configuration manually or restore from a backup.
```

```
Specify a backup file? [y/n]: no
```

```
Existing local configuration:
```

4. Enter the IP addresses and prefixes for both the Director devices.



**NOTE:** The Director group devices and QFabric default partition IP addresses must be on the same subnet as the customer management network.

Please enter the Director Group 0 IP address and prefix: *ip address/prefix*

Please enter the Director Group 1 IP address and prefix: *ip address/prefix*

5. Enter the gateway IP address for the Director group.

Please enter the Director Group gateway IP address: *gateway ip address*

6. Enter the default partition IP address. (You will use this address to log in to the QFabric on subsequent connections.)

Please enter the QFabric default partition IP address: *ip address*

7. Enter the MAC address information.

Please enter the starting MAC address: *mac address*

Please enter the number of MAC addresses: *number of mac addresses*



**NOTE:** The minimum number of MAC addresses accepted is 4000.

8. Enter the QFabric system serial ID number.

Please enter the QFabric serial ID: *serial id*

9. Create the Director device root password.

Please enter a Director device root password: *director-device-password*

Please re-enter the password: *director-device password*

10. Create a password for the QFabric system components.

Please enter a password for QFabric components (Node devices, Interconnect devices, and infrastructure): *component-password*

Please re-enter the password: *component-password*

Note: please record your passwords for recovery purposes.



**CAUTION:** Carefully save your passwords for future reference, because they cannot be recovered on a QFabric system.

11. Confirm the initial configuration. Ensure that the information is accurate before proceeding.

Does the following configuration appear correct?

#### Initial Setup Review

Director Group 0 IP/prefix [10.49.214.74/24]

Director Group 1 IP/prefix [10.49.214.75/24]

Director Group gateway IP [10.49.214.254]

QFabric default partition IP [10.49.214.150]

Starting MAC address [00:11:00:00:00:00]

```

Number of MAC addresses [4000]
QFabric serial ID [qfsn-123456789]
Director device password [*****]
QFabric component password [*****]

```

12. Confirm the initial setup.

### Initial Setup Confirmation

```
[y/n]: yes
```



**CAUTION:** Resetting this initial configuration requires assistance from Juniper Networks customer support or [“Performing a QFabric Switch Recovery Installation on the Director Group” on page 410](#). As a result, make sure you are certain the values you entered are correct before you enter **yes**.

13. The director device displays the configuration.

### Initial Setup Completion

```

Saving temporary configuration...
Configuring peer...
Configuring local interfaces...
Configuring interface eth0 with [10.49.214.74/24:10.49.214.254]
Configured interface eth0 with [10.49.214.74/24:10.49.214.254]
Configuring the QFabric software with an initial pool of 4000 MAC addresses
[00:11:00:00:00:00 - 00:11:00:00:0f:3b]
Configuring the QFabric default partition IP address [10.49.214.150]
Reconfiguring the QFabric software static configuration
Applying the new Director device password
Applying the QFabric component password
Configuration complete. Director Group services will auto start within 30
seconds.

```

## Restoring a Backup Configuration

Before you restore a backup configuration for the Director group:

- You must have a backup configuration file. You create the backup file with the **request system software configuration-backup** command and save it on an external USB flash drive.
- If you need to reinstall the system software, perform that operation first (see [“Performing a QFabric Switch Recovery Installation on the Director Group” on page 410](#)).

To connect and configure the Director group with a backup configuration:

1. Log in as **root**. If the software booted before you connected to the console port, you might need to press the Enter key for the prompt to appear.

```
dg0 login: root
```



**NOTE:** The prompt is either **dg0 login** or **dg1 login** depending on the Director device to which you connected your cable.

2. To use a previously saved backup configuration enter **yes** when prompted to specify the backup file and then enter the path and filename of the backup configuration.

```
Specify a back up file? [y/n]: yes
```

```
Please specify the full path of the configuration backup file: path/filename
```

3. Confirm the restoration of the configuration from the backup. Ensure that the information is accurate before proceeding.

```
Does the following configuration appear correct?
```

### Backup Restoration Review

```
Director Group 0 IP/prefix [10.49.214.74/24]
Director Group 1 IP/prefix [10.49.214.75/24]
Director Group gateway IP [10.49.214.254]
QFabric default partition IP [10.49.214.150]
Starting MAC address [00:11:00:00:00:00]
Number of MAC addresses [4000]
QFabric serial ID [qfsn-123456789]
Director device password [*****]
QFabric component password [*****]
```

4. Confirm the backup restoration.

```
[y/n]: yes
```

### Backup Restoration Confirmation

5. The Director device displays the configuration.

**Backup Restoration  
Completion**

```
Saving temporary configuration...
Configuring peer...
Configuring local interfaces...
Configuring interface eth0 with [10.49.214.74/24:10.49.214.254]
Configured interface eth0 with [10.49.214.74/24:10.49.214.254]
Configuring the QFabric software with an initial pool of 4000 MAC addresses
[00:11:00:00:00:00 - 00:11:00:00:0f:3b]
Configuring the QFabric default partition IP address [10.49.214.150]
Reconfiguring the QFabric software static configuration
Applying the new Director device password
Applying the QFabric component password

Configuration complete. Director Group services will auto start within 30
seconds.
```

**Related  
Documentation**

- [Gaining Access to the QFabric Switch Through the Default Partition](#)
- [QFabric Switch Initial and Default Configuration Information](#)
- [Installing and Connecting a QFX3100 Director Device on page 213](#)
- [Performing a QFabric Switch Recovery Installation on the Director Group on page 410](#)
- [request system software configuration-backup](#)

## PART 5

# Maintenance

- [Removing or Replacing a Device on page 295](#)
- [Replacing QFX3100 Components on page 309](#)
- [Replacing QFX3008-I Components on page 321](#)
- [Replacing QFX3500 Components on page 361](#)
- [Replacing Transceivers and Fiber-Optic Cables on page 373](#)
- [Routine Maintenance on page 379](#)
- [Viewing QFX3100 System Information on page 381](#)
- [Viewing QFX3008-I System Information on page 387](#)
- [Viewing QFX3500 System Information on page 397](#)



# Removing or Replacing a Device

- [Powering Off a QFX3100 Director Device on page 295](#)
- [Powering Off a QFX3008-I Interconnect Device on page 296](#)
- [Powering Off a QFX3500 Device on page 298](#)
- [Removing a QFX3100 Director Device from a Rack or Cabinet on page 299](#)
- [Removing a QFX3008-I Interconnect Device from a Rack or Cabinet on page 300](#)
- [Removing a QFX3500 Device from a Rack or Cabinet on page 302](#)
- [Replacing a QFX3100 Director Device in a QFX3000-G QFabric System on page 303](#)
- [Adding or Replacing a QFX3008-I Interconnect Device in a QFX3000-G QFabric System on page 304](#)
- [Adding or Replacing a QFX3500 Node Device in a QFX3000-G QFabric System on page 306](#)

## Powering Off a QFX3100 Director Device

---

Power off a QFX3100 Director device when it needs to be removed from a rack or cabinet or when the device is not active and you want to save power.

Before you power off the QFX3100 Director device:

- Ensure that you understand how to prevent electrostatic discharge damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).

Ensure that you have the following parts and tools available:

- An external management device such as a PC connected to the management network.

To power off a QFX3100 Director device:

1. Log in to the QFX3100 Director device. See [Gaining Access to the QFabric Switch Through the Default Partition](#).
2. Determine if the Director device you want to power off is the master or standby Director device by issuing the **show fabric administration inventory director-group status** operational mode command.
3. If the device you want to power off is the master Director device, issue the **request fabric administration director-group change-master director-device *director-device-name***

operational mode CLI command. The specified device becomes the new master Director device, and the previous master Director device becomes a backup Director device.

4. Press the power switch on the QFX3100 Director device rear panel to initiate a graceful shutdown.



**NOTE:** Pressing the power switch momentarily either causes the system to power on or causes a graceful shutdown. Pressing the power switch for 4 seconds or longer causes an abrupt power shutdown.

5. Observe the power supply faceplate LEDs. The AC power supply LED should turn off.
6. On the external management device, you can monitor the shutdown process to ensure that the system shuts down properly.

**Related Documentation**

- [Powering On a QFX3100 Director Device on page 220](#)
- [Connecting AC Power to a QFX3100 Director Device on page 218](#)

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## Powering Off a QFX3008-I Interconnect Device

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Before you power off the device:

- Ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).
- Ensure that you do not need to forward traffic through the device.

Ensure that you have the following parts and tools available to power off the device:

- An ESD grounding strap
- An external management device such as a PC
- An RJ-45 to DB-9 rollover cable to connect the external management device to the console (**CON**) port

To power off the device:

1. Connect a management device to the console (**CONSOLE**) port on the master Control Board in the QFX3008-I Interconnect device. For instructions about connecting a management device to the console (**CONSOLE**) port, see [“Connecting a QFX Series Device to a Management Console” on page 285](#).
2. Shut down the 16-port QSFP+ front cards in the QFX3008-I Interconnect device. Issue the **request fpc offline** operational mode CLI command.

This command shuts down the front cards gracefully. As the front cards go offline, traffic will be routed to other QFX3008-I Interconnect devices in your QFX3000 QFabric system.

3. Shut down the Control Boards by issuing the **request system halt both-routing-engines** operational mode CLI command. This command shuts down the devices gracefully and preserves system state information. A message appears on the console, confirming that the operating system has halted.

You see the following output (or something similar) after entering the command:

```
Halting re1
*** FINAL System shutdown message from user@switch***
System going down IMMEDIATELY
Shutdown NOW!
[pid 859]
user@switch> JWaiting (max 60 seconds) for system process `vnru' to stop...done
Waiting (max 60 seconds) for system process `bufdaemon' to stop...done
Waiting (max 60 seconds) for system process `syncer' to stop...
Syncing disks, vnodes remaining...2 2 2 1 1 0 0 0 0 done
syncing disks... All buffers synced.
Uptime: 3h3m49s
recorded reboot as normal shutdown
The operating system has halted. Please press any key to reboot.
```



**CAUTION:** The final output of any version of the **request system halt** command is the “The operating system has halted. Please press any key to reboot” message. Wait at least 60 seconds after first seeing this message before following the instructions in Step 5 to power off the switch.

4. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
5. Set the wiring tray switch to the OFF (O) position. Observe the wiring tray LEDs. The power supply LEDs should turn off (appear unlit). Repeat this step for the second wiring tray.



**NOTE:** After you power off a wiring tray, wait for at least 60 seconds before you turn it back on. After you power on a wiring tray, wait for at least 60 seconds before you turn it back off.

#### Related Documentation

- [Connecting AC Power to a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 239](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays on page 246](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays on page 250](#)

## Powering Off a QFX3500 Device

---

Before you power off a QFX3500 device:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage”](#) on page 192.
- Ensure that you do not need to forward traffic through the device.

Ensure that you have the following parts and tools available to power off the device:

- An ESD grounding strap
- An external management device such as a PC
- An RJ-45 to DB-9 rollover cable to connect the external management device to the console port

To power off a QFX3500 device:

1. Connect to the device using one of the following methods:
  - Connect a management device to the console (**CON**) port in a QFX3500 device. For instructions about connecting a management device to the console (**CON**) port, see [“Connecting a QFX Series Device to a Management Console”](#) on page 285.
  - If you are using the QFX3500 device as a standalone switch, you can shut down the QFX3500 device from a management device on your out-of-band management network. For instructions about connecting a management device to the management (**CO** or **C1**) port, see [Connecting a QFX3500 Device to a Network for Out-of-Band Management](#).
2. Shut down the QFX3500 device from the external management device by issuing the **request system halt** operational mode CLI command. This command shuts down the device gracefully and preserves system state information. A message appears on the console, confirming that the operating system has halted.

You see the following output (or something similar, depending on the hardware being shut down) after entering the command:

```
Shutdown NOW!  
[pid 1764]  
  
user@device>  
  
*** FINAL System shutdown message from user@device ***  
System going down IMMEDIATELY  
  
JWaiting (max 300 seconds) for system process `vn1ru_mem' to stop...done  
Waiting (max 300 seconds) for system process `vn1ru' to stop...done  
Waiting (max 300 seconds) for system process `bufdaemon' to stop...done  
Waiting (max 300 seconds) for system process `syncer' to stop...  
Syncing disks, vnodes remaining...4 1 1 1 0 0 done  
  
syncing disks... All buffers synced.
```

Uptime: 1d19h22m25s

The operating system has halted.  
Please press any key to reboot.



**CAUTION:** The final output of any version of the `request system halt` command is the “The operating system has halted. Please press any key to reboot” message. Wait at least 60 seconds after first seeing this message before following the instructions in [Step 4](#) and [Step 5](#) to power off the device.

3. Attach the grounding strap to your bare wrist and to a site ESD point.
4. Disconnect power to the device by performing one of the following:
  - AC power supply—If the AC power source outlet has a power switch, set it to the OFF (O) position. If the AC power source outlet does not have a power switch, gently pull out the male end of the power cord connected to the power source outlet.
  - DC power supply—Switch the circuit breaker on the panel board that services the DC circuit to the OFF position.
5. Remove the power source cable from the power supply faceplate:
  - AC power supply—Remove the power cord from the power supply faceplate by detaching the power cord retainer and gently pulling out the female end of the power cord connected to the power supply faceplate.
  - DC power supply—Remove the screws securing the ring lugs attached to the power source cables to the power supply using the screwdriver, and remove the power source cables from the power supply. Replace the screws on the terminals and tighten them.

**Related Documentation**

- [Connecting AC Power to a QFX3500 Device on page 265](#)
- [Installing a Management Board in a QFX3500 Device on page 368](#)
- [Removing a Management Board from a QFX3500 Device on page 369](#)

## Removing a QFX3100 Director Device from a Rack or Cabinet

If you need to relocate an installed QFX3100 Director device, use the procedure described in this topic. (The remainder of this topic uses “rack” to mean “rack or cabinet.”)



**NOTE:** When you remove multiple devices from a rack, remove the device in the top of the rack first and proceed to remove the rest of the devices from top to bottom.

Before removing a QFX3100 Director device from a rack:

- Ensure that the rack is stable and secured to the building.
- Ensure that there is enough space to place the removed QFX3100 Director device in its new location and along the path to the new location.
- Read [“General Safety Guidelines and Warnings” on page 161](#).
- Ensure that the QFX3100 Director device has been safely powered off and that you have unplugged (disconnected) the power cords.
- Ensure that you have disconnected any cables or wires attached to the QFX3100 Director device ports.

Ensure that you have the following parts and tools available:

- A Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mounting screws, for mounting the QFX3100 Director device on the rack.

To remove a QFX3100 Director device from a rack or cabinet:

1. Use the screwdriver to remove the mounting screws that attach the chassis front-mounting brackets to the rack or cabinet.
2. Place the removed screws in a labeled bag. You will need them when you reinstall the chassis.
3. Lift the QFX3100 Director device from the rack or cabinet and transport it to your desired new location.

**Related  
Documentation**

- [Mounting a QFX3100 Director Device on Two Posts in a Rack or Cabinet on page 215](#)
- [Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet on page 217](#)

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## Removing a QFX3008-I Interconnect Device from a Rack or Cabinet

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If you want to move an installed QFX3008-I Interconnect device to another location, you need to remove it from the rack or cabinet in which it is installed. An installed device rests on the mounting shelf. In a four-post rack, the front-mounting brackets (“ears”) attached to the chassis are bolted to the rack. In a two-post rack, the mid-mounting brackets (“ears”) attached to the chassis are bolted to the rack.



**NOTE:** When you remove multiple devices from a rack or cabinet, remove the device in the top of the rack or cabinet first and proceed to remove the rest of the switches from top to bottom.

Before removing a QFX3008-I Interconnect device from a rack or a cabinet:

- Ensure that the rack or cabinet is stable and secured to the building.
- Ensure that there is enough space to place the removed device in its new location and along the path to the new location.

- Read [“General Safety Guidelines and Warnings” on page 161](#), with particular attention to [“Chassis Lifting Guidelines for a QFX3008-I Interconnect Device” on page 175](#).
- Ensure that the device has been safely powered off (see [“Powering Off a QFX3008-I Interconnect Device” on page 296](#)) and that you have unplugged (disconnected) the power cords. Remove three-phase wiring trays from the chassis and move them separately, leaving the power cords attached to the wiring trays (see [“Removing a Wiring Tray from a QFX3008-I Interconnect Device” on page 326](#)).
- Ensure that you have disconnected any cables or wires attached to the device.

Ensure that you have the following parts and tools available to remove the switch:

- A Phillips (+) screwdriver, number 2. You might also need a number 3 Phillips (+) screwdriver, depending on the size of your rack mounting screws.
- A mechanical lift rated for at least 750 lb (340.2 kg). If you do not have a lift rated for 750 lb (341 kg), you must remove all components from the chassis and use a lift rated for at least 250 lb (114 kg). The weight of an empty QFX3008-I Interconnect device and midplane is approximately 205 lb (93 kg).



**WARNING:** Because of the QFX3008-I Interconnect device size and weight, we require the use of a mechanical lift to install the QFX3008-I Interconnect device in a rack or cabinet or to move the device from one location to another.



**CAUTION:** The handles on the QFX3008-I Interconnect device are designed to help maneuver the chassis from the mechanical lift to the mounting shelves in the rack. Do not attempt to lift the chassis using the handles.

To remove a QFX3008-I Interconnect device from a rack or cabinet:

1. Use the appropriate Phillips (+) screwdriver to remove the mounting screws that attach the chassis front-mounting brackets to the rack or cabinet.
2. Place the removed screws in a labeled bag. You will need them when you reinstall the chassis.
3. Move the lift to the rack and position it so that its platform is centered about 0.5 in. (1.27 cm) below the bottom of the device chassis and as close to it as possible.
4. Carefully slide the device from the mounting shelves attached to the rack onto the lift.
5. Use the number 2 Phillips (+) screwdriver to remove the mounting hardware from the rack.
6. Use the lift to transport the device to its new location.

#### Related Documentation

- [Installing and Connecting a QFX3008-I Interconnect Device on page 223](#)

## Removing a QFX3500 Device from a Rack or Cabinet

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If you need to relocate an installed QFX3500 device, use the procedure described in this topic. (The remainder of this topic uses “rack” to mean “rack or cabinet.”)



**NOTE:** When you remove multiple devices from a rack, remove the device in the top of the rack first and proceed to remove the rest of the devices from top to bottom.

Before removing a QFX3500 device from a rack:

- Ensure that the rack is stable and secured to the building.
- Ensure that there is enough space to place the removed QFX3500 device in its new location and along the path to the new location.
- Read [“General Safety Guidelines and Warnings” on page 161](#).
- Ensure that the QFX3500 device has been safely powered off (see [“Powering Off a QFX3500 Device” on page 298](#)) and that you have unplugged (disconnected) the power cords.
- Ensure that you have disconnected any cables or wires attached to the QFX3500 device ports.

Ensure that you have the following parts and tools available:

- A Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mounting screws, for mounting the QFX3500 device on the rack.

To remove a QFX3500 device from a rack or cabinet:

1. Use the screwdriver to remove the mounting screws that attach the chassis front-mounting brackets to the rack or cabinet.
2. Remove the QFX3500 device from the rack or cabinet.
3. Use the screwdriver to remove the mounting screws that attach the mounting blades attached to the rear of the rack or cabinet.
4. Place the removed screws and mounting blades in a labeled bag. You will need them when you reinstall the chassis.
5. Transport the QFX3500 device to your desired new location.

### Related Documentation

- [Mounting a QFX3500 Device in a Rack or Cabinet on page 261](#)

## Replacing a QFX3100 Director Device in a QFX3000-G QFabric System

The Director group in a QFX3000-G QFabric system automatically recognizes when devices are added or replaced in the QFabric system. The Director group sends each device its own portion of the Junos OS configuration and adds them to the QFabric system inventory.

Before you replace a QFX3100 Director device in a QFX3000-G QFabric system:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage”](#) on page 192.
- If possible, install the replacement QFX3100 Director device and connect it to power to minimize the amount of time it will take to replace the device.

Ensure that you have the following parts and tools available to replace the device:

- An ESD grounding strap
- An external management device such as a PC
- An RJ-45 to DB-9 rollover cable to connect the external management device to the console port
- A 4-gigabyte (GB) USB flash drive

To replace a QFX3100 Director device in a QFX3000-G QFabric system:

1. Ensure that the QFX3100 Director device is the standby Director device, then power off the device that you are removing from the QFabric system. See [“Powering Off a QFX3100 Director Device”](#) on page 295.
2. Uncable the device. Label each cable as you remove it, so that you can easily connect the replacement Director device.
3. Interconnect the two QFX3100 Director devices for control plane redundancy. See [“Connecting QFX3100 Director Devices in a Director Group”](#) on page 274.
4. Connect the QFX3100 Director device to the control plane network. See [“Connecting QFX3100 Director Devices to the Control Plane Network”](#) on page 275.
5. Perform a recovery installation to upgrade the software to the same version that is on the existing Director device. See [“Performing a QFabric Switch Recovery Installation on the Director Group”](#) on page 410.

After performing the recovery installation, the new Director device will synchronize its database with the existing Director device.

6. Verify that the QFX3100 Director device has been added to the QFX3000 QFabric system using the `show fabric administration inventory operational-mode` CLI command.

### Related Documentation

- [Example: Configuring the Virtual Chassis for the QFabric Switch Control Plane](#)
- [Removing a QFX3100 Director Device from a Rack or Cabinet](#) on page 299

## Adding or Replacing a QFX3008-I Interconnect Device in a QFX3000-G QFabric System

The Director group in a QFX3000-G QFabric system automatically recognizes when devices are added or replaced in the QFabric system. The Director group sends each device its own portion of the Junos OS configuration and adds them to the QFabric system inventory. You can install up to four QFX3008-I Interconnect devices in a QFX3000-G QFabric system.



**CAUTION:** The QFX3000-G QFabric system might experience data loss during this procedure. Data will continue to be forwarded through QFX3008-I Interconnect devices that are not powered down during this procedure, but available network bandwidth is reduced.

Before you add or replace a QFX3008-I Interconnect device in a QFX3000-G QFabric system:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage”](#) on page 192.
- Ensure that you do not need to forward traffic through the device.
- If possible, install the replacement QFX3008-I Interconnect device and connect it to power to minimize the amount of time it will take to replace the device.

Ensure that you have the following parts and tools available to power off the device:

- An ESD grounding strap
- An external management device such as a PC
- An RJ-45 to DB-9 rollover cable to connect the external management device to the console port

To add or replace a QFX3008-I Interconnect Device in a QFX3000 QFabric system:

1. If you are replacing a device, power off the QFX3008-I Interconnect device that you will remove from the QFabric system. See [“Powering Off a QFX3008-I Interconnect Device”](#) on page 296.
2. Uncable the old device. Label each cable as you remove it, so that you can easily connect the replacement Interconnect device.
3. Connect the new QFX3008-I Interconnect device to the QFX3000-G QFabric system control plane network. See [“Connecting a QFX3008-I Interconnect Device to the Control Plane Network”](#) on page 278.

4. Connect the QFX3008-I Interconnect device to each QFX3500 Node device for data plane interconnection. See [“Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device” on page 284](#).
5. Verify that the QFX3008-I Interconnect device has been added to the QFX3000-G QFabric system using the `show fabric administration inventory operational-mode CLI` command.

**Related  
Documentation**

- [Example: Configuring the Virtual Chassis for the QFabric Switch Control Plane](#)
- [Removing a QFX3008-I Interconnect Device from a Rack or Cabinet on page 300](#)

## Adding or Replacing a QFX3500 Node Device in a QFX3000-G QFabric System

The Director group in a QFX3000-G QFabric system automatically recognizes when devices are added or replaced in the QFabric system. The Director group sends each device its own portion of the Junos OS configuration and adds them to the QFabric system inventory. You can install up to 128 QFX3500 Node devices in a QFX3000-G QFabric system.



**CAUTION:** The QFX3000-G QFabric system might experience data loss during this procedure. Data loss can occur even when removing a device from a redundant server Node group. If this is a planned maintenance operation, take necessary measures to prevent data loss, such as powering off servers attached to the QFX3500 Node device access ports, before you begin the procedure.



**NOTE:** If you previously used the QFX3500 Node device as a standalone switch and had advanced feature licenses installed, you can transfer those licenses to a new device.

Before you add or replace a QFX3500 Node device in a QFX3000-G QFabric system:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage”](#) on page 192.
- Ensure that you do not need to forward traffic through the device.
- If possible, install the replacement QFX3500 Node device to minimize the amount of time it will take to replace the device.

Ensure that you have the following parts and tools available to power off the device:

- An ESD grounding strap
- An external management device such as a PC
- An RJ-45 to DB-9 rollover cable to connect the external management device to the console port

To add or replace a QFX3500 Node device in a QFX3000-G QFabric system:

1. If you are replacing a device, power off the QFX3500 Node device that you will remove from the QFabric system. See [“Powering Off a QFX3500 Device”](#) on page 298.
2. Uncable the old device. Label each cable as you remove it, so that you can easily connect the replacement Node device.
3. If the new device is using Junos 11.2 or earlier, upgrade the software on the new device to the Junos OS release currently running in the QFX3000 QFabric switch. See [Upgrading Software on a QFX3500 Switch](#).

4. Ensure that the QFX3500 Node device you are adding to the QFabric switch is set to fabric mode. By default, the QFX3500 Node devices work as standalone switches. You perform this step using the console (**CON**) port on each QFX3500 Node device. You can leave the QFX3500 Node device powered on. See [Converting the Device Mode for a QFabric Switch Component](#).
5. Connect the QFX3500 Node device to the QFX3000 QFabric switch control plane network. See [“Connecting a QFX3500 Node Device to the Control Plane Network” on page 282](#).
6. Connect the QFX3500 Node device to each QFX3008-I Interconnect device for data plane interconnection. See [“Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device” on page 284](#).
7. Verify that the QFX3500 Node device has been added to the QFX3000-G QFabric system using the `show fabric administration inventory operational-mode` CLI command.
8. If you need to delete an alias for the old Node device, configure an alias for the new Node device, or add it to a Node group, log onto the QFabric system through the default partition on the Director group. See [Gaining Access to the QFabric Switch Through the Default Partition](#), [Configuring Aliases for the QFabric Switch](#), and [Configuring Node Groups for the QFabric Switch](#).



**TIP:** By default the Node devices are identified using their hardware serial number. Aliases take the place of the hardware serial numbers and help to simplify configuration tasks.

**Related Documentation**

- [Example: Configuring the Virtual Chassis for the QFabric Switch Control Plane](#)
- [Removing a QFX3500 Device from a Rack or Cabinet on page 302](#)



# Replacing QFX3100 Components

- [Installing and Removing QFX3100 Director Device Hardware Components on page 309](#)
- [Removing a Power Supply from a QFX3100 Director Device on page 310](#)
- [Installing a Power Supply in a QFX3100 Director Device on page 311](#)
- [Removing a Fan Module from a QFX3100 Director Device on page 312](#)
- [Installing a Fan Module in a QFX3100 Director Device on page 314](#)
- [Removing a Network Module from a QFX3100 Director Device on page 315](#)
- [Installing a Network Module in a QFX3100 Director Device on page 316](#)
- [Removing an HDD Module from a QFX3100 Director Device on page 317](#)
- [Installing an HDD Module in a QFX3100 Director Device on page 318](#)

## Installing and Removing QFX3100 Director Device Hardware Components

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The field-replaceable units (FRUs) in a QFX3100 Director device are:

- Power supply
- Fan modules
- Hard disk drive (HDD) modules
- Network modules

The AC power supply and fan modules are hot-removable and hot-swappable. You can remove and replace them without powering off the Director device or disrupting device functions.

A single HDD module is hot-removable and hot-swappable. You can remove and replace them without powering off the Director device or disrupting device functions. Do not remove both HDD modules at the same time, however.

The network module is not hot-removable or hot-swappable. You should power off the Director device if you need to remove or insert a network module.

See these topics for instructions for installing and removing components:

- [Installing a Power Supply in a QFX3100 Director Device on page 311](#)
- [Removing a Power Supply from a QFX3100 Director Device on page 310](#)

- [Installing a Fan Module in a QFX3100 Director Device on page 314](#)
- [Removing a Fan Module from a QFX3100 Director Device on page 312](#)
- [Installing an HDD Module in a QFX3100 Director Device on page 318](#)
- [Removing an HDD Module from a QFX3100 Director Device on page 317](#)
- [Installing a Network Module in a QFX3100 Director Device on page 316](#)
- [Removing a Network Module from a QFX3100 Director Device on page 315](#)

**Related Documentation**

- [Cooling System and Airflow in a QFX3100 Director Device on page 27](#)
- [AC Power Supply in a QFX3100 Director Device on page 30](#)
- [Network Modules in a QFX3100 Director Device on page 28](#)
- [HDD Modules in a QFX3100 Director Device on page 29](#)

## Removing a Power Supply from a QFX3100 Director Device

The AC power supply in a QFX3100 Director device is a hot-removable and hot-insertable field-replaceable unit (FRU) located on the far right side of the rear panel. Two AC power supplies can be installed in a QFX3100 Director device. You can remove and replace a single AC power supply without powering off the QFX3100 Director device or disrupting QFX3100 Director device functions.

Before you remove an AC power supply from the QFX3100 Director device:

- Ensure that you understand how to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).

Ensure that you have the following parts and tools available to remove an AC power supply from a QFX3100 Director device:

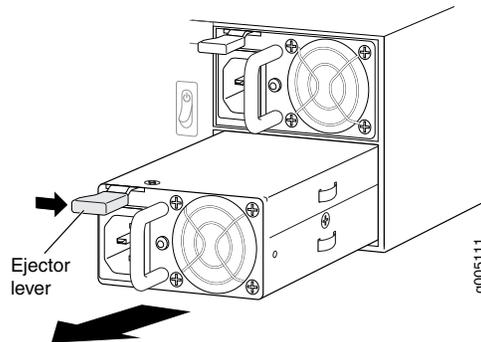
- ESD grounding strap
- Antistatic bag or antistatic mat
- Replacement power supply for the power supply slot

To remove an AC power supply from a QFX3100 Director device (see [Figure 88 on page 311](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to a site ESD point.
2. Remove the power cord from the AC appliance inlet on the AC power supply faceplate.
3. Push the power supply faceplate ejector lever to the right while pulling the power supply away from the QFX3100 Director device to release the latch. Stop pulling the power supply once the lever is released.

4. Taking care not to touch power supply components, pins, leads, or solder connections, place one hand under the power supply to support it. Grasp the power supply handle with your other hand and pull the power supply completely out of the chassis.
5. Place the power supply in the antistatic bag or on the antistatic mat.

**Figure 88: Removing a Power Supply from a QFX3100 Director Device**



**Related Documentation**

- [Installing a Power Supply in a QFX3100 Director Device on page 311](#)
- [AC Power Supply in a QFX3100 Director Device on page 30](#)

## Installing a Power Supply in a QFX3100 Director Device

The AC power supply in a QFX3100 Director device is a hot-removable and hot-insertable field-replaceable unit (FRU) located on the far right side of the rear panel. Two AC power supplies are installed in a QFX3100 Director device. You can remove and replace a single AC power supply without powering off the QFX3100 Director device or disrupting QFX3100 Director device functions.

Before you install an AC power supply in the QFX3100 Director device:

- Ensure that you understand how to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).

Ensure that you have the following parts and tools available to install an AC power supply:

- ESD grounding strap

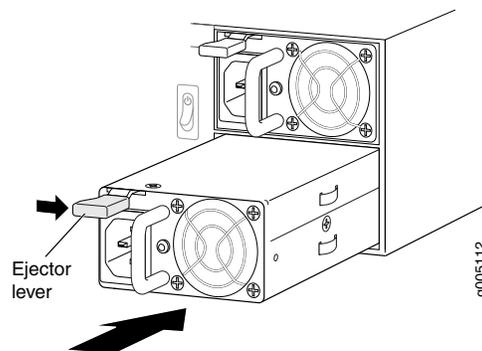


**NOTE:** Each AC power supply must be connected to a dedicated AC power source outlet.

To install an AC power supply in the QFX3100 Director device (see [Figure 89 on page 312](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to a site ESD point.
2. If the power supply slot has a power supply in it that needs to be removed, remove the power supply. See [“Removing a Power Supply from a QFX3100 Director Device” on page 310](#).
3. Taking care not to touch power supply components, pins, leads, or solder connections, remove the power supply from its bag.
4. Using one hand on the faceplate handle and the other hand on the bottom of the power supply to support its weight, gently slide the power supply straight into the power supply slot until the power supply reaches a point where backpressure prevents the power supply from pushing forward; do not force the power supply fully into the slot at this point of the procedure.
5. Use your thumb to move the ejector lever at the top of the power supply faceplate to the right, and push the power supply flush into the back of the chassis. Release the latch.

**Figure 89: Installing a Power Supply in a QFX3100 Director Device**



**Related Documentation**

- [AC Power Supply in a QFX3100 Director Device on page 30](#)
- [AC Power Cord Specifications for a QFX3100 Director Device on page 135](#)
- [Rear Panel of a QFX3100 Director Device on page 26](#)

## Removing a Fan Module from a QFX3100 Director Device

QFX3100 Director devices have three fan modules on the rear panel. The fan modules are hot-removable and hot-insertable field-replaceable units (FRUs). You can remove and replace a fan module without powering off the QFX3100 Director device or disrupting QFX3100 Director device functions.

Before you begin removing a fan module from a QFX3100 Director device:

- Ensure that you understand how to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage”](#) on page 192.

Ensure that you have the following parts and tools available:

- ESD grounding strap
- Antistatic bag or antistatic mat
- A Phillips (+) screwdriver, number 2
- Replacement fan module for the fan module slot

To remove a fan module from a QFX3100 Director device (see [Figure 90](#) on page 313):

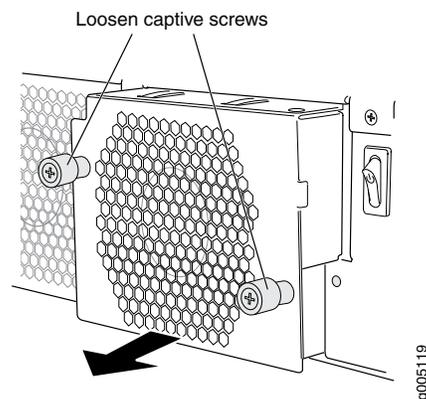
1. Attach the ESD grounding strap to your bare wrist, and connect the strap to a site ESD point.
2. Place the antistatic bag or the antistatic mat on a flat, stable surface.
3. Unscrew both captive screws counterclockwise using your fingers. If you are unable to easily unscrew the captive screws with your fingers, use the screwdriver.



**WARNING:** To avoid injury, do not touch the fan with your hands or any tools as you slide the fan module out of the chassis—the fan might still be running.

4. When the fan stops spinning, grasp the fan module tightly to avoid dropping it and remove the fan module from the fan module slot.
5. Place the fan module in the antistatic bag or on the antistatic mat.

**Figure 90: Removing a Fan Module from a QFX3100 Director Device**



**Related Documentation**

- [Installing a Fan Module in a QFX3100 Director Device](#) on page 314
- [Fan Modules in a QFX3100 Director Device](#) on page 29

## Installing a Fan Module in a QFX3100 Director Device

QFX3100 Director devices have three field-replaceable unit (FRU) fan modules on the back panel. The fans are hot-removable and hot-insertable FRUs: You can remove and replace them without powering off the QFX3100 Director device or disrupting QFX3100 Director device functions.

Before you begin installing a fan module in a QFX3100 Director device:

- Ensure that you understand how to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage”](#) on page 192.

Ensure that you have the following parts and tools available:

- ESD grounding strap

To install a fan module in a QFX3100 Director device (see [Figure 91](#) on page 314):

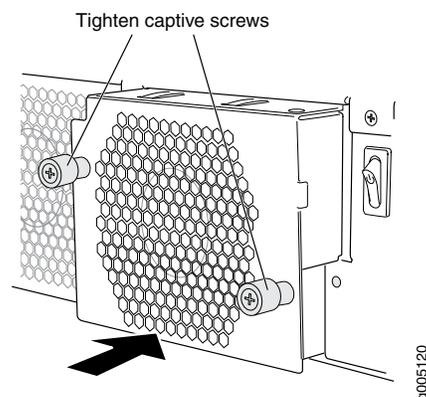
1. Attach the ESD grounding strap to your bare wrist, and connect the strap to a site ESD point.
2. Remove the fan module from its bag.
3. Ensure that the fan module is properly aligned with the fan module slot.



**WARNING:** To avoid injury, do not touch the fan with your hands or any tools as you slide the fan module into the chassis—the fan may start running.

4. Insert the fan module into the fan module slot, and gently push the module all the way into the slot until the module is seated flush in the fan module slot.
5. Tighten both screws on the fan module using your fingers.

**Figure 91: Installing a Fan Module in a QFX3100 Director Device**



- Related Documentation**
- [Removing a Fan Module from a QFX3100 Director Device on page 312](#)
  - [Rear Panel of a QFX3100 Director Device on page 26](#)

## Removing a Network Module from a QFX3100 Director Device

QFX3100 Director devices support up to two network modules on the front panel. The network modules are field-replaceable units (FRUs).



**NOTE:** The Director device requires powering off before installation or removal of the network module.

Before you begin removing a network module from a QFX3100 Director device:

- Ensure that you understand how to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).

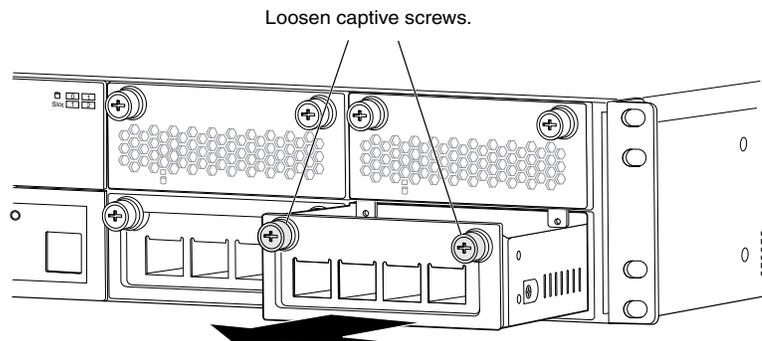
Ensure that you have the following parts and tools available:

- ESD grounding strap
- Phillips (+) screwdriver, number 2
- Antistatic bag or antistatic mat

To remove a network module from a QFX3100 Director device (see [Figure 92 on page 316](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to a site ESD point.
2. Place the antistatic bag or the antistatic mat on a flat, stable surface.
3. Power off the Director device. See [“Powering Off a QFX3100 Director Device” on page 295](#)
4. Unscrew both captive screws counterclockwise using your fingers. If you are unable to easily unscrew the captive screws with your fingers, use the screwdriver.
5. Gently pull the network module toward you and out of the network module slot, being careful to keep one hand underneath the module to support it when it is removed from the chassis.
6. Place the network module in the antistatic bag or on the antistatic mat.

Figure 92: Removing a Network Module from a QFX3100 Director Device



#### Related Documentation

- [Installing a Network Module in a QFX3100 Director Device on page 316](#)
- [Network Modules in a QFX3100 Director Device on page 28](#)

## Installing a Network Module in a QFX3100 Director Device

QFX3100 Director devices have two network module slots on the front panel. Network modules are field-replacable units (FRUs).



**NOTE:** The Director device requires powering off before installation or removal of the network module.

Before you begin installing a network module in a QFX3100 Director device:

- Ensure that you understand how to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).

Ensure that you have the following parts and tools available:

- ESD grounding strap

To install a network module in a QFX3100 Director device (see [Figure 93 on page 317](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to a site ESD point.
2. Power off the QFX3100 Director device. See [“Powering Off a QFX3100 Director Device” on page 295](#).
3. If the network module slot has an installed network module, remove the network module. See [“Removing a Network Module from a QFX3100 Director Device” on page 315](#).
4. Taking care not to touch network module components, pins, leads, or solder connections, remove the network module from its bag.

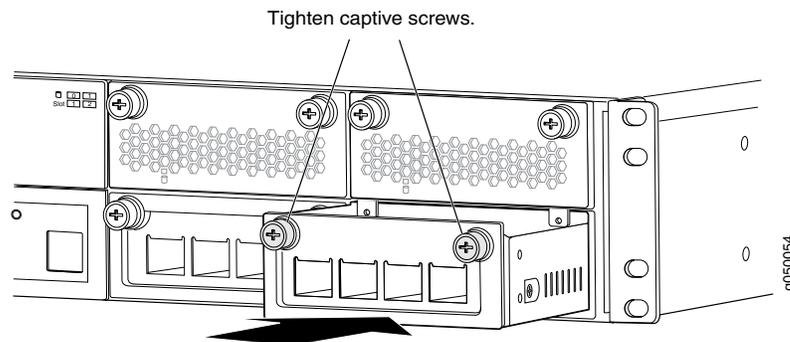
5. Ensure that the network module is properly aligned with the network module slot. The network module faceplate should be aligned so the ports are numbered 0 through 3 from left to right.
6. Insert the network module into the network module slot, and gently push the module all the way into the slot until the module is seated flush in the network module slot.



**CAUTION:** Do not use too much force to seat the network module flush into the network module slot. If backpressure is preventing the network module from seating flush in the network module slot, remove the network module from the slot and retry the procedure, taking care to ensure that the network module is properly aligned with the network module slot.

7. Tighten both screws on the network module, using your fingers.
8. Power on the QFX3100 Director device. See [“Powering On a QFX3100 Director Device” on page 220](#).

**Figure 93: Installing a Network Module in a QFX3100 Director Device**



- Related Documentation**
- [Network Modules in a QFX3100 Director Device on page 28](#)
  - [Rear Panel of a QFX3100 Director Device on page 26](#)

## Removing an HDD Module from a QFX3100 Director Device

QFX3100 Director devices have two 2-terabyte (TB) hard disk drive (HDD) module slots on the front panel. HDD modules are field-replaceable units (FRUs). At least one HDD module should always be installed in a QFX3100 Director device.

Before you begin removing an HDD module from a QFX3100 Director device:

- Ensure that you understand how to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).

Ensure that you have the following parts and tools available:

- ESD grounding strap
- Phillips (+) screwdriver, number 2
- Antistatic bag or antistatic mat
- Replacement HDD module for the HDD module slot

To remove an HDD module from a QFX3100 Director device (see [Figure 94 on page 318](#)):

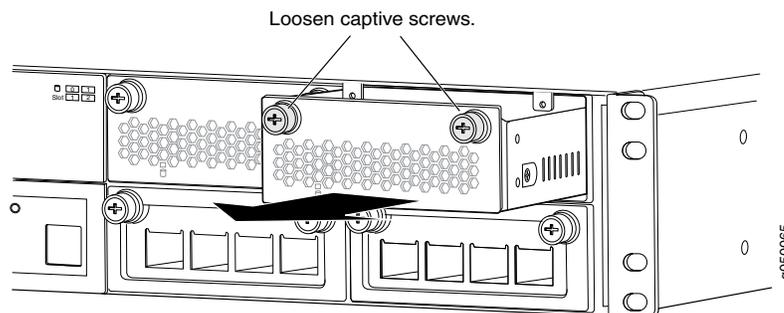
1. Attach the ESD grounding strap to your bare wrist, and connect the strap to a site ESD point.
2. Place the antistatic bag or the antistatic mat on a flat, stable surface.
3. Unscrew both captive screws counterclockwise using your fingers. If you are unable to unscrew the captive screws using your fingers, use the screwdriver.
4. Gently pull the HDD module toward you and out of the HDD module slot, being careful to keep one hand underneath the module to support it when it is removed from the chassis.



**NOTE:** If the Director device is powered on, at least one HDD module must be installed at all times. This step should only be performed when an HDD module in the other HDD slot is installed and operational.

5. Place the HDD module in the antistatic bag or on the antistatic mat.

**Figure 94: Removing an HDD Module from a QFX3100 Director Device**



**Related Documentation**

- [Installing an HDD Module in a QFX3100 Director Device on page 318](#)
- [HDD Modules in a QFX3100 Director Device on page 29](#)

## Installing an HDD Module in a QFX3100 Director Device

QFX3100 Director devices have two 2-terabyte (TB) hard disk drive (HDD) module slots on the front panel. HDD modules are field-replaceable units (FRUs).

Before you begin installing an HDD module in a QFX3100 Director device:

- Ensure that you understand how to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage”](#) on page 192.

Ensure that you have the following parts and tools available:

- ESD grounding strap

To install an HDD module in a QFX3100 Director device (see [Figure 95](#) on page 319):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to a site ESD point.
2. Taking care not to touch HDD module components, pins, leads, or solder connections, remove the HDD module from its bag.
3. If the Director device is powered on, at least one HDD module must be installed at all times. You should only perform this step when an HDD module in the other HDD slot is installed and operational.

If an HDD module in the HDD module slot needs to be removed, remove the HDD module. See [“Removing an HDD Module from a QFX3100 Director Device”](#) on page 317

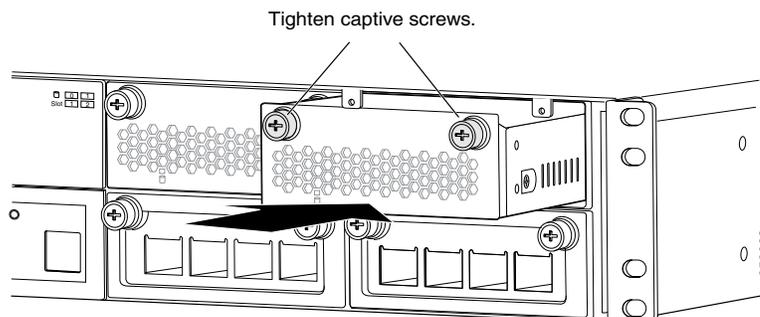
4. Ensure that the HDD module is properly aligned with the HDD module slot. The HDD module faceplate should be aligned so the screws are aligned with the top of the HDD module slot.
5. Insert the HDD module into the HDD module slot, and gently push the module all the way into the slot until the module is seated flush in the HDD module slot.



**CAUTION:** If backpressure prevents the HDD module from seating flush in the HDD module slot, remove the HDD module from the slot and retry the procedure, taking care to ensure that the HDD module is properly aligned with the HDD module slot.

6. Tighten both screws on the HDD module, using your fingers.

**Figure 95: Installing an HDD Module in a QFX3100 Director Device**



- Related Documentation**
- [HDD Modules in a QFX3100 Director Device on page 29](#)
  - [Rear Panel of a QFX3100 Director Device on page 26](#)

# Replacing QFX3008-I Components

- Installing and Removing QFX3008-I Interconnect Device Hardware Components on page 322
- Removing an AC Power Supply from a QFX3008-I Interconnect Device on page 323
- Installing an AC Power Supply in a QFX3008-I Interconnect Device on page 324
- Removing a Wiring Tray from a QFX3008-I Interconnect Device on page 326
- Installing a Wiring Tray in a QFX3008-I Interconnect Device on page 328
- Removing a Bottom Fan Tray and Front Panel Display from a QFX3008-I Interconnect Device on page 329
- Installing a Bottom Fan Tray and Front Panel Display in a QFX3008-I Interconnect Device on page 331
- Removing a Side Fan Tray from a QFX3008-I Interconnect Device on page 332
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- Taking a Control Board Offline in a QFX3008-I Interconnect Device on page 345
- Removing a Control Board from a QFX3008-I Interconnect Device on page 347
- Installing a Control Board in a QFX3008-I Interconnect Device on page 349
- Taking a 16-Port QSFP+ Front Card Offline in a QFX3008-I Interconnect Device on page 351
- Removing a 16-Port QSFP+ Front Card from a QFX3008-I Interconnect Device on page 352
- Installing a 16-Port QSFP+ Front Card in a QFX3008-I Interconnect Device on page 353
- Taking the Rear Card Offline in a QFX3008-I Interconnect Device on page 355
- Removing a Rear Card from a QFX3008-I Interconnect Device on page 356
- Installing a Rear Card in a QFX3008-I Interconnect Device on page 358

## Installing and Removing QFX3008-I Interconnect Device Hardware Components

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The field-replaceable units (FRUs) in a QFX3008-I Interconnect device are:

- Control Boards
- Fan trays
- Air filters
- 16-port QSFP+ front cards
- Rear cards
- QSFP+ and SFP+ transceivers
- Power supplies
- Wiring trays

The FRUs in a QFX3008-I Interconnect device are hot-insertable and hot-removable: you can remove and replace these components while the device is functioning without turning off power to the device or disrupting the device function. However, we recommend that you take the 16-port QSFP+ front cards and the rear cards offline before you remove them. You must take Control Boards offline before you remove them. See [“Field-Replaceable Units in a QFX3008-I Interconnect Device” on page 38](#) for details.

To install a Control Board in a QFX3008-I Interconnect device, follow the instructions in [“Installing a Control Board in a QFX3008-I Interconnect Device” on page 349](#). To remove a Control Board from a QFX3008-I Interconnect device, follow the instructions in [“Removing a Control Board from a QFX3008-I Interconnect Device” on page 347](#).

To install a fan tray in a QFX3008-I Interconnect device, follow the instructions in [“Installing a Bottom Fan Tray and Front Panel Display in a QFX3008-I Interconnect Device” on page 331](#), [“Installing a Side Fan Tray in a QFX3008-I Interconnect Device” on page 334](#), and [“Installing a Top Fan Tray in a QFX3008-I Interconnect Device” on page 337](#). To remove a fan tray from a QFX3008-I Interconnect device, follow the instructions in [“Removing a Bottom Fan Tray and Front Panel Display from a QFX3008-I Interconnect Device” on page 329](#), [“Removing a Side Fan Tray from a QFX3008-I Interconnect Device” on page 332](#), and [“Removing a Top Fan Tray from a QFX3008-I Interconnect Device” on page 336](#).

To install an air filter in a QFX3008-I Interconnect device, follow the instructions in [“Installing a Bottom Air Filter in a QFX3008-I Interconnect Device” on page 340](#) and [“Installing a Side Air Filter in a QFX3008-I Interconnect Device” on page 343](#). To remove an air filter from a QFX3008-I Interconnect device, follow the instructions in [“Removing a Bottom Air Filter from a QFX3008-I Interconnect Device” on page 338](#) and [“Removing a Side Air Filter from a QFX3008-I Interconnect Device” on page 341](#).

To install a 16-port QSFP+ front card in a QFX3008-I Interconnect device, follow the instructions in [“Installing a 16-Port QSFP+ Front Card in a QFX3008-I Interconnect Device” on page 353](#). To remove a 16-port QSFP+ front card from a QFX3008-I Interconnect device,

follow the instructions in [“Removing a 16-Port QSFP+ Front Card from a QFX3008-I Interconnect Device”](#) on page 352.

To install a rear card in a QFX3008-I Interconnect device, follow the instructions in [“Installing a Rear Card in a QFX3008-I Interconnect Device”](#) on page 358. To remove a rear card from a QFX3008-I Interconnect device, follow the instructions in [“Removing a Rear Card from a QFX3008-I Interconnect Device”](#) on page 356.

To install a transceiver in a QFX3008-I Interconnect device, follow the instructions in [“Installing a Transceiver in a QFX Series Device”](#) on page 374. To remove a transceiver from a QFX3008-I Interconnect device, follow the instructions in [“Removing a Transceiver from a QFX Series Device”](#) on page 373.

To install a power supply in a QFX3008-I Interconnect device, follow the instructions in [“Installing an AC Power Supply in a QFX3008-I Interconnect Device”](#) on page 324. To remove a power supply from a QFX3008-I Interconnect device, follow the instructions in [“Removing an AC Power Supply from a QFX3008-I Interconnect Device”](#) on page 323.

To install a wiring tray in a QFX3008-I Interconnect device, follow the instructions in [“Installing a Wiring Tray in a QFX3008-I Interconnect Device”](#) on page 328. To remove a wiring tray from a QFX3008-I Interconnect device, follow the instructions in [“Removing a Wiring Tray from a QFX3008-I Interconnect Device”](#) on page 326.

#### Related Documentation

- [QFX3008-I Interconnect Device Overview](#) on page 33

## Removing an AC Power Supply from a QFX3008-I Interconnect Device

The AC power supply in a QFX3008-I Interconnect device is a hot-insertable and hot-removable field-replaceable unit (FRU). Six AC power supplies are installed in the chassis. All power supplies install in the rear of the chassis in the slots provided at the bottom. See [“Slot Numbering for a QFX3008-I Interconnect Device”](#) on page 40.

Before you remove an AC power supply from the device, ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage”](#) on page 192.

Ensure that you have the following parts and tools available to remove an AC power supply from a QFX3008-I Interconnect device:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1
- Replacement power supply

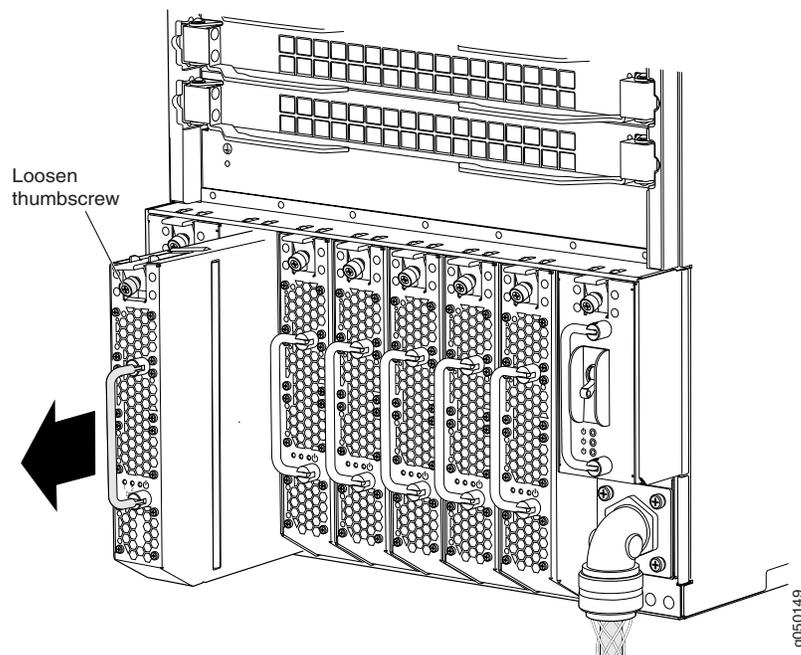


**CAUTION:** Do not leave the power supply slot empty while the device is operational. Replace the power supply promptly.

To remove an AC power supply from a QFX3008-I Interconnect device (see [Figure 96](#) on page 324):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Unscrew the captive screw, located at the top of each power supply, counter-clockwise using your fingers. If you cannot easily unscrew the captive screw with your fingers, use the screwdriver.
3. Pull the captive screw away from the faceplate of the power supply to release the latch.
4. Pull the handle away from the faceplate of the power supply until it is perpendicular to the faceplate.
5. Taking care not to touch power supply components, pins, leads, or solder connections, place one hand under the power supply to support it. Grasp the power supply handle with your other hand and pull the power supply completely out of the chassis.

**Figure 96: Removing an AC Power Supply from a QFX3008-I Interconnect Device**



**Related Documentation**

- [AC Power Supply in a QFX3008-I Interconnect Device on page 52](#)
- [Installing an AC Power Supply in a QFX3008-I Interconnect Device on page 324](#)

## Installing an AC Power Supply in a QFX3008-I Interconnect Device

The AC power supply in a QFX3008-I Interconnect device is a hot-insertable and hot-removable field-replaceable unit (FRU). Six AC power supplies are installed in the chassis. All power supplies install in the rear of the chassis in the slots provided at the bottom. See “[Slot Numbering for a QFX3008-I Interconnect Device](#)” on page 40.

Before you install an AC power supply in the device, ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).

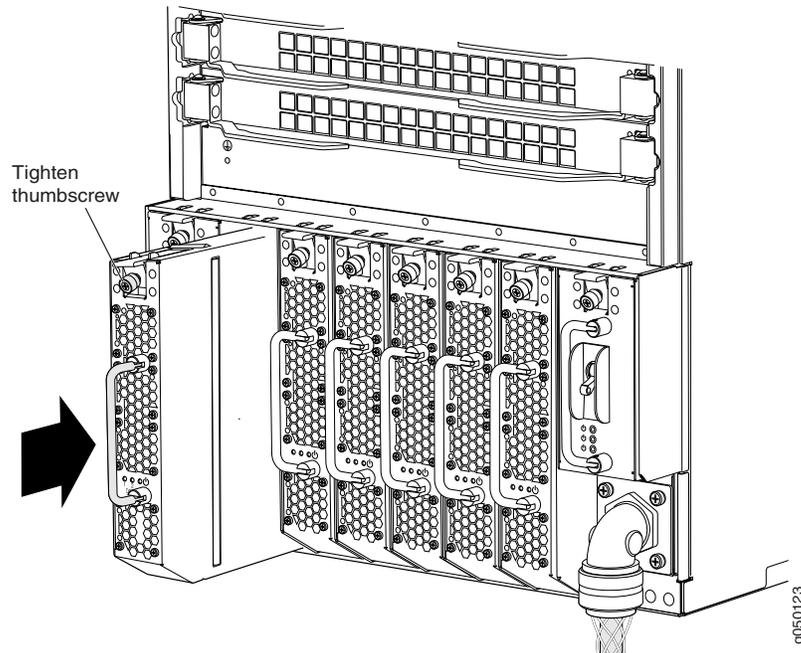
Ensure that you have the following parts and tools available to install an AC power supply in a QFX3008-I Interconnect device:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1

To install an AC power supply in a QFX3008-I Interconnect device (see [Figure 97 on page 326](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Taking care not to touch power supply components, pins, leads, or solder connections, remove the power supply from its bag.
3. Unscrew the captive screw, located at the top of each power supply, counterclockwise using your fingers. If you cannot easily unscrew the captive screw with your fingers, use the screwdriver.
4. Pull the handle away from the faceplate of the power supply until it is perpendicular to the faceplate.
5. Using both hands, place the power supply in the power supply slot on the rear of the device. Slide the power supply straight into the chassis until the power supply is fully seated in the slot. Ensure that the power supply faceplate is flush with any adjacent power supply faceplates.
6. Push the captive screw into the power supply faceplate. Ensure that the screw is seated inside the corresponding hole on the faceplate.
7. Tighten the captive screw using your fingers. When the screw is completely tight, the latch locks into the device chassis.

Figure 97: Installing an AC Power Supply in a QFX3008-I Interconnect Device



**Related Documentation**

- [AC Power Supply in a QFX3008-I Interconnect Device on page 52](#)
- [Removing an AC Power Supply from a QFX3008-I Interconnect Device on page 323](#)

## Removing a Wiring Tray from a QFX3008-I Interconnect Device

The wiring tray in a QFX3008-I Interconnect device is a hot-insertable and hot-removable field-replaceable unit (FRU). Two wiring trays are installed in the rear of the chassis.

Before you remove a wiring tray from the device, ensure that you understand how to prevent ESD damage. See “[Prevention of Electrostatic Discharge Damage](#)” on page 192.

Ensure that you have the following parts and tools available to remove a wiring tray from a QFX3008-I Interconnect device:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1
- Replacement wiring tray

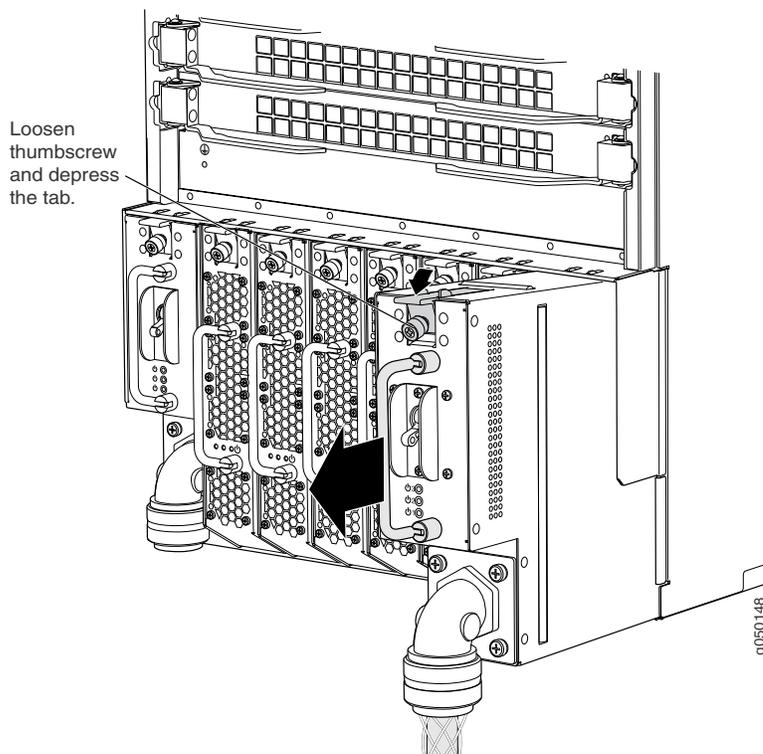


**CAUTION:** Do not leave the wiring tray slot empty while the device is operational. Replace the wiring tray promptly.

To remove a wiring tray from a QFX3008-I Interconnect device (see [Figure 98 on page 327](#)):

1. Set the wiring tray power switch to the OFF (O) position.
2. If the AC power source has a power switch, set it to the OFF (O) position, and unplug the power cord or cords from the AC power source.
3. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
4. Unscrew the captive screw, located at the top of each wiring tray, counterclockwise using your fingers. If you cannot easily unscrew the captive screw with your fingers, use the screwdriver.
5. Taking care not to touch wiring tray components, pins, leads, or solder connections, place one hand under the wiring tray to support it. Grasp the wiring tray handle with your other hand, depress the tab at the top of the wiring tray, and pull the wiring tray completely out of the chassis.

**Figure 98: Removing a Wiring Tray from a QFX3008-I Interconnect Device**



**Related Documentation**

- [Wiring Tray in a QFX3008-I Interconnect Device on page 54](#)
- [Installing a Wiring Tray in a QFX3008-I Interconnect Device on page 328](#)

## Installing a Wiring Tray in a QFX3008-I Interconnect Device

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The wiring tray in a QFX3008-I Interconnect device is a hot-insertable and hot-removable field-replaceable unit (FRU). Two wiring trays are installed in the rear of the chassis.

Before you install a wiring tray in the device, ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage”](#) on page 192.



**NOTE:** AC power cords must be connected to three-phase delta and wye wiring trays before they are installed in the chassis. See [“Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays”](#) on page 246 and [“Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays”](#) on page 250.

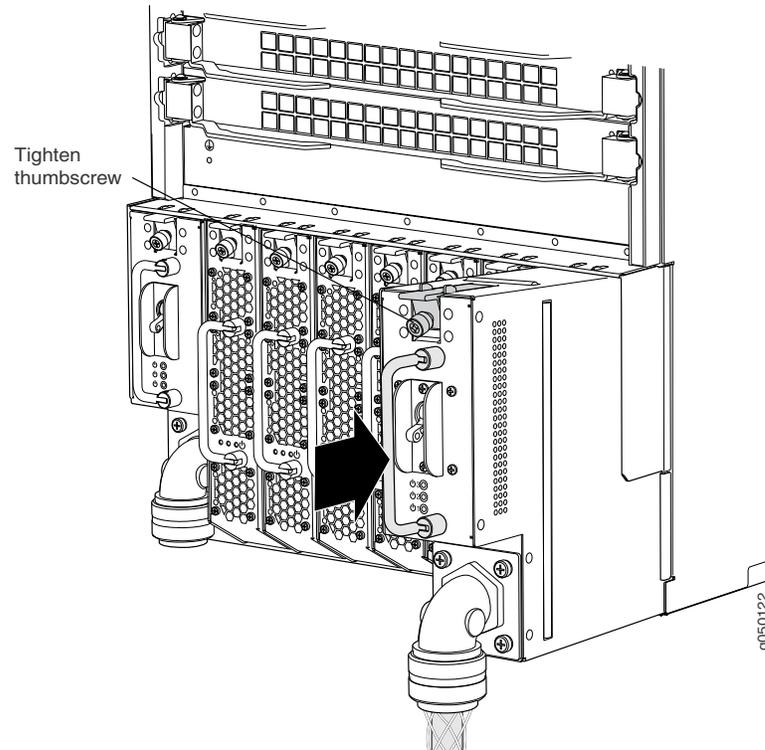
Ensure that you have the following parts and tools available to install a wiring tray in a QFX3008-I Interconnect device:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1

To install a wiring tray in a QFX3008-I Interconnect device (see [Figure 99](#) on page 329):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Set the wiring tray power switch to the OFF (O) position.
3. Unscrew the captive screw, located at the top of each wiring tray, counterclockwise using your fingers. If you cannot easily unscrew the captive screw with your fingers, use the screwdriver.
4. Using both hands, place the wiring tray in the wiring tray slot on the rear of the device. Slide the wiring tray straight into the chassis until the wiring tray is fully seated in the slot.
5. Push the captive screw into the wiring tray faceplate. Ensure that the screw is seated inside the corresponding hole on the faceplate.
6. Tighten the captive screw using your fingers. When the screw is completely tight, the latch locks into the device chassis.

Figure 99: Installing a Wiring Tray in a QFX3008-I Interconnect Device



- Related Documentation**
- [Wiring Tray in a QFX3008-I Interconnect Device on page 54](#)
  - [Removing a Wiring Tray from a QFX3008-I Interconnect Device on page 326](#)

## Removing a Bottom Fan Tray and Front Panel Display from a QFX3008-I Interconnect Device

A QFX3008-I Interconnect device bottom fan tray and front panel display is field-replaceable and is hot-removable and hot-insertable; you can remove and replace the fan tray while the device is running without turning off power to the device or disrupting device functions. The rest of this topic uses bottom fan tray to mean bottom fan tray and front panel display.



**CAUTION:** Do not remove a fan tray unless you have a replacement fan tray available.

The bottom fan tray installs horizontally as part of the panel display located directly below the front card cage. A handle on the panel display faceplate facilitates handling of the fan tray. There is a captive screw at the top of the panel display to secure the fan tray in the chassis.

Before you remove a bottom fan tray, ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage”](#) on page 192.

Ensure that you have the following parts and tools available to remove a fan tray from a QFX3008-I Interconnect device:

- Electrostatic discharge (ESD) grounding strap
- Replacement fan tray
- Phillips (+) screwdriver, number 2



**CAUTION:** The fan trays can be removed and replaced while the QFX3008-I Interconnect device is operating. However, you must replace the fan tray within 2 minutes of removing the fan tray to prevent overheating of the chassis.

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To remove a bottom fan tray from a QFX3008-I Interconnect device (see [Figure 100](#) on page 331):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Unscrew the captive screw counterclockwise using your fingers. If you cannot easily unscrew the captive screw with your fingers, use the screwdriver.
3. Grasp the handle on the right side of the panel display and gently pull the fan tray toward you about 5 in. (13 cm) out of the chassis.

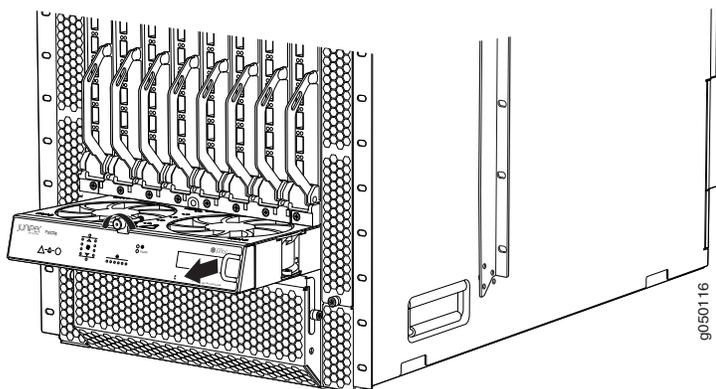


**WARNING:** There is no fan guard on the fans. Be careful to keep your fingers clear of the moving fan blades when you are removing the fan tray. To avoid injury, do not touch the fans with your hands or any tools as you slide the fan tray out of the chassis—the fans might still be spinning.

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4. Wait for approximately 15 seconds to allow all the fans to stop spinning.
5. Slide the fan tray completely out of the chassis.

Figure 100: Removing a Bottom Front Fan Tray from a QFX3008-I Interconnect Device



**Related Documentation**

- [Installing a Bottom Fan Tray and Front Panel Display in a QFX3008-I Interconnect Device on page 331](#)
- [Cooling System and Airflow in a QFX3008-I Interconnect Device on page 44](#)
- [Field-Replaceable Units in a QFX3008-I Interconnect Device on page 38](#)

## Installing a Bottom Fan Tray and Front Panel Display in a QFX3008-I Interconnect Device

A QFX3008-I Interconnect device bottom fan tray and front panel display is field-replaceable and is hot-removable and hot-insertable; you can remove and replace the fan tray while the device is running without turning off power to the device or disrupting device functions. The rest of this topic uses bottom fan tray to mean bottom fan tray and front panel display.

The bottom fan tray installs horizontally as part of the front panel display located directly below the front card cage. A handle on the bottom fan tray faceplate facilitates handling of the fan tray. There is a captive screw at the top of the bottom fan tray to secure the fan tray in the chassis.

Before you install a bottom fan tray, ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).

Ensure that you have the following parts and tools available to install a bottom fan tray in a QFX3008-I Interconnect device:

- Electrostatic discharge (ESD) grounding strap



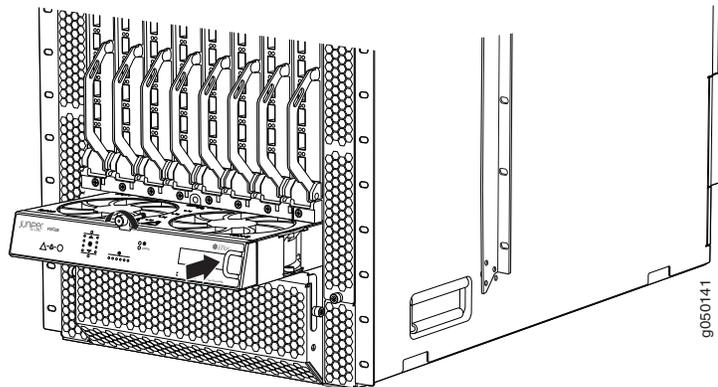
**CAUTION:** The fan trays can be removed and replaced while the QFX3008-I Interconnect device is operating. However, you must replace the fan tray

within 2 minutes of removing the fan tray to prevent overheating of the chassis.

To install a fan tray in a QFX3008-I Interconnect device (see [Figure 101 on page 332](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Hold the handle of the fan tray with one hand and support the weight of the tray with the other hand. Align the tray with the fan tray guides on the fan tray slot. Slide in the fan tray until it is fully seated in the chassis.
3. Tighten the captive screw on the panel display using your fingers.

**Figure 101: Installing a Bottom Fan Tray in a QFX3008-I Interconnect Device**



**Related Documentation**

- [Removing a Bottom Fan Tray and Front Panel Display from a QFX3008-I Interconnect Device on page 329](#)
- [Cooling System and Airflow in a QFX3008-I Interconnect Device on page 44](#)

## Removing a Side Fan Tray from a QFX3008-I Interconnect Device

A QFX3008-I Interconnect device has eight field-replaceable side fan trays. All eight side fan trays are hot-removable and hot-insertable field-replaceable units (FRUs); you can remove and replace the fan tray while the device is running without turning off power to the device or disrupting device functions.



**CAUTION:** Do not remove a fan tray unless you have a replacement fan tray available.

Four fan trays install vertically on the left front of the chassis and four on the right front of the chassis. Handles and captive screws on the two cover panels on each side of the chassis facilitate handling and securing of the fan trays in the chassis.

Before you remove a fan tray, ensure that you understand how to prevent ESD damage. See “Prevention of Electrostatic Discharge Damage” on page 192.

Ensure that you have the following parts and tools available to remove a fan tray from a QFX3008-I Interconnect device:

- Electrostatic discharge (ESD) grounding strap
- Replacement fan tray
- Phillips (+) screwdriver, number 2



**CAUTION:** The fan trays can be removed and replaced while the QFX3008-I Interconnect device is operating. However, you must replace the fan tray within 2 minutes of removing the fan tray to prevent overheating of the chassis.

To remove a fan tray from a QFX3008-I Interconnect device (see [Figure 102 on page 334](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Unscrew the captive screw, located at the top of each cover panel, counterclockwise using your fingers. If you cannot easily unscrew the captive screw with your fingers, use the screwdriver.
3. Hold the screw on the cover panel with one hand while holding the handle with the other. Pull firmly on the screw to detach the cover panel.
4. Pull on the small handle to slide the fan tray out about 5 in. (13 cm) out of the chassis.



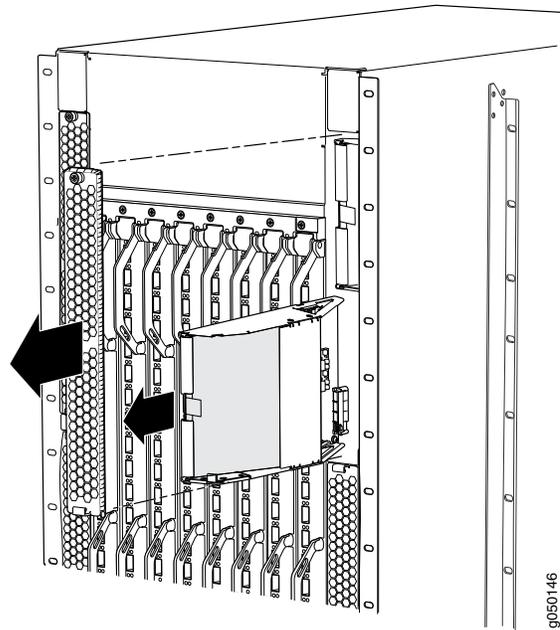
**WARNING:** There is no fan guard on the fans. Be careful to keep your fingers clear of the moving fan blades when you are removing the fan tray. To avoid injury, do not touch the fans with your hands or any tools as you slide the fan tray out of the chassis—the fans might still be spinning.



**CAUTION:** Do not attempt to pull the fan tray out by the air filter tab, located in the center of the module. You can damage the air filter.

5. Wait for approximately 15 seconds to allow all the fans to stop spinning.
6. Slide the fan tray completely out of the chassis, being careful to use your other hand to support the weight.

Figure 102: Removing a Side Fan Tray from a QFX3008-I Interconnect Device



**Related Documentation**

- [Installing a Side Fan Tray in a QFX3008-I Interconnect Device on page 334](#)
- [Cooling System and Airflow in a QFX3008-I Interconnect Device on page 44](#)
- [Field-Replaceable Units in a QFX3008-I Interconnect Device on page 38](#)

## Installing a Side Fan Tray in a QFX3008-I Interconnect Device

A QFX3008-I Interconnect device has eight field-replaceable side fan trays. All eight side fan trays are hot-removable and hot-insertable field-replaceable units (FRUs); you can remove and replace the fan tray while the device is running without turning off power to the device or disrupting device functions.

Four fan trays install vertically on the left front of the chassis and four on the right front of the chassis. Handles and captive screws on the two cover panels on each side of the chassis facilitate handling and securing of the fan trays in the chassis.

Before you begin to install a fan tray, ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).

Ensure that you have the following parts and tools available to install a fan tray in a QFX3008-I Interconnect device:

- Electrostatic discharge (ESD) grounding strap
- Replacement fan tray

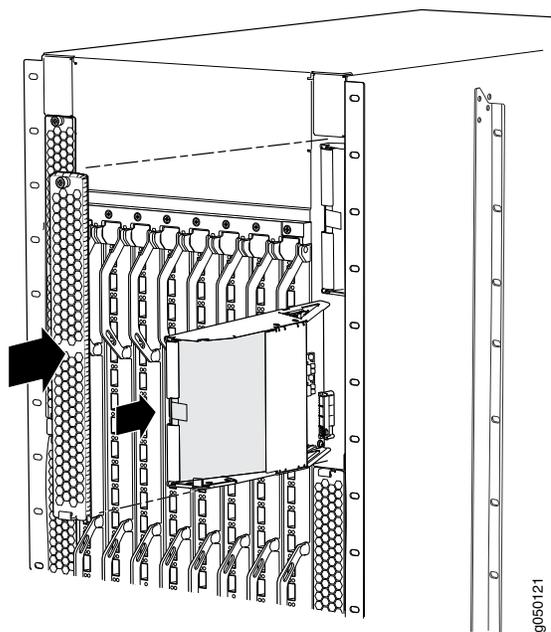


**CAUTION:** The fan trays can be removed and replaced while the QFX3008-I Interconnect device is operating. However, you must replace the fan tray within 2 minutes of removing the fan tray to prevent overheating of the chassis.

To install a fan tray in a QFX3008-I Interconnect device (see [Figure 103 on page 335](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Hold the handle of the fan tray with one hand and support the weight of the tray with the other hand. Align the tray with the fan tray guides on the fan tray slot. Slide in the fan tray until it is fully seated in the chassis.
3. Hold the handle and the screw of the cover panel and align the cover panel at a slight angle to attach the handle end in to the slot.
4. Push the screw end of the cover panel in to the chassis.
5. Tighten the captive screw on the cover panel using your fingers.

**Figure 103: Installing a Side Fan Tray in a QFX3008-I Interconnect Device**



**Related Documentation**

- [Cooling System and Airflow in a QFX3008-I Interconnect Device on page 44](#)
- [Removing a Side Fan Tray from a QFX3008-I Interconnect Device on page 332](#)

## Removing a Top Fan Tray from a QFX3008-I Interconnect Device

A QFX3008-I Interconnect device top fan tray is field-replaceable, and is hot-removable and hot-insertable; you can remove and replace the fan tray while the device is running without turning off power to the device or disrupting switching functions.



**CAUTION:** Do not remove a fan tray unless you have a replacement fan tray available.

The top fan tray installs horizontally at the top on the back of the chassis, behind a cover door. There are two captive screws at the top of the cover door to secure the cover door to the chassis.

Before you remove a top fan tray, ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).

Ensure that you have the following parts and tools available to remove a top fan tray from a QFX3008-I Interconnect device:

- Electrostatic discharge (ESD) grounding strap
- Replacement top fan tray
- Phillips (+) screwdriver, number 2



**CAUTION:** The fan trays can be removed and replaced while the QFX3008-I Interconnect device is operating. However, you must replace the fan tray within 2 minutes of removing the fan tray to prevent overheating of the chassis.

To remove a fan tray from a QFX3008-I Interconnect device (see [Figure 104 on page 337](#)):

1. Attach the electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Unscrew the captive screws on the cover door counterclockwise using your fingers. If you cannot easily unscrew the captive screws with your fingers, use the screwdriver.
3. Open the door, being careful to lower it gently, until it stops.
4. Turn the latch, located in the center of the fan tray, counterclockwise to release the tray.
5. Pull firmly on the latch to slide the fan tray about 5 in. (13 cm) out of the chassis.

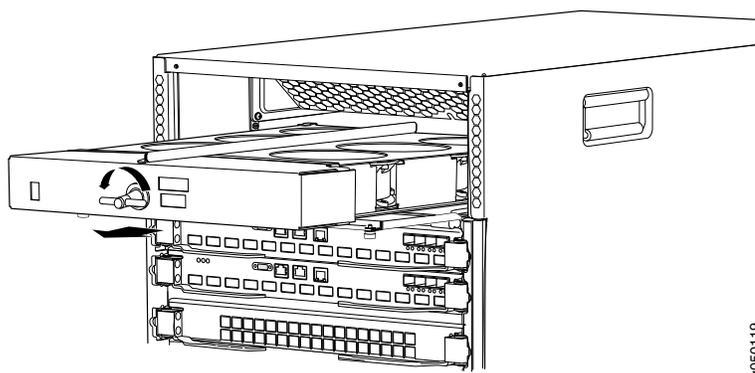


**WARNING:** There is no fan guard on the fans. Be careful to keep your fingers clear of the moving fan blades when you are removing the fan tray.

To avoid injury, do not touch the fans with your hands or any tools as you slide the fan tray out of the chassis—the fans might still be spinning.

6. Wait for approximately 15 seconds to allow all the fans to stop spinning.
7. Slide the fan tray completely out of the chassis.

**Figure 104: Removing a Top Fan Tray from a QFX3008-I Interconnect Device**



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**Related Documentation**

- [Installing a Top Fan Tray in a QFX3008-I Interconnect Device on page 337](#)
- [Cooling System and Airflow in a QFX3008-I Interconnect Device on page 44](#)
- [Field-Replaceable Units in a QFX3008-I Interconnect Device on page 38](#)

## Installing a Top Fan Tray in a QFX3008-I Interconnect Device

A QFX3008-I Interconnect device top fan tray is field-replaceable, and is hot-removable and hot-insertable; you can remove and replace the fan tray while the device is running without turning off power to the device or disrupting switching functions.

The top fan tray installs horizontally at the top on the back of the chassis, behind a cover door. There are two captive screws at the top of the cover door to secure the cover door to the chassis.

Before you begin to install a fan tray, ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).

Ensure that you have the following parts and tools available to install a fan tray in a QFX3008-I Interconnect device:

- Electrostatic discharge (ESD) grounding strap
- Replacement fan tray

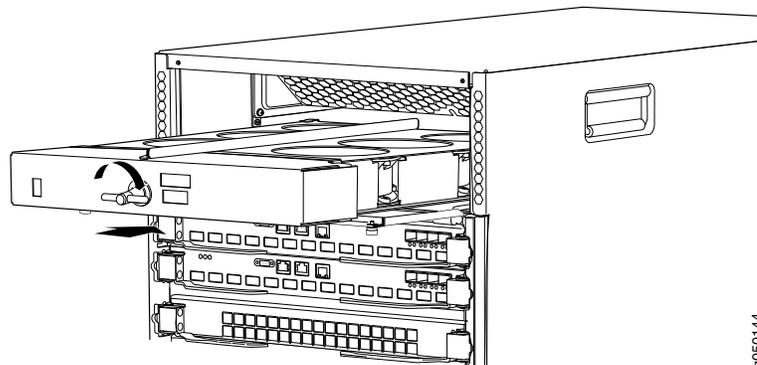


**CAUTION:** The fan trays can be removed and replaced while the QFX3008-I Interconnect device is operating. However, you must replace the fan tray within 2 minutes of removing the fan tray to prevent overheating of the chassis.

To install a fan tray in a QFX3008-I Interconnect device (see [Figure 105 on page 338](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis
2. Align the tray with the fan tray guide on the top of the tray. Slide in the fan tray until it is fully seated in the chassis.
3. Turn the latch, located in the middle of the fan tray, clockwise to lock the fan tray in the chassis.
4. Close the cover door and tighten the captive screws on the faceplate using your fingers.

**Figure 105: Installing a Top Fan Tray in a QFX3008-I Interconnect Device**



**Related Documentation**

- [Removing a Top Fan Tray from a QFX3008-I Interconnect Device on page 336](#)
- [Cooling System and Airflow in a QFX3008-I Interconnect Device on page 44](#)

## Removing a Bottom Air Filter from a QFX3008-I Interconnect Device

A QFX3008-I Interconnect device bottom air filter is located beneath the bottom fan tray and front panel display. There are two captive screws on either side of the air filter door that secure the air filter in the chassis.



**CAUTION:** Do not run the device for more than 2 minutes without the air filter in place.



**CAUTION:** Always keep the air filter in place while the device is operating, except during replacement. Because the fans are very powerful, they could pull small bits of wire or other materials into the device through the unfiltered air intake. This could damage the device components.

Before you remove an air filter, ensure that you understand how to prevent ESD damage. See “Prevention of Electrostatic Discharge Damage” on page 192.

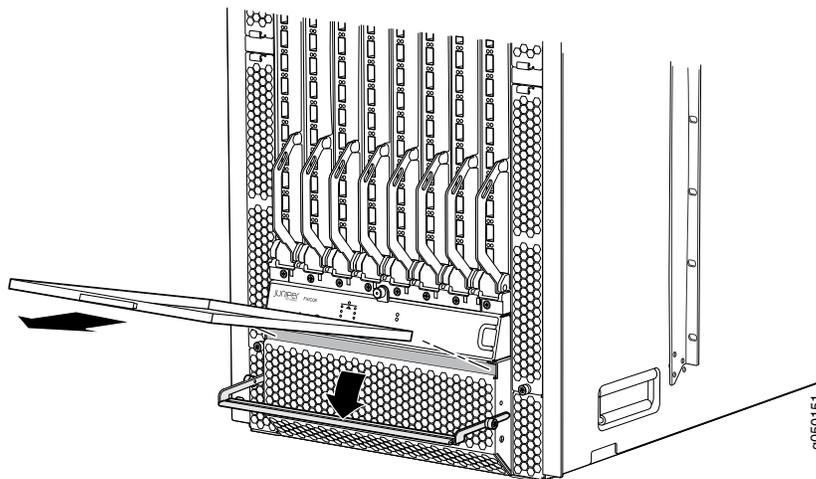
Ensure that you have the following parts and tools available to remove a bottom air filter from a QFX3008-I Interconnect device:

- Electrostatic discharge (ESD) grounding strap
- Replacement air filter
- Phillips (+) screwdriver, number 2

To remove a bottom air filter from a QFX3008-I Interconnect device (see [Figure 106 on page 339](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis
2. Unscrew the captive screws counterclockwise using your fingers. If you cannot easily unscrew the captive screws with your fingers, use the screwdriver.
3. Open the door, being careful to lower it gently, until it stops.
4. Pull on the air filter tab, located in the center of the filter, and slide the air filter straight out.

**Figure 106: Removing a Bottom Air Filter from a QFX3008-I Interconnect Device**



- Related Documentation**
- [Installing a Bottom Air Filter in a QFX3008-I Interconnect Device on page 340](#)
  - [Cooling System and Airflow in a QFX3008-I Interconnect Device on page 44](#)
  - [Field-Replaceable Units in a QFX3008-I Interconnect Device on page 38](#)

## Installing a Bottom Air Filter in a QFX3008-I Interconnect Device

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A QFX3008-I Interconnect device bottom air filter is located beneath the bottom fan tray and front panel display. Two captive screws on either side of the air filter door secure the air filter in the chassis.



.....  
**CAUTION:** Do not run the device for more than 2 minutes without the air filter in place.  
.....



.....  
**CAUTION:** Always keep the air filter in place while the device is operating, except during replacement. Because the fans are very powerful, they could pull small bits of wire or other materials into the device through the unfiltered air intake. This could damage device components.  
.....

Before you install a bottom air filter, ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).

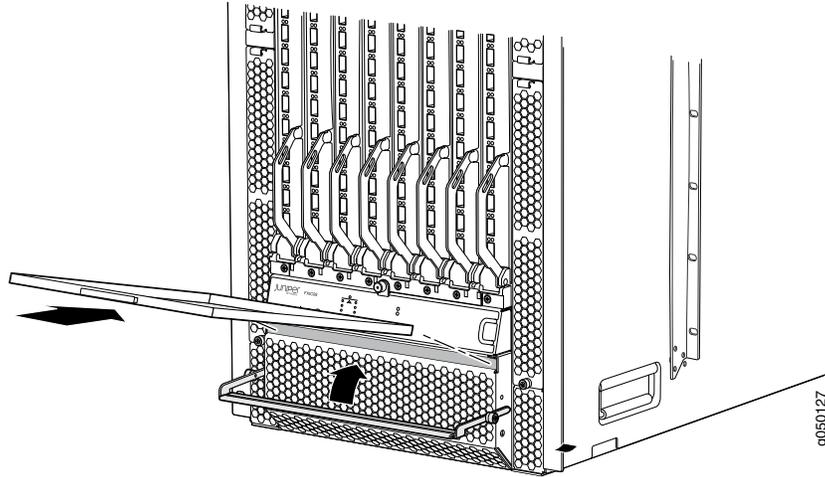
Ensure that you have the following parts and tools available to install a bottom air filter in a QFX3008-I Interconnect device:

- Electrostatic discharge (ESD) grounding strap

To install the air filter (see [Figure 107 on page 341](#)):

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
2. If the air filter door is closed, unscrew the captive screws on each side of the air filter door, and pull the door open.
3. Slide the air filter into the chassis. The air filter has a label indicating which side should be facing up.
4. Close the air filter door, and tighten the captive screws on each side of the air filter door.

Figure 107: Installing a Bottom Air Filter in a QFX3008-I Interconnect Device



**Related Documentation**

- [Cooling System and Airflow in a QFX3008-I Interconnect Device on page 44](#)
- [Removing a Bottom Air Filter from a QFX3008-I Interconnect Device on page 338](#)
- [Maintaining the Air Filters in a QFX3008-I Interconnect Device on page 379](#)

## Removing a Side Air Filter from a QFX3008-I Interconnect Device

The QFX3008-I Interconnect device has eight side air filters located in each of eight side fan tray modules. A tab on the air filter facilitates the removal and installation of the air filter.



**CAUTION:** Do not run the device for more than 2 minutes without the air filter in place.



**CAUTION:** Always keep the air filter in place while the device is operating, except during replacement. Because the fans are very powerful, they could pull small bits of wire or other materials into the device through the unfiltered air intake. This could damage device components.

Before you remove a side air filter, ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).

Ensure that you have the following parts and tools available to remove a side air filter from a QFX3008-I Interconnect device:

- Electrostatic discharge (ESD) grounding strap
- Replacement air filter

- Phillips (+) screwdriver, number 2

To remove an air filter from a QFX3008-I Interconnect device (see [Figure 108 on page 342](#) and [Figure 109 on page 343](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Unscrew the captive screw, located on each cover panel, counterclockwise using your fingers. If you cannot easily unscrew the captive screw with your fingers, use the screwdriver.
3. Hold the screw on the cover panel with one hand while holding the handle with the other. Pull firmly on the screw to detach the cover panel.
4. Pull the air filter tab to the side and slide the filter out of the fan tray module.

**Figure 108: Removing a Side Fan Tray from a QFX3008-I Interconnect Device**

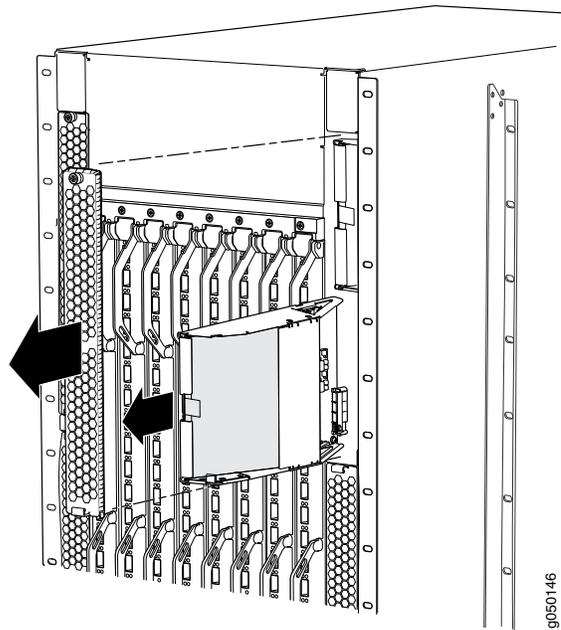
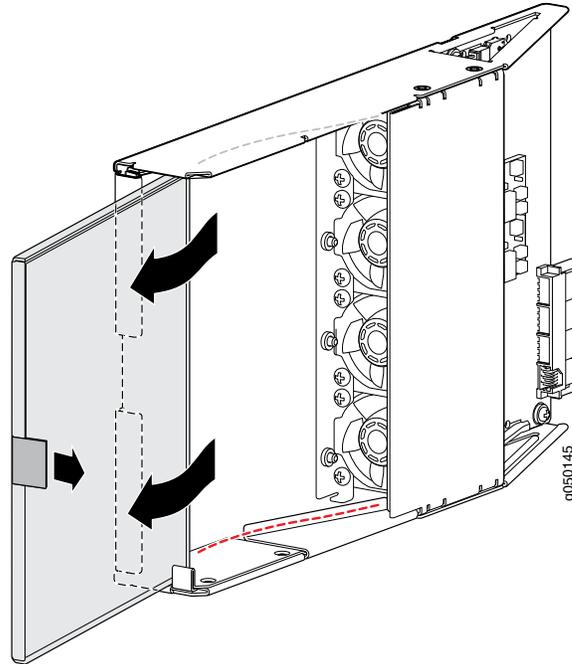


Figure 109: Removing a Side Air Filter from a QFX3008-I Interconnect Device Side Fan Tray



**Related Documentation**

- [Installing a Side Air Filter in a QFX3008-I Interconnect Device](#) on page 343
- [Cooling System and Airflow in a QFX3008-I Interconnect Device](#) on page 44
- [Field-Replaceable Units in a QFX3008-I Interconnect Device](#) on page 38

## Installing a Side Air Filter in a QFX3008-I Interconnect Device

The QFX3008-I Interconnect device has eight side air filters located in each of eight side fan tray modules. A tab on the air filter facilitates the removal and installation of the air filter.



**CAUTION:** Do not run the device for more than 2 minutes without the air filter in place.



**CAUTION:** Always keep the air filter in place while the device is operating, except during replacement. Because the fans are very powerful, they could pull small bits of wire or other materials into the device through the unfiltered air intake. This could damage device components.

Before you remove an air filter, ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage”](#) on page 192.

Ensure that you have the following parts and tools available to remove a bottom air filter from a QFX3008-I Interconnect device:

- Electrostatic discharge (ESD) grounding strap

To install an air filter (see [Figure 110 on page 344](#) and [Figure 111 on page 345](#)):

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
2. Align the filter with the fan tray module so that it slides into the chassis at a slant.
3. Slide the air filter all the way into the slot.
4. Hold the handle and the screw of the cover panel and align the cover panel at a slight angle to attach the handle end to the slot.
5. Push the screw end of the cover panel into the chassis.
6. Tighten the captive screw on the cover panel using your fingers.

**Figure 110: Installing a Side Air Filter in a QFX3008-I Interconnect Device Side Fan Tray**

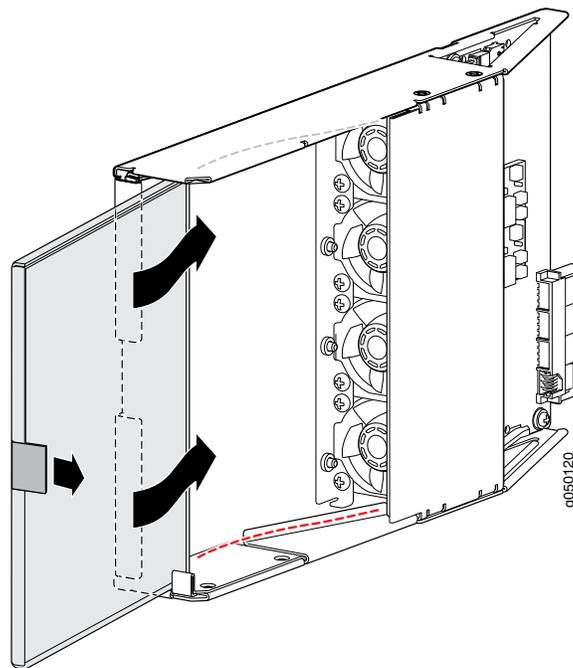
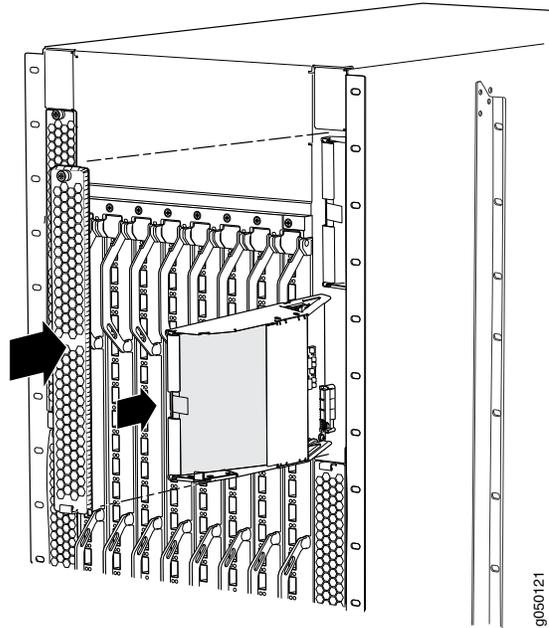


Figure 111: Installing a Side Fan Tray in a QFX3008-I Interconnect Device



#### Related Documentation

- [Removing a Side Air Filter from a QFX3008-I Interconnect Device on page 341](#)
- [Maintaining the Air Filters in a QFX3008-I Interconnect Device on page 379](#)
- [Cooling System and Airflow in a QFX3008-I Interconnect Device on page 44](#)

## Taking a Control Board Offline in a QFX3008-I Interconnect Device

If you are going to remove a Control Board from a QFX3008-I Interconnect device, take the Control Board offline before you remove it to preserve its configuration.

The Control Board performs Routing Engine functions in a QFX3008-I Interconnect device. There are two Control Boards installed in a QFX3008-I Interconnect device.



**CAUTION:** When you switch Control Board mastership, or when a master Control Board fails, no data traffic is forwarded over the QFX3008-I Interconnect device. Data traffic over other QFX3008-I Interconnect devices in your QFX3000 QFabric system is not disrupted.



**NOTE:** We recommend that you take the backup Control Board offline before removing it.

Before you offline a Control Board:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).
- Ensure that you do not need to forward traffic through the device.
- Determine whether the Control Board is the master or backup using one of these methods:
  - Check the **MASTER** LED on the Control Board faceplate. If the **MASTER** LED is lit steady green, the Control Board is the master.
  - Issue the **show chassis routing-engine** CLI command.

Ensure that you have the following parts and tools available to power off the device:

- An ESD grounding strap
- An external management device such as a PC
- An RJ-45 to DB-9 rollover cable to connect the external management device to the console (**CON**) port

To take the Control Board offline in a QFX3008-I Interconnect device, perform the tasks appropriate for your device:

1. [Taking a Master Control Board Offline on page 346](#)
2. [Taking a Backup Control Board Offline on page 347](#)

## Taking a Master Control Board Offline

To take a master Control Board offline in a QFX3008-I Interconnect device:

1. Connect a management device to the console (**CONSOLE**) port on the master Control Board in the QFX3008-I Interconnect device. For instructions about connecting a management device to the console (**CONSOLE**) port, see [“Connecting a QFX Series Device to a Management Console” on page 285](#).
2. Make the master Control Board the backup Control Board by using the **request chassis routing-engine master switch** CLI command.

The current backup Control Board becomes the master Control Board after this command is issued.



**CAUTION:** Until the backup Control Board assumes mastership, no data traffic is forwarded over the QFX3008-I Interconnect device. Data traffic over other QFX3008-I Interconnect devices in your QFX3000 QFabric system is not disrupted.

3. Use the **show chassis routing-engine** command to confirm that mastership has changed.
4. Connect the management device to the console (**CONSOLE**) port on the new master Control Board in the QFX3008-I Interconnect device.

5. Take the backup Control Board offline using the **request system halt other-routing-engine** CLI command.
6. Use the **show chassis routing-engine** command to confirm that the Control Board is offline. When the state field in the command output shows that the card is offline, it is safe to remove the Control Board. See [“Removing a Control Board from a QFX3008-I Interconnect Device” on page 347](#).

## Taking a Backup Control Board Offline

To take the backup Control Board offline:

1. Connect a management device to the console (**CONSOLE**) port on the master Control Board in the QFX3008-I Interconnect device. For instructions about connecting a management device to the console (**CONSOLE**) port, see [“Connecting a QFX Series Device to a Management Console” on page 285](#).
2. Take the backup Control Board offline using the **request system halt other-routing-engine** CLI command.
3. Use the **show chassis routing-engine** command to confirm that the Control Board is offline. When the state field in the command output shows that the card is offline, it is safe to remove the Control Board. See [“Removing a Control Board from a QFX3008-I Interconnect Device” on page 347](#).

### Related Documentation

- [Installing a Control Board in a QFX3008-I Interconnect Device on page 349](#)
- [Control Board in a QFX3008-I Interconnect Device on page 49](#)
- [Control Board LEDs on a QFX3008-I Interconnect Device on page 389](#)

## Removing a Control Board from a QFX3008-I Interconnect Device

There are two Control Boards in a QFX3008-I Interconnect device. The Control Boards install horizontally in the rear of the chassis in the slots labeled **CB 0** and **CB 1**. See [“Slot Numbering for a QFX3008-I Interconnect Device” on page 40](#).



**CAUTION:** Before you remove a Control Board, we recommend that you first take it offline. It is important to know whether you are removing the master or the backup Control Board.

See [“Taking a Control Board Offline in a QFX3008-I Interconnect Device” on page 345](#) for more information.



**CAUTION:** When you switch Control Board mastership, or when a master Control Board fails, traffic is not forwarded over the QFX3008-I Interconnect device until the backup Control Board assumes mastership.



**CAUTION:** Do not lift modules by holding the ejector levers. The levers cannot support the weight of the module. Lifting the module by the levers might bend the levers, and the bent levers prevent the board from being properly seated in the chassis.

Before you begin to remove a Control Board:

- Ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage”](#) on page 192.
- (Recommended) Take the Control Board offline. See [“Taking a Control Board Offline in a QFX3008-I Interconnect Device”](#) on page 345.

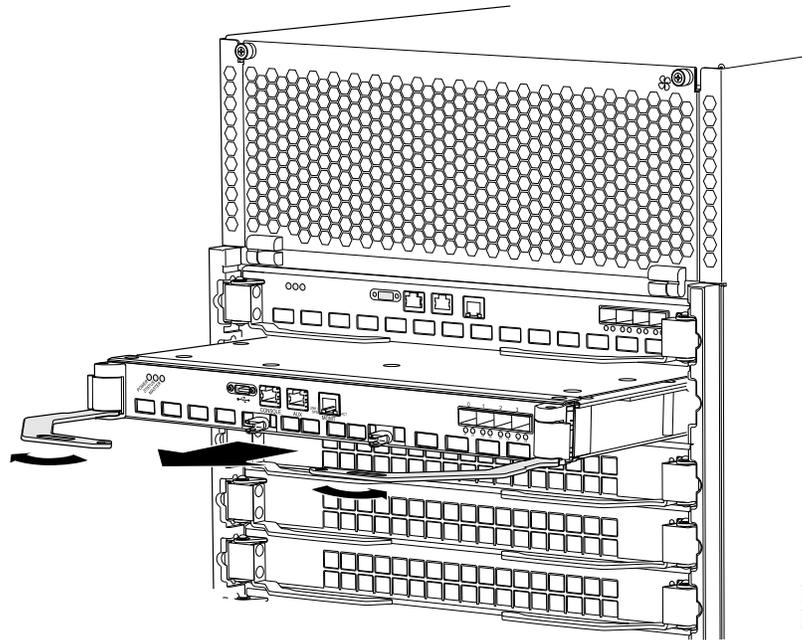
Ensure that you have the following parts and tools available to remove a Control Board from a QFX3008-I Interconnect device:

- Electrostatic discharge (ESD) grounding strap
- Antistatic bag or antistatic mat
- Replacement Control Board

To remove a Control Board from a QFX3008-I Interconnect device (see [Figure 112](#) on page 349):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Place the antistatic bag or antistatic mat on a flat, stable surface.
3. Pull both the ejector levers outward simultaneously, away from the faceplate of the Control Board, until they go no further. This action causes the Control Board to slide out of the chassis slightly.
4. Grasp the ejector levers and pull the Control Board out about halfway.
5. Taking care not to touch the leads, pins, or solder connections, place one hand underneath the Control Board to support it, and slide it completely out of the chassis.
6. Place the Control Board in the antistatic bag or on the antistatic mat.

Figure 112: Removing a Control Board from a QFX3008-I Interconnect Device



**Related Documentation**

- [Installing a Control Board in a QFX3008-I Interconnect Device on page 349](#)
- [Control Board in a QFX3008-I Interconnect Device on page 49](#)
- [Control Board LEDs on a QFX3008-I Interconnect Device on page 389](#)

## Installing a Control Board in a QFX3008-I Interconnect Device

There are two Control Boards in a QFX3008-I Interconnect device. The Control Boards install horizontally in the rear of the chassis in the slots labeled **CB 0** and **CB 1**. See “[Slot Numbering for a QFX3008-I Interconnect Device](#)” on page 40.



**CAUTION:** Do not lift modules by holding the ejector levers. The levers cannot support the weight of the module. Lifting the module by the levers might bend the levers, and the bent levers prevent the board from being properly seated in the chassis.



**NOTE:** When you install a new Control Board in the QFX3008-I Interconnect device, the Junos OS is updated to the same version that is running on the QFX3100 Director group.

Before you begin installing a Control Board in a QFX3008-I Interconnect device, ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).

Ensure that you have the following parts and tools available to install a Control Board:

- Electrostatic discharge (ESD) grounding strap
- Replacement Control Board

To install a Control Board in a QFX3008-I Interconnect device (see [Figure 113 on page 351](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Taking care not to touch the leads, pins, or solder connections, pull the Control Board out from the bag.
3. Pull both the ejector levers outward simultaneously, away from the faceplate of the Control Board, until they go no further.
4. Carefully align the sides of the Control Board with the guides inside the chassis.
5. Ensuring that the Control Board is correctly aligned, carefully slide it into the chassis until you feel resistance.
6. Push both the ejector levers simultaneously toward the faceplate of the Control Board until the levers are flush against the faceplate and are fully engaged.

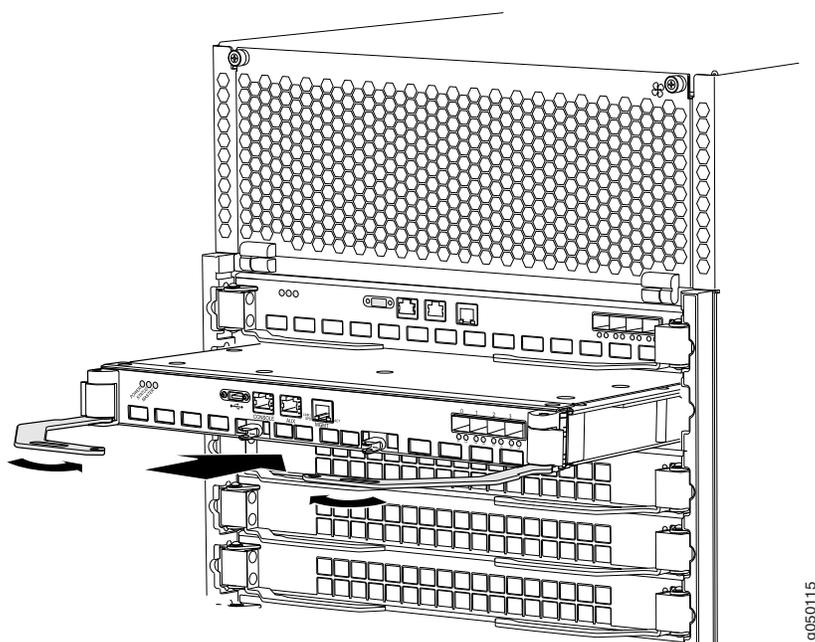


**CAUTION:** Ensure that you push the ejector levers evenly and that both ejector levers are completely engaged. It is possible for the board to receive power if only one of the levers is fully closed, causing a device malfunction.

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7. Verify that the Control Board is installed correctly and functioning normally by checking the LEDs on the faceplate of the Control Board. The **POWER LED** and **STATUS LED** should be lit steady green a few minutes after the Control Board is installed.

Figure 113: Installing a Control Board in a QFX3008-I Interconnect Device



**Related Documentation**

- [Control Board in a QFX3008-I Interconnect Device on page 49](#)
- [Control Board LEDs on a QFX3008-I Interconnect Device on page 389](#)

## Taking a 16-Port QSFP+ Front Card Offline in a QFX3008-I Interconnect Device

To prevent data loss, we recommend that you take a 16-port QSFP+ front card offline before removing it from a QFX3008-I Interconnect device.

To take the front card offline in a QFX3008-I Interconnect device:

1. Use the **request chassis fpc interconnect-device *name* slot *slot-number* offline** CLI command. Enter the name of the device in which the front card you want to remove is installed, and the number of the slot from which you are removing the front card; the slots are numbered from 0 through 7. See “[Slot Numbering for a QFX3008-I Interconnect Device](#)” on page 40.
2. Use the **show chassis fpc** CLI command to verify that the front card is offline. When the state field in the command output shows that the card is offline, it is safe to remove the front card. See “[Removing a 16-Port QSFP+ Front Card from a QFX3008-I Interconnect Device](#)” on page 352.

**Related Documentation**

- [Installing a 16-Port QSFP+ Front Card in a QFX3008-I Interconnect Device on page 353](#)
- [16-Port QSFP+ Front Cards in a QFX3008-I Interconnect Device on page 48](#)
- [16-Port QSFP+ Front Card LEDs on a QFX3008-I Interconnect Device on page 391](#)

## Removing a 16-Port QSFP+ Front Card from a QFX3008-I Interconnect Device

You can install up to eight 16-port QSFP+ front cards in a QFX3008-I Interconnect device. The front cards are installed vertically in the front of the chassis in the slots labeled 0 through 7. See [“Slot Numbering for a QFX3008-I Interconnect Device” on page 40](#).



**CAUTION:** Before you remove a front card, we recommend that you take it offline to prevent the loss of data packets. See [“Taking a 16-Port QSFP+ Front Card Offline in a QFX3008-I Interconnect Device” on page 351](#).



**CAUTION:** Do not lift modules by holding the ejector levers. The levers cannot support the weight of the module. Lifting the module by the levers might bend the levers, and the bent levers prevent the board from being properly seated in the chassis.

Before you begin to remove a front card:

- Ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).
- (Recommended) Take the front card offline. See [“Taking a 16-Port QSFP+ Front Card Offline in a QFX3008-I Interconnect Device” on page 351](#).

Ensure that you have the following parts and tools available to remove a front card from a QFX3008-I Interconnect device:

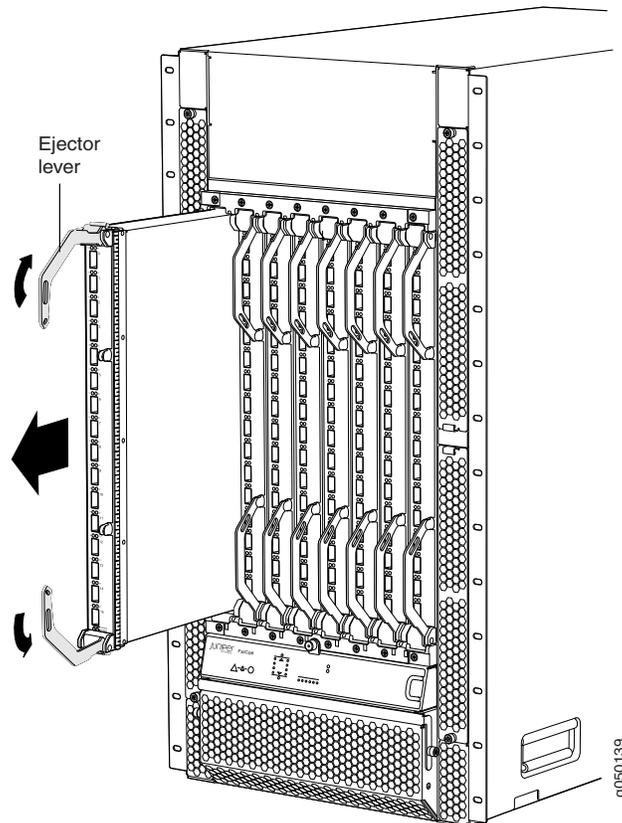
- Electrostatic discharge (ESD) grounding strap
- Antistatic bag or antistatic mat
- Replacement front card or front card cover panel

To remove a front card (see [Figure 114 on page 353](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Place the antistatic bag or antistatic mat on a flat, stable surface.
3. Pull both the ejector levers outward simultaneously, away from the faceplate of the front card, until they go no further. This action causes the card to slide out of the chassis slightly.
4. Grasp the handle on the faceplate of the front card with one hand, and pull the card about halfway out.
5. Taking care not to touch the leads, pins, or solder connections, place the other hand on the base of the front card to support its weight and slide it out of the chassis completely.

6. Place the front card in the antistatic bag or on the antistatic mat.
7. If you are not replacing the front card, install the cover panel over the empty slot by rotating the knob on the top and bottom of the cover panel to the closed position.

**Figure 114: Removing a 16-Port Front Card from a QFX3008-I Interconnect Device**



**Related Documentation**

- [Installing a 16-Port QSFP+ Front Card in a QFX3008-I Interconnect Device on page 353](#)
- [16-Port QSFP+ Front Cards in a QFX3008-I Interconnect Device on page 48](#)
- [16-Port QSFP+ Front Card LEDs on a QFX3008-I Interconnect Device on page 391](#)

## Installing a 16-Port QSFP+ Front Card in a QFX3008-I Interconnect Device

You can install up to eight 16-port QSFP+ front cards in a QFX3008-I Interconnect device. The front cards are installed vertically in the front of the chassis in the slots labeled **0** through **7**. See “[Slot Numbering for a QFX3008-I Interconnect Device](#)” on page 40.



**CAUTION:** Do not lift modules by holding the ejector levers. The levers cannot support the weight of the module. Lifting the module by the levers might

bend the levers, and the bent levers prevent the board from being properly seated in the chassis.



**NOTE:** You can install front cards in any slot. You do not have to install the front cards in serial order.

Before you begin installing a front card in a QFX3008-I Interconnect device, ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).

Ensure that you have the following parts and tools available to install a front card:

- Electrostatic discharge (ESD) grounding strap
- Replacement front card

To install a front card in a QFX3008-I Interconnect device (see [Figure 115 on page 355](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. If the slot has a cover panel on it, rotate the knob on each side of the cover panel to the open position and remove the panel. Save the cover panel for later use.
3. Taking care not to touch the leads, pins, or solder connections, pull the front card out from the bag.
4. Pull both the ejector levers outward simultaneously, away from the faceplate of the front card, until they go no further.
5. Turn the front card so that you can insert it in one of the vertical slots. Then hold the handle with one hand and support the base of the front card with the other hand as you align the front card with the guides inside the chassis.
6. Ensuring that the card remains correctly aligned, slide the front card into the chassis until you feel resistance.

Ensure that the ejector levers are engaged in the horizontal ejector rail. If the levers are not engaged, push the card's faceplate just inside the hinges of the levers until the ejectors are engaged in the ejector rail.

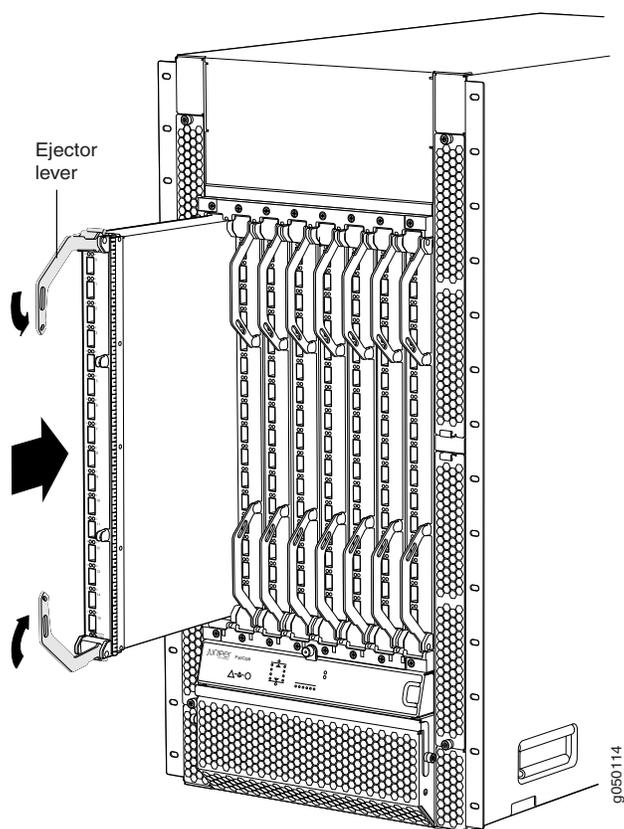
7. Push both the ejector levers simultaneously toward the faceplate of the front card until the levers are flush against the faceplate and are fully engaged.



**CAUTION:** Ensure that you push the ejector levers evenly and that both ejector levers are completely engaged. It is possible for the board to receive power if only one of the levers is fully closed, causing a device malfunction.

8. Verify that the front card is installed correctly and functioning normally by checking the LEDs on the faceplate of the front card. The **STATUS** LED and **POWER** LED should be lit steady green a few minutes after the front card is installed.

**Figure 115: Installing 16-Port QSFP+ Front Card in a QFX3008-I Interconnect Device**



- Related Documentation**
- [16-Port QSFP+ Front Cards in a QFX3008-I Interconnect Device on page 48](#)
  - [16-Port QSFP+ Front Card LEDs on a QFX3008-I Interconnect Device on page 391](#)

## Taking the Rear Card Offline in a QFX3008-I Interconnect Device

To prevent data loss, we recommend that you take a rear card offline before removing it from a QFX3008-I Interconnect device.

The rear cards provide switching functionality for a QFX3000 QFabric system. We recommend that you install all eight rear cards in each QFX3008-I Interconnect device for normal device operation. When you take a rear card offline, the switching capacity of the QFX3000 QFabric system will be reduced until the rear card is replaced.

To take the rear card offline in a QFX3008-I Interconnect device:

1. Use the **request chassis fpc interconnect-device *name* slot *slot-number* offline** CLI command. Enter the name of the device in which the rear card you want to remove is installed, and the number of the slot from which you are removing the rear card; the slots are numbered from 8 through 15. See [“Slot Numbering for a QFX3008-I Interconnect Device” on page 40](#).
2. Use the **show chassis fpc** CLI command to verify that the rear card is offline. When the state field in the command output shows that the card is offline, it is safe to remove the rear card. See [“Removing a Rear Card from a QFX3008-I Interconnect Device” on page 356](#).

#### Related Documentation

- [Installing a Rear Card in a QFX3008-I Interconnect Device on page 358](#)
- [Rear Cards in a QFX3008-I Interconnect Device on page 51](#)
- [Rear Card LEDs on a QFX3008-I Interconnect Device on page 393](#)

## Removing a Rear Card from a QFX3008-I Interconnect Device

There are eight rear cards in a QFX3008-I Interconnect device. The rear cards are installed horizontally in the rear of the chassis in the slots labeled 0 through 7. See [“Slot Numbering for a QFX3008-I Interconnect Device” on page 40](#).



**CAUTION:** Before you remove a rear card, we recommend that you take it offline. See [“Taking the Rear Card Offline in a QFX3008-I Interconnect Device” on page 355](#) for more information.



**CAUTION:** Do not lift modules by holding the ejector levers. The levers cannot support the weight of the module. Lifting the module by the levers might bend the levers, and the bent levers prevent the board from being properly seated in the chassis.

Before you begin to remove a rear card:

- Ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).
- (Recommended) Take the rear card offline. See [“Taking the Rear Card Offline in a QFX3008-I Interconnect Device” on page 355](#).

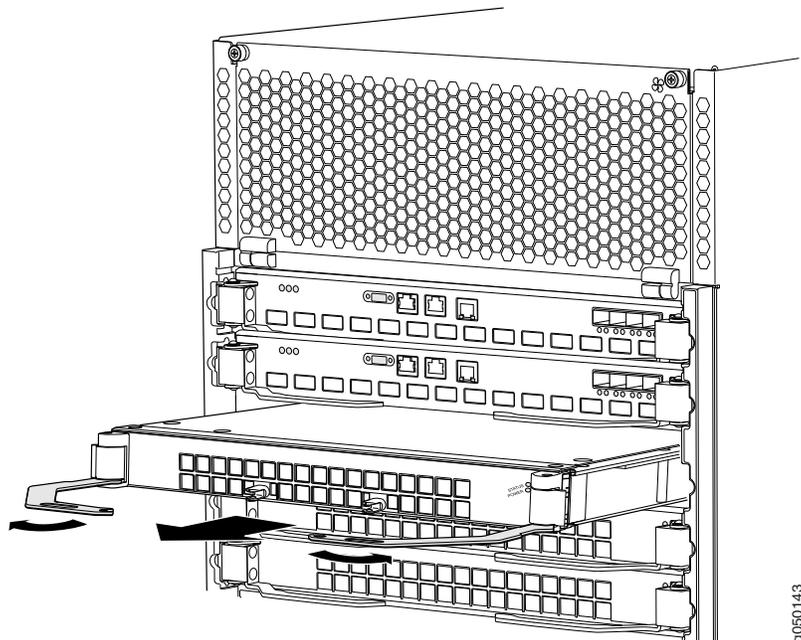
Ensure that you have the following parts and tools available to remove a rear card from a QFX3008-I Interconnect device:

- Electrostatic discharge (ESD) grounding strap
- Antistatic bag or antistatic mat
- Replacement rear card

To remove a rear card (see [Figure 116 on page 357](#)):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Place the antistatic bag or antistatic mat on a flat, stable surface.
3. Pull both the ejector levers outward simultaneously, away from the faceplate of the rear card, until they go no further. This action causes the rear card to slide out of the chassis slightly.
4. Grasping the ejector levers, pull the rear card about halfway out.
5. Taking care not to touch the leads, pins, or solder connections, place one hand underneath the rear card to support it, and slide it out of the chassis completely.
6. Place the rear card in the antistatic bag or on the antistatic mat.

**Figure 116: Removing a Rear Card from a QFX3008-I Interconnect Device**



**Related Documentation**

- [Rear Cards in a QFX3008-I Interconnect Device on page 51](#)
- [Rear Card LEDs on a QFX3008-I Interconnect Device on page 393](#)
- [Installing a Rear Card in a QFX3008-I Interconnect Device on page 358](#)

## Installing a Rear Card in a QFX3008-I Interconnect Device

There are eight rear cards in a QFX3008-I Interconnect device. The rear cards are installed horizontally in the rear of the chassis in the slots labeled 0 through 7. See [“Slot Numbering for a QFX3008-I Interconnect Device” on page 40](#).



**CAUTION:** Do not lift modules by holding the ejector levers. The levers cannot support the weight of the module. Lifting the module by the levers might bend the levers, and the bent levers prevent the board from being properly seated in the chassis.

Before you begin installing a rear card in a QFX3008-I Interconnect device, ensure that you understand how to prevent ESD damage. See [“Prevention of Electrostatic Discharge Damage” on page 192](#).

Ensure that you have the following parts and tools available to install a rear card:

- Electrostatic discharge (ESD) grounding strap
- Replacement rear card

To install a rear card in a QFX3008-I Interconnect device (see [Figure 117 on page 359](#)):

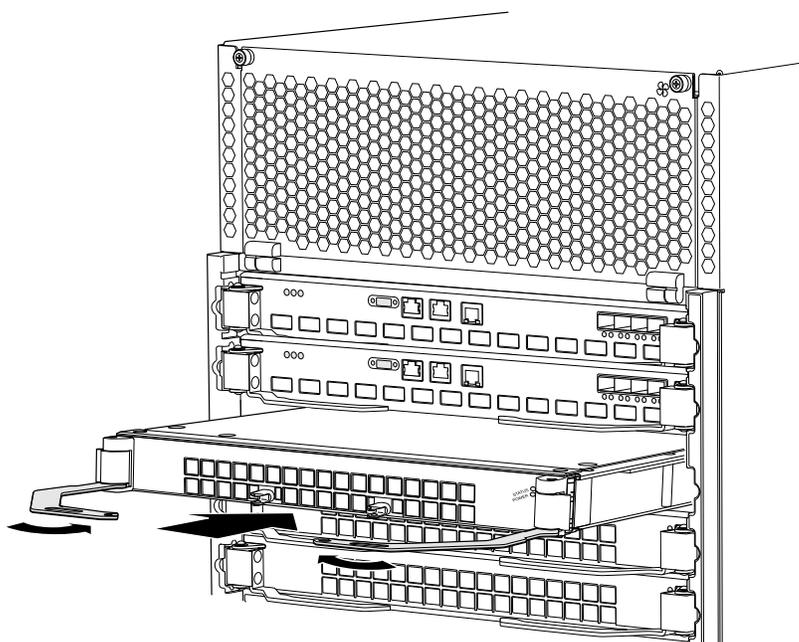
1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Taking care not to touch the leads, pins, or solder connections, pull the rear card out from the bag.
3. Pull both the ejector levers outward simultaneously, away from the faceplate of the rear card, until they go no further.
4. Carefully align the sides of the rear card with the guides inside the chassis.
5. Ensuring that the rear card is correctly aligned, carefully slide it into the chassis until you feel resistance.
6. Push both the ejector levers toward the faceplate of the rear card until the levers are flush against the faceplate and are fully engaged.



**CAUTION:** Ensure that you push the ejector levers evenly and both ejector levers are completely engaged. It is possible for the board to receive power if only one of the levers is fully closed, causing a device malfunction.

7. Verify that the rear card is installed correctly and functioning normally by checking the LEDs on the faceplate of the rear card. The **STATUS** LED and **POWER** LED should be lit steady green a few minutes after the rear card is installed.

Figure 117: Installing a Rear Card in a QFX3008-I Interconnect Device



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**Related Documentation**

- [Rear Cards in a QFX3008-I Interconnect Device on page 51](#)
- [Rear Card LEDs on a QFX3008-I Interconnect Device on page 393](#)



# Replacing QFX3500 Components

- [Installing and Removing QFX3500 Device Hardware Components on page 361](#)
- [Installing a Power Supply in a QFX3500 Device on page 362](#)
- [Removing a Power Supply from a QFX3500 Device on page 364](#)
- [Installing a Fan Tray in a QFX3500 Device on page 365](#)
- [Removing a Fan Tray from a QFX3500 Device on page 367](#)
- [Installing a Management Board in a QFX3500 Device on page 368](#)
- [Removing a Management Board from a QFX3500 Device on page 369](#)

## Installing and Removing QFX3500 Device Hardware Components

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The QFX3500 device chassis is a rigid sheet-metal structure that houses the hardware components. The field-replaceable units (FRUs) in QFX3500 devices are:

- Power supply
- Fan tray
- Management board
- SFP transceiver
- SFP+ transceiver
- QSFP+ transceiver

All of the QFX3500 device FRUs except the management board are hot-insertable and hot-removable: you can remove and replace them without powering off the device or disrupting device functions. You must power off the QFX3500 device before replacing the management board.



**CAUTION:** Replace a failed power supply with a blank panel or new power supply within 1 minute of removal to prevent chassis overheating. Replace a failed fan tray with a new fan tray within 1 minute of removal to prevent chassis overheating.

To install a power supply in a QFX3500 device, follow the instructions in [“Installing a Power Supply in a QFX3500 Device” on page 362](#). To remove a power supply from a

QFX3500 device, follow the instructions in [“Removing a Power Supply from a QFX3500 Device” on page 364](#).

To install a fan tray in a QFX3500 device, follow the instructions in [“Installing a Fan Tray in a QFX3500 Device” on page 365](#). To remove a fan tray from a QFX3500 device, follow the instructions in [“Removing a Fan Tray from a QFX3500 Device” on page 367](#).

To install a management board in a QFX3500 device, follow the instructions in [“Installing a Management Board in a QFX3500 Device” on page 368](#). To remove a management board from a QFX3500 device, follow the instructions in [“Removing a Management Board from a QFX3500 Device” on page 369](#).

To install an SFP, SFP+, or QSFP+ transceiver in a QFX3500 device, follow the instructions in [“Installing a Transceiver in a QFX Series Device” on page 374](#). To remove an SFP, SFP+, or QSFP+ transceiver from a QFX3500 device, follow the instructions in [“Removing a Transceiver from a QFX Series Device” on page 373](#).

To connect a fiber-optic cable to an SFP, SFP+, or QSFP+ transceiver in a QFX3500 device, follow the instructions in [“Connecting a Fiber-Optic Cable to a QFX Series Device” on page 377](#). To disconnect a fiber-optic cable from an SFP, SFP+, or QSFP+ transceiver from a QFX3500 device, follow the instructions in [“Disconnecting a Fiber-Optic Cable from a QFX Series Device” on page 376](#).

#### Related Documentation

- [AC Power Supply for a QFX3500 Device on page 73](#)
- [Cooling System and Airflow for a QFX3500 Device on page 68](#)
- [Rear Panel of a QFX3500 Device on page 66](#)
- [Interface Specifications for SFP+ Transceivers for QFX3500 Device Access Ports on page 108](#)
- [Interface Specifications for SFP+ DAC Cables for QFX3500 Device Access Ports on page 117](#)

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## Installing a Power Supply in a QFX3500 Device

The power supplies in a QFX3500 device are hot-removable and hot-insertable field-replaceable units (FRUs): you can remove and replace them without powering off the device or disrupting device functions.

- Before you install a power supply in a QFX3500 device, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [“Prevention of Electrostatic Discharge Damage” on page 192](#)).
- Ensure that the airflow direction of the power supply is the same as the chassis. Labels on the power supply handle indicate the direction of airflow. See [“Cooling System and Airflow for a QFX3500 Device” on page 68](#) for more information.
- Ensure that you have the following parts and tools available to install a power supply in a QFX3500 device:

- ESD grounding strap

To install a power supply in a QFX3500 device (see [Figure 118 on page 363](#)):

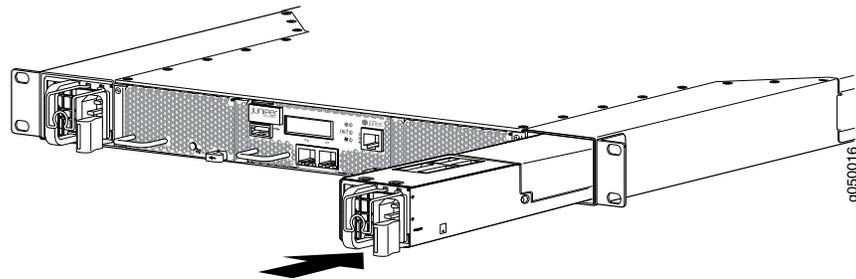
1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Taking care not to touch power supply components, pins, leads, or solder connections, remove the power supply from its bag.



**CAUTION:** Verify that the direction of the arrow on the power supply handle matches the direction of airflow in the chassis. Ensure that each power supply you install in the chassis has the same airflow direction. If you install power supplies with two different airflow directions, Junos OS raises an alarm, and the status (OK/!) LED blinks amber.

3. Using both hands, place the power supply in the power supply slot on the front panel of the device and slide it in until it is fully seated and the locking lever slides into place.

**Figure 118: Installing a Power Supply in a QFX3500 Device**



**NOTE:** Each power supply must be connected to a dedicated power source outlet.



**NOTE:** If you have a Juniper J-Care service contract, register any addition, change, or upgrade of hardware components at <https://www.juniper.net/customers/csc/management/updateinstallbase.jsp>. Failure to do so can result in significant delays if you need replacement parts. This note does not apply if you replace components with the same type of component.

**Related Documentation**

- [AC Power Supply for a QFX3500 Device on page 73](#)
- [Field-Replaceable Units in a QFX3500 Device on page 63](#)
- [Front Panel of a QFX3500 Device on page 65](#)
- [AC Power Cord Specifications for a QFX3500 Device on page 147](#)

- [Connecting AC Power to a QFX3500 Device on page 265](#)
- [Connecting DC Power to a QFX3500 Device on page 267](#)
- [Removing a Power Supply from a QFX3500 Device on page 364](#)

## Removing a Power Supply from a QFX3500 Device

The power supplies in a QFX3500 device are hot-removable and hot-insertable field-replaceable units (FRUs): you can remove and replace them without powering off the device or disrupting device functions.

Before you remove a power supply from a QFX3500 device, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [“Prevention of Electrostatic Discharge Damage” on page 192](#)).

Ensure that you have the following parts and tools available to remove a power supply from a QFX3500 device:

- ESD grounding strap
- Antistatic bag or an antistatic mat
- Phillips (+) screwdriver, number 2 (DC power supply)



**CAUTION:** Replace the power supply with a blank panel or new power supply within 1 minute of removal to prevent chassis overheating.

To remove a power supply from a QFX3500 device (see [Figure 119 on page 365](#)):

1. Place the antistatic bag or the antistatic mat on a flat, stable surface.
2. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.

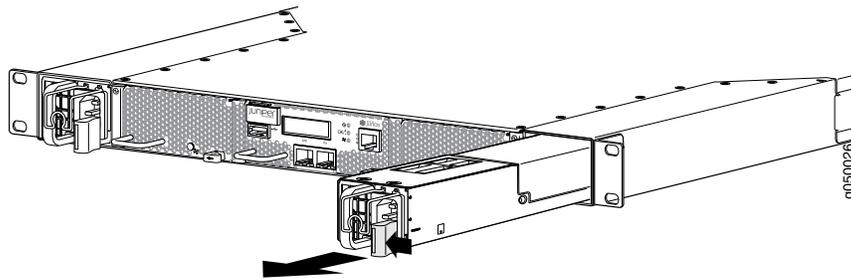


**NOTE:** If only one power supply is installed in your QFX3500 device, you need to power off the device before removing the power supply. See [“Powering Off a QFX3500 Device” on page 298](#).

3. Disconnect power to the device:
  - AC power supply—If the AC power source outlet has a power switch, set it to the OFF (O) position. If the AC power source outlet does not have a power switch, gently pull out the male end of the power cord connected to the power source outlet.
  - DC power supply—Switch the circuit breaker on the panel board that services the DC circuit to the OFF position.

4. Remove the power source cable from the power supply faceplate:
  - AC power supply—Remove the power cord from the power supply faceplate by detaching the power cord retainer and gently pulling out the female end of the power cord connected to the power supply faceplate.
  - DC power supply—Remove the screws securing the ring lugs attached to the power source cables to the power supply using the screwdriver, and remove the power source cables from the power supply. Replace the screws on the terminals and tighten them.
5. Slide the locking lever toward the handle until it stops.
6. Grasp the power supply handle and pull firmly to slide the power supply halfway out of the chassis.
7. Place one hand under the power supply to support it and slide it completely out of the chassis. Take care not to touch power supply components, pins, leads, or solder connections.
8. Place the power supply in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

Figure 119: Removing a Power Supply from a QFX3500 Device



**Related Documentation**

- [AC Power Supply for a QFX3500 Device on page 73](#)
- [Connecting AC Power to a QFX3500 Device on page 265](#)
- [Installing a Power Supply in a QFX3500 Device on page 362](#)

## Installing a Fan Tray in a QFX3500 Device

The fan trays in a QFX3500 device are hot-removable and hot-insertable field-replaceable units (FRUs): you can remove and replace them without powering off the device or disrupting device functions.



**CAUTION:** Replace a failed fan tray with a new fan tray within 1 minute of removal to prevent chassis overheating. Before removing the fan tray, ensure you have a replacement fan tray.



**NOTE:** The fan tray provides FRU-side-to-port-side or port-side-to-FRU-side airflow depending on the device model you purchase.

Before you install a fan tray in a QFX3500 device, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see “[Prevention of Electrostatic Discharge Damage](#)” on page 192).

Ensure that you have the following parts and tools available to install a fan tray in a QFX3500 device:

- ESD grounding strap

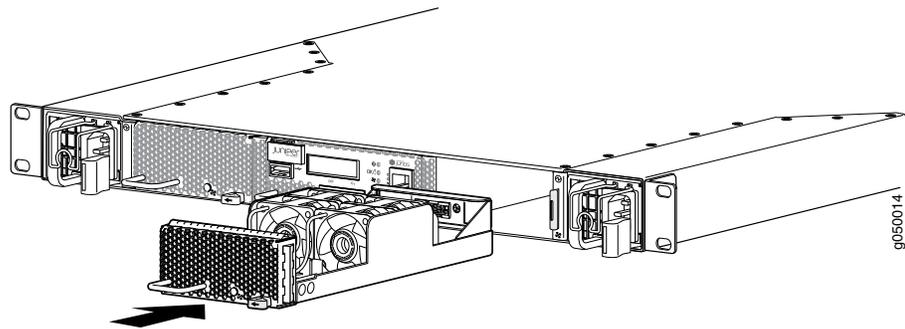
To install a fan tray in a QFX3500 device (see [Figure 120](#) on page 366):

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Taking care not to touch the connectors, remove the fan tray from its bag.
3. Using both hands, align the tray with the fan tray slot on the front panel of the chassis and slide it in until it is fully seated and the locking lever slides into place.



**CAUTION:** Damage can occur if you attempt to install a fan tray into a chassis with a different airflow direction. Check the device model to ensure that you are installing a fan tray with the same airflow direction as the chassis. The fan trays are designed so that they can only be inserted into the QFX3500 device model that supports the same airflow type. See “[Cooling System and Airflow for a QFX3500 Device](#)” on page 68 for more information.

**Figure 120: Installing a Fan Tray in a QFX3500 Device**



**Related Documentation**

- [Removing a Fan Tray from a QFX3500 Device on page 367](#)

## Removing a Fan Tray from a QFX3500 Device

The fan trays in QFX3500 devices are hot-removable and hot-insertable field-replaceable units (FRUs): you can remove and replace them without powering off the device or disrupting device functions.



**CAUTION:** Replace a failed fan tray with a new fan tray within 1 minute of removal to prevent chassis overheating. Before removing the fan tray, ensure you have a replacement fan tray.

Before you remove a fan tray from a QFX3500 device, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see “[Prevention of Electrostatic Discharge Damage](#)” on page 192).

Ensure that you have the following parts and tools available to remove a fan tray from a QFX3500 device:

- ESD grounding strap
- Antistatic bag or an antistatic mat

To remove a fan tray from a QFX3500 device (see [Figure 121](#) on page 368):

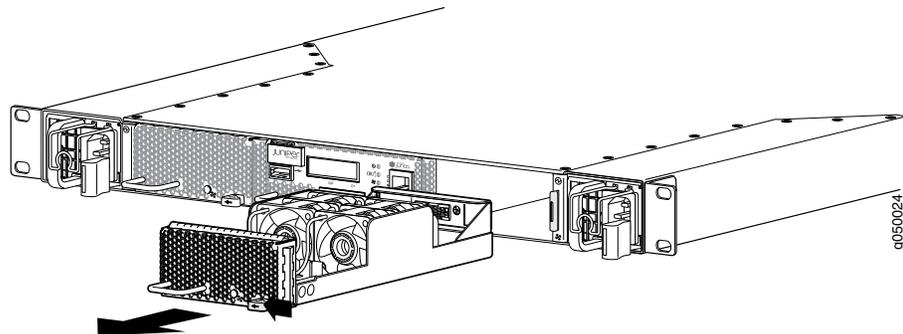
1. Place the antistatic bag or the antistatic mat on a flat, stable surface.
2. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
3. Slide the locking lever toward the handle until it stops.



**WARNING:** To avoid injury, do not touch the fan with your hands or any tools as you slide the fan tray out of the chassis—the fan may still be running.

4. Grasp the handle on the fan tray and pull firmly to slide the fan tray halfway out of the chassis.
5. When the fans stop spinning, slide the fan tray completely out of the chassis.
6. Place the fan tray in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

Figure 121: Removing a Fan Tray from a QFX3500 Device



**NOTE:** When a fan tray is removed, the CLI message **Fan/Blower is Absent** is logged in the system log, and the system raises a minor alarm.

#### Related Documentation

- [Cooling System and Airflow for a QFX3500 Device on page 68](#)
- [Field-Replaceable Units in a QFX3500 Device on page 63](#)
- [Front Panel of a QFX3500 Device on page 65](#)
- [Installing a Fan Tray in a QFX3500 Device on page 365](#)

## Installing a Management Board in a QFX3500 Device

A QFX3500 device has a single field-replaceable unit (FRU) management board.



**CAUTION:** You must power off the QFX3500 device before replacing the management board.



**NOTE:** The management board provides FRU-side-to-port-side or port-side-to-FRU-side airflow depending on the device model you purchase.

Before you install a management board in a QFX3500 device, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [“Prevention of Electrostatic Discharge Damage” on page 192](#)).

Ensure that you have the following parts and tools available to install a management board in a QFX3500 device:

- ESD grounding strap

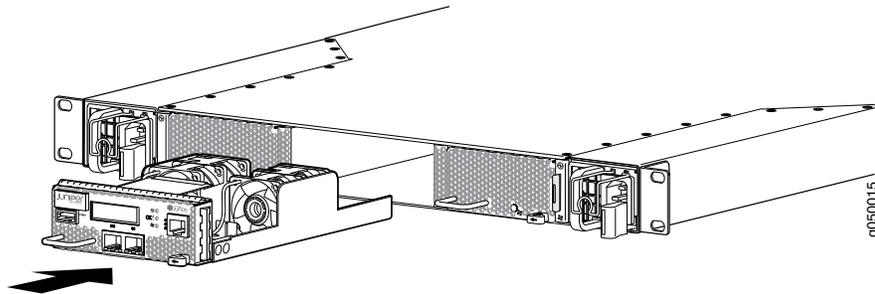
To install a management board in a QFX3500 device (see [Figure 122 on page 369](#)):

1. Ensure that the QFX3500 device is powered off (see [“Powering Off a QFX3500 Device” on page 298](#)).
2. Attach the ESD grounding strap to your bare wrist and to a site ESD point.
3. Taking care not to touch the connectors, remove the management board from its bag.
4. Using both hands, align the tray with the management board slot on the front panel of the chassis and slide it in until it is fully seated and the locking lever slides into place.



**CAUTION:** Damage can occur if you attempt to install a management board into a chassis with a different airflow direction. Check the device model to ensure that you are installing a management board with the same airflow direction as the chassis. The management boards are designed so that they can only be inserted into the QFX3500 device model that supports the same airflow type. See [“Cooling System and Airflow for a QFX3500 Device” on page 68](#) for more information.

Figure 122: Installing a Management Board in a QFX3500 Device



**Related Documentation**

- [Management Board for a QFX3500 Device on page 71](#)
- [Field-Replaceable Units in a QFX3500 Device on page 63](#)
- [Connecting a QFX Series Device to a Management Console on page 285](#)
- [Connecting a QFX3500 Node Device to the Control Plane Network on page 282](#)
- [Connecting a QFX3500 Device to a Network for Out-of-Band Management](#)
- [Removing a Management Board from a QFX3500 Device on page 369](#)

## Removing a Management Board from a QFX3500 Device

QFX3500 devices have a single field-replaceable unit (FRU) management board on the front panel.



**CAUTION:** You must power off the QFX3500 device before replacing the management board.

Before you remove a management board from a QFX3500 device, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [“Prevention of Electrostatic Discharge Damage” on page 192](#)).

Ensure that you have the following parts and tools available to remove a management board from a QFX3500 device:

- ESD grounding strap
- Antistatic bag or an antistatic mat

To remove a management board from a QFX3500 device (see [Figure 123 on page 370](#)):

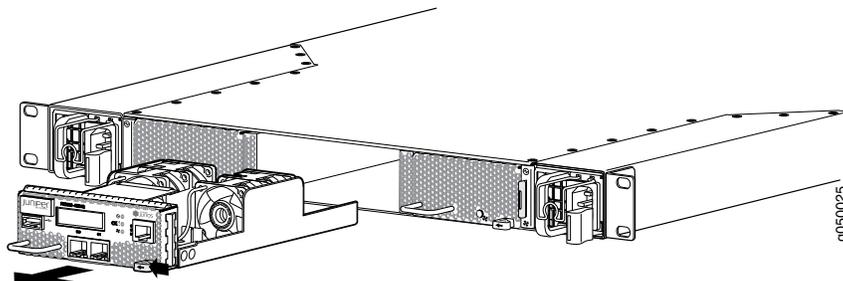
1. Place the antistatic bag or the antistatic mat on a flat, stable surface.
2. Ensure that the QFX3500 device is powered off. See [“Powering Off a QFX3500 Device” on page 298](#).
3. Attach the ESD grounding strap to your bare wrist and to a site ESD point.
4. Slide the locking lever toward the handle until it stops.



**WARNING:** To avoid injury, do not touch the fan with your hands or any tools as you slide the management board out of the chassis—the fan may still be running.

5. Grasp the management board handle and pull firmly to slide the management board halfway out of the chassis.
6. When the fans stop spinning, slide the management board completely out of the chassis.
7. Place the management board in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

**Figure 123: Removing a Management Board from a QFX3500 Device**



**Related Documentation**

- [Management Board for a QFX3500 Device on page 71](#)
- [Field-Replaceable Units in a QFX3500 Device on page 63](#)
- [Front Panel of a QFX3500 Device on page 65](#)
- [Connecting a QFX3500 Device to a Network for Out-of-Band Management](#)

- [Connecting a QFX Series Device to a Management Console on page 285](#)
- [Installing a Management Board in a QFX3500 Device on page 368](#)



# Replacing Transceivers and Fiber-Optic Cables

- [Removing a Transceiver from a QFX Series Device on page 373](#)
- [Installing a Transceiver in a QFX Series Device on page 374](#)
- [Disconnecting a Fiber-Optic Cable from a QFX Series Device on page 376](#)
- [Connecting a Fiber-Optic Cable to a QFX Series Device on page 377](#)

## Removing a Transceiver from a QFX Series Device

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The transceivers for a QFX Series device are hot-removable and hot-insertable field-replaceable units (FRUs). You can remove and replace them without powering off the device or disrupting device functions.

Before you begin removing a transceiver from a QFX Series device, ensure that you have taken the necessary precautions for safe handling of lasers (see [“Laser and LED Safety Guidelines and Warnings for the QFX Series” on page 168](#)).

Ensure that you have the following parts and tools available:

- Antistatic bag or an antistatic mat
- Needlenose pliers
- Rubber safety caps to cover the transceiver and fiber-optic cable connector
- Dust cover to cover the port

To remove a transceiver from a QFX Series device:

1. Place the antistatic bag or antistatic mat on a flat, stable surface.
2. Label the cable connected to the transceiver so that you can reconnect it correctly.



**WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

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**WARNING:** Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The rubber safety cap keeps the port clean and prevents accidental exposure to laser light.



**CAUTION:** Do not bend fiber-optic cables beyond their minimum bend radius. Bending the cables beyond their minimum bend radius can damage the cables and cause problems that are difficult to diagnose.

3. Remove the cable connected to the transceiver (see [“Disconnecting a Fiber-Optic Cable from a QFX Series Device” on page 376](#)). Cover the transceiver and the end of each fiber-optic cable connector with a rubber safety cap immediately after disconnecting the fiber-optic cables.
4. Using your fingers, pull the ejector lever away from the transceiver to unlock the transceiver.



**CAUTION:** Before removing the transceiver, make sure you open the ejector lever completely until you hear it click. This prevents damage to the transceiver.

5. Using the needlenose pliers, pull the ejector lever out from the transceiver.
6. Grasp the transceiver ejector lever and gently slide the transceiver approximately 0.5 in. (1.3 cm) straight out of the port.



**CAUTION:** To avoid electrostatic discharge (ESD) damage to the transceiver, do not touch the connector pins at the end of the transceiver.

7. Using your fingers, grasp the body of the transceiver and pull it straight out of the port.
8. Place the transceiver in the antistatic bag or on the antistatic mat placed on a flat, stable surface.
9. Place the dust cover over the empty port.

**Related  
Documentation**

- [Installing a Transceiver in a QFX Series Device on page 374](#)

## Installing a Transceiver in a QFX Series Device

The transceivers for a QFX Series device are hot-removable and hot-insertable field-replaceable units (FRUs). You can remove and replace them without powering off the device or disrupting device functions.

Before you begin installing a transceiver in a QFX Series device, ensure that you have taken the necessary precautions for safe handling of lasers (see “[Laser and LED Safety Guidelines and Warnings for the QFX Series](#)” on page 168).

Ensure that you have a rubber safety cap available to cover the transceiver.

To install a transceiver in a QFX Series device:



**CAUTION:** To avoid electrostatic discharge (ESD) damage to the transceiver, do not touch the connector pins at the end of the transceiver.

1. Remove the transceiver from its bag.
2. Check to see whether the transceiver is covered by a rubber safety cap. If it is not, cover the transceiver with a rubber safety cap.



**WARNING:** Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The rubber safety cap keeps the port clean and prevents accidental exposure to laser light.

3. If the port in which you want to install the transceiver is covered with a dust cover, remove the dust cover and save it in case you need to cover the port later.
4. Using both hands, carefully place the transceiver in the empty port. The connectors must face the device chassis.



**CAUTION:** Before you slide the transceiver into the port, ensure that the transceiver is aligned correctly. Misalignment might cause the pins to bend, making the transceiver unusable.

5. Slide the transceiver in gently until it is fully seated.
6. Remove the rubber safety cap when you are ready to connect the cable to the transceiver.



**WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

Figure 124: Installing an SFP Transceiver in a QFX Series Device

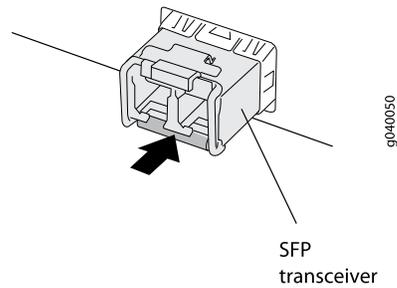
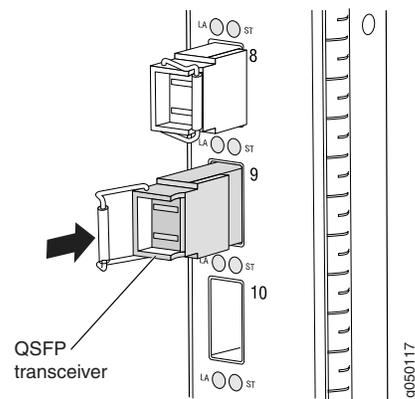


Figure 125: Installing a QSFP+ Transceiver in a QFX Series Device



#### Related Documentation

- [Removing a Transceiver from a QFX Series Device on page 373](#)
- [Connecting a Fiber-Optic Cable to a QFX Series Device on page 377](#)

## Disconnecting a Fiber-Optic Cable from a QFX Series Device

QFX Series devices have field-replaceable unit (FRU) optical transceivers to which you can connect fiber-optic cables.

Before you disconnect a fiber-optic cable from an optical transceiver installed in a QFX Series device, ensure that you have taken the necessary precautions for safe handling of lasers (see “[Laser and LED Safety Guidelines and Warnings for the QFX Series](#)” on [page 168](#)).

Ensure that you have the following parts and tools available:

- Rubber safety cap to cover the transceiver
- Rubber safety cap to cover the fiber-optic cable connector

To disconnect a fiber-optic cable from an optical transceiver installed in a QFX Series device:

1. (Recommended) Disable the port in which the transceiver is installed by including the **disable** statement at the **[edit interfaces]** hierarchy level for the specific interface.



**WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.



**WARNING:** Do not stare into the laser beam or view it directly with optical instruments even if the interface has been disabled.

2. Carefully unplug the fiber-optic cable connector from the transceiver.
3. Cover the transceiver with a rubber safety cap.



**WARNING:** Do not leave a fiber-optic transceiver uncovered except when inserting or removing a cable. The rubber safety cap keeps the port clean and prevents accidental exposure to laser light.

4. Cover the fiber-optic cable connector with the rubber safety cap.

**Related Documentation**

- [Connecting a Fiber-Optic Cable to a QFX Series Device on page 377](#)
- [Maintaining Fiber-Optic Cables in a QFX Series Device on page 379](#)

## Connecting a Fiber-Optic Cable to a QFX Series Device

QFX Series devices have field-replaceable unit (FRU) optical transceivers to which you can connect fiber-optic cables.

Before you connect a fiber-optic cable to an optical transceiver installed in a QFX Series device, ensure that you have taken the necessary precautions for safe handling of lasers (see “[Laser and LED Safety Guidelines and Warnings for the QFX Series](#)” on page 168).

To connect a fiber-optic cable to an optical transceiver installed in a QFX Series device:



**WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.



**WARNING:** Do not stare into the laser beam or view it directly with optical instruments even if the interface has been disabled.

1. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
2. If the optical transceiver is covered by a rubber safety cap, remove the cap. Save the cap.
3. Insert the cable connector into the optical transceiver.
4. Secure the cables so that they are not supporting their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.



**CAUTION:** Do not bend fiber-optic cables beyond their minimum bend radius. Bending the cables beyond their minimum bend radius can damage the cables and cause problems that are difficult to diagnose.



**CAUTION:** Do not let fiber-optic cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

**Related Documentation**

- [Disconnecting a Fiber-Optic Cable from a QFX Series Device on page 376](#)
- [Maintaining Fiber-Optic Cables in a QFX Series Device on page 379](#)

# Routine Maintenance

- [Maintaining the Air Filters in a QFX3008-I Interconnect Device on page 379](#)
- [Maintaining Fiber-Optic Cables in a QFX Series Device on page 379](#)

## Maintaining the Air Filters in a QFX3008-I Interconnect Device

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To maintain the air filters in a QFX3008-I Interconnect device.

- Check the air filters regularly for dust and debris. Replace the filter elements as needed. The filter elements degrade over time, so the filter elements in use, as well as spares, should be replaced every 6 months.
- Use spare filter elements within 1 year of manufacture. Check for the date of manufacture printed on the filter.
- Store spare filter elements in a dark, cool, and dry place. Storing the filter elements at higher temperatures, or where they can be exposed to ultraviolet (UV) radiation, hydrocarbon emissions, or vapors from solvents can significantly reduce their life.



**CAUTION:** Always keep the air filters in place while the device is operating. Because the fans are very powerful, they could pull small bits of wire or other materials into the device through the unfiltered air intake. This could damage device components.

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**Related Documentation**

- [Removing a Bottom Air Filter from a QFX3008-I Interconnect Device on page 338](#)
- [Installing a Bottom Air Filter in a QFX3008-I Interconnect Device on page 340](#)
- [Removing a Side Air Filter from a QFX3008-I Interconnect Device on page 341](#)
- [Installing a Side Air Filter in a QFX3008-I Interconnect Device on page 343](#)

## Maintaining Fiber-Optic Cables in a QFX Series Device

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To maintain fiber-optic cables in a QFX Series device:

- When you unplug a fiber-optic cable from a transceiver, place rubber safety caps over the transceiver and on the end of the cable.
- Anchor fiber-optic cable to avoid stress on the connectors. When attaching a fiber-optic cable to a transceiver, be sure to secure the fiber-optic cable so that it is not supporting its own weight as it hangs to the floor. Never let a fiber-optic cable hang free from the connector.
- Do not bend fiber-optic cables beyond their minimum bend radius. Bending the cables beyond their minimum bend radius can damage the cables and cause problems that are difficult to diagnose.
- Frequent plugging and unplugging of fiber-optic cables in and out of optical instruments can damage the instruments, which are expensive to repair. Attach a short fiber extension to the optical equipment. Any wear and tear due to frequent plugging and unplugging is then absorbed by the short fiber extension, which is easier and less expensive to replace than the instruments.
- Keep fiber-optic cable connections clean. Microdeposits of oil and dust in the canal of the transceiver or cable connector can cause loss of light, reduction in signal power, and possibly intermittent problems with the optical connection.

To clean the transceiver canal, use an appropriate fiber-cleaning device such as RIFOCS Fiber Optic Adaptor Cleaning Wands (part number 946). Follow the directions in the cleaning kit you use.

After cleaning the transceiver, make sure that the connector tip of the fiber-optic cable is clean. Use only an approved alcohol-free fiber-optic cable cleaning kit such as the Cletop-S<sup>®</sup> Fiber Cleaner. Follow the directions in the cleaning kit you use.

**Related  
Documentation**

- [Connecting a Fiber-Optic Cable to a QFX Series Device on page 377](#)
- [Disconnecting a Fiber-Optic Cable from a QFX Series Device on page 376](#)

# Viewing QFX3100 System Information

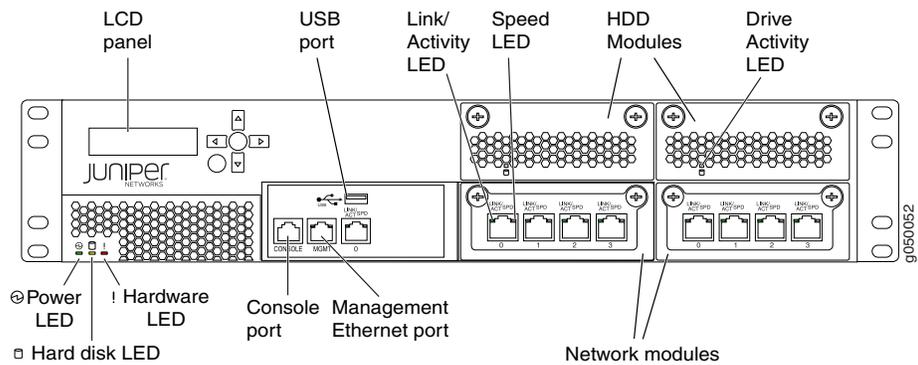
- Chassis Status LEDs on a QFX3100 Director Device on page 381
- Management Port LEDs on a QFX3100 Director Device on page 382
- Network Module Port LEDs on a QFX3100 Director Device on page 383
- AC Power Supply LED on a QFX3100 Director Device on page 384

## Chassis Status LEDs on a QFX3100 Director Device

The QFX3100 Director device has three chassis LEDs on the bottom left side of the front panel.

See [Figure 126 on page 381](#).

**Figure 126: Chassis LEDs**



[Table 67 on page 381](#) describes the chassis LEDs on a QFX3100 Director device, their colors and states, and the status they indicate.

**Table 67: Chassis LEDs on a QFX3100 Director Device**

LED	Color	State	Description
Power	Unlit	Off	Device is powered off.
	Green	On steadily	Device is powered on.

Table 67: Chassis LEDs on a QFX3100 Director Device (*continued*)

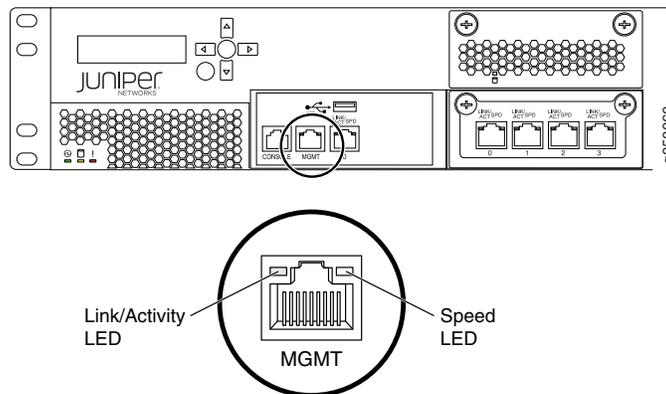
LED	Color	State	Description
Hard disk	Unlit	Off	Data is not being read from or written to the hard disk drive.
	Amber	Flickering	Data is being read from or written to the hard disk drive.
Alarm	Unlit	Off	QFX3100 Director device hardware has no major (red) alarm conditions.
	Red	On steadily	QFX3100 Director device hardware is hotter than the maximum high temperature threshold.
		Fast blinking	At least one fan has failed.
		Slow blinking	A power supply is not supplying power to the QFX3100 Director device.

**Related Documentation** • [Front Panel of a QFX3100 Director Device on page 26](#)

## Management Port LEDs on a QFX3100 Director Device

The management port (labeled **MGMT**) on the QFX3100 Director device has two LEDs that indicate link/activity and speed (see [Figure 127 on page 382](#)).

Figure 127: LEDs on the Management Port on a QFX3100 Director Device



[Table 68 on page 383](#) describes the Link/Activity and Speed LED.

Table 68: Link/Activity LED on the Management Port on a QFX3100 Director Device

LED	Color	State	Description
Link/Activity	Unlit	Off	There is no link established.
	Green	On steadily	A link is established, but there is no activity on the link.
		Flickering	There is link activity.
Speed	Unlit	Off	10-Mbps link is established. However, if the Link/Activity LED is also unlit, this indicates there is no link established.
	Green	On steadily	100-Mbps link is established.
	Amber	On steadily	1-Gbps link is established.

- Related Documentation**
- [Front Panel of a QFX3100 Director Device on page 26](#)
  - [Installing and Connecting a QFX3100 Director Device on page 213](#)

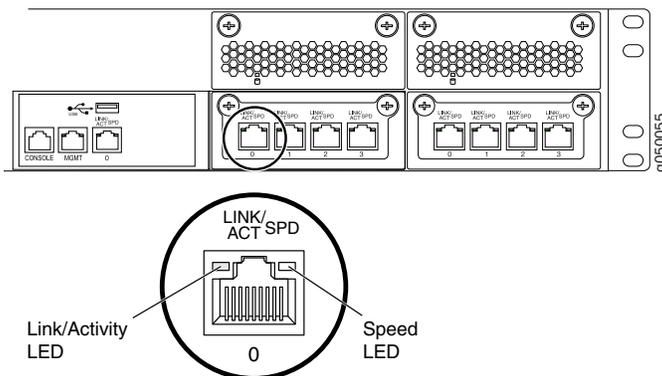
## Network Module Port LEDs on a QFX3100 Director Device

The network module ports (labeled 0 through 3) on QFX3100 Director device have two LEDs that indicate link speed and activity (see [Figure 128 on page 383](#)).



**NOTE:** [Figure 128 on page 383](#) shows the RJ-45 network module ports. The LEDs on the SFP network module ports are identical.

Figure 128: Network Module Port LEDs on a QFX3100 Director Device



[Table 69 on page 384](#) describes the network module port LEDs.



**NOTE:** In most cases, when the QFX3100 Director device is configured as part of a QFabric switch, the link speed will be 1000 Mbps.

**Table 69: Network Module Port LEDs on a QFX3100 Director Device**

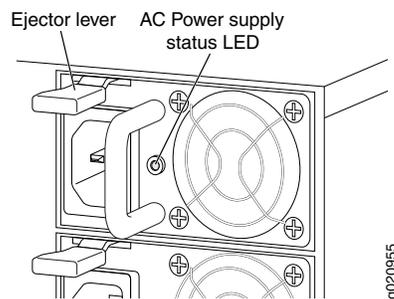
LED	Color	State	Description
Link/Activity	Off	Unlit	The port is not active, or there is no power to the network module.
	Green	On steadily	The port and the link are active, but there is no link activity.
		Flickering	The port and the link are active, and there is link activity.
Speed	Off	Unlit	10 Mbps or there is no power to the network module.
	Green	On steadily	100 Mbps.
	Amber	On steadily	1000 Mbps.

- Related Documentation**
- [Front Panel of a QFX3100 Director Device on page 26](#)
  - [Installing and Connecting a QFX3100 Director Device on page 213](#)

## AC Power Supply LED on a QFX3100 Director Device

An AC power supply has one bicolored power supply status LED on its faceplate. This LED displays information about the status of the power supply. See [Figure 129 on page 384](#).

**Figure 129: AC Power Supply LEDs on a QFX3100 Director Device**



[Table 70 on page 385](#) describes the power supply status LED on an AC power supply in a QFX3100 Director device.

Table 70: Power Supply LED on a QFX3100 Director Device

LED	Color	State	Description
Power	Unlit	Off	There is no power to the power supply, or the input voltage is not within the normal operating range.
	Green	On steadily	Power supply is functioning normally, and is powering the system.
	Yellow	On steadily	Power supply is in standby mode. The power supply is powered on but is not providing power to the system.

- Related Documentation**
- [AC Power Specifications for a QFX3100 Director Device on page 135](#)
  - [Connecting AC Power to a QFX3100 Director Device on page 218](#)



# Viewing QFX3008-I System Information

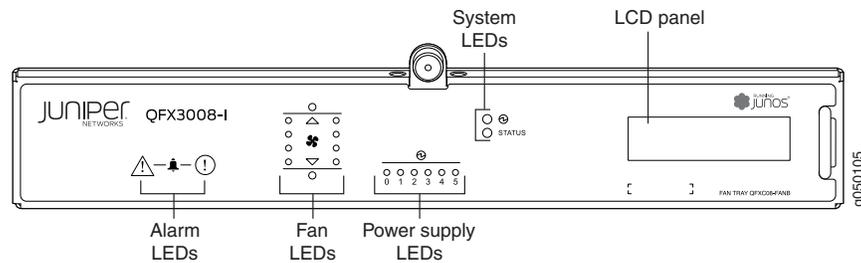
- Chassis Status LEDs on a QFX3008-I Interconnect Device on page 387
- Control Board LEDs on a QFX3008-I Interconnect Device on page 389
- 16-Port QSFP+ Front Card LEDs on a QFX3008-I Interconnect Device on page 391
- Rear Card LEDs on a QFX3008-I Interconnect Device on page 393
- AC Power Supply LEDs on a QFX3008-I Interconnect Device on page 394
- Wiring Tray LEDs on a QFX3008-I Interconnect Device on page 395

## Chassis Status LEDs on a QFX3008-I Interconnect Device

The front panel of the chassis of a QFX3008-I Interconnect device has four sets of informational LEDs to the left of the LCD panel.

See [Figure 130 on page 387](#).

**Figure 130: Chassis Status LEDs**



[Table 71 on page 388](#) describes the chassis status LEDs in a QFX3008-I Interconnect device, their colors and states, and the status they indicate.

Table 71: Chassis Status LEDs on a QFX3008-I Interconnect Device

Description	Color	State	Description
Minor alarm (triangle)	Unlit	Off	No alarm.
	Yellow or Amber	On steadily	A minor alarm indicates a noncritical condition that requires monitoring or maintenance. A minor alarm that is left unchecked might cause interruption in service or performance degradation. The minor and major alarm LEDs can be lit simultaneously. See <a href="#">“Chassis Alarm Messages on a QFX3008-I Interconnect Device”</a> on page 438.
Major alarm (round)	Unlit	Off	No alarm.
	Red	On steadily	A major alarm indicates a critical error condition that requires immediate action. The minor and major alarm LEDs can be lit simultaneously. See <a href="#">“Chassis Alarm Messages on a QFX3008-I Interconnect Device”</a> on page 438.
Fan trays	Unlit	Off	There is no power to the component.
	Amber	Blinking	There is a component failure, and the indicated fan tray should be replaced.
	Green	On steadily	The fan tray is operating normally.
Power supplies	Unlit	Off	There is no input power to the power supply.
	Amber	Blinking	There is a component failure, and the indicated power supply should be replaced.
	Green	On steadily	The AC input and DC output for the power supply are OK.
System power	Unlit	Off	The device is powered off.
	Amber	Blinking	One or more power component failures are generating one or more alarms.
	Green	On steadily	The AC input and DC output for the system are OK.

Table 71: Chassis Status LEDs on a QFX3008-I Interconnect Device (*continued*)

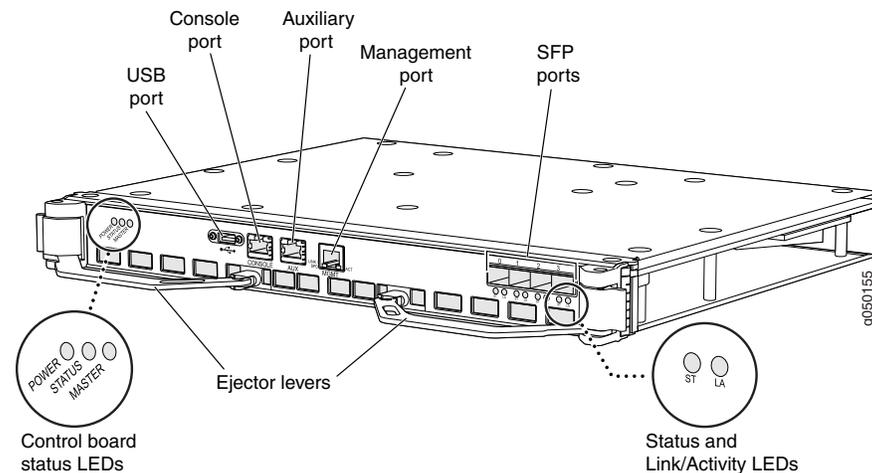
Description	Color	State	Description
System status	Unlit	Off	The device is powered off.
	Green	On steadily	The fan trays and front and rear cards are operating normally.
		Intermittent blinking	The beacon feature has been enabled on the device using the <b>request chassis beacon</b> command.
	Amber	Blinking	One or more fan tray or front or rear card component failures are generating one or more alarms.

- Related Documentation**
- [Front Panel Display of the QFX3008-I Interconnect Device on page 43](#)
  - [Understanding Alarms on page 437](#)
  - `request chassis beacon`

## Control Board LEDs on a QFX3008-I Interconnect Device

Each Control Board has three LEDs on the left side of the module front panel that indicate Control Board status. Each SFP+ management port has two LEDs that indicate link status and activity. See [Figure 131 on page 389](#).

Figure 131: Control Board LEDs on a QFX3008-I Interconnect Device



[Table 72 on page 390](#) describes these LEDs, their colors and states, and the status they indicate.

Table 72: Control Board LEDs on a QFX3008-I Interconnect Device

LED	Color	State	Description
Power	Unlit	Off	There is no power to the Control Board, or the Control Board is not fully seated in the chassis. See <a href="#">"Installing a Control Board in a QFX3008-I Interconnect Device"</a> on page 349.
	Green	On steadily	Control Board is powered on.
	Amber	Blinking	Control Board is offline.
Status	Green	On steadily	Control Board is operating normally.
		Intermittent blinking	The beacon feature has been enabled on the card using the <code>request chassis beacon</code> command.
	Amber	On steadily	Software is loading on the Control Board.
		Blinking	Control Board has failed to boot properly and needs to be reset or reinstalled. See <a href="#">"Installing a Control Board in a QFX3008-I Interconnect Device"</a> on page 349.
Master	Unlit	Off	Control Board is acting as the backup Control Board.
	Green	On steadily	Control Board is acting as the master Control Board.

[Table 73 on page 390](#) describes the SFP+ port LEDs.

Table 73: Control Board SFP+ Port LEDs on a QFX3008-I Interconnect Device

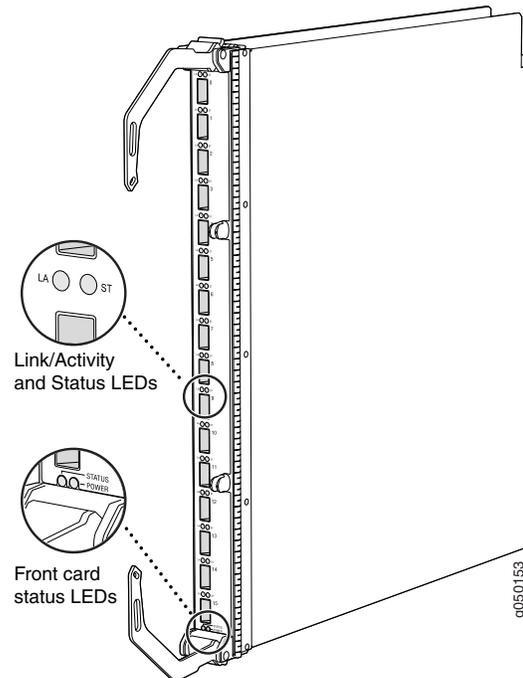
LED	Color	State	Description
Link/Activity	Unlit	Off	No link is established, there is a fault, or the link is down.
	Green	On steadily	A link is established, but there is no link activity.
		Flickering	A link is established, and there is link activity.
Status	Unlit	Off	No transceiver is installed in the port, the port is configured for a different interface, or the transceiver is not supported.
	Green	On steadily	A transceiver is installed in the port.

- Related Documentation**
- [Control Board in a QFX3008-I Interconnect Device on page 49](#)
  - [Taking a Control Board Offline in a QFX3008-I Interconnect Device on page 345](#)
  - [Removing a Control Board from a QFX3008-I Interconnect Device on page 347](#)
  - request chassis beacon

## 16-Port QSFP+ Front Card LEDs on a QFX3008-I Interconnect Device

Each 16-port QSFP+ front card has two LEDs at the bottom of the module front panel that indicate front card status. Each QSFP+ port has two LEDs that indicate link status and activity. See [Figure 132 on page 391](#).

**Figure 132: 16-Port QSFP+ Front Card LEDs on a QFX3008-I Interconnect Device**



[Table 74 on page 392](#) describes these LEDs, their colors and states, and the status they indicate.

Table 74: 16-Port QSFP+ Front Card LEDs on a QFX3008-I Interconnect Device

LED	Color	State	Description
Status	Green	On steadily	Front card is operating normally.
		Intermittent blinking	The beacon feature has been enabled on the card using the <b>request chassis beacon</b> command.
	Amber	On steadily	Software is loading on the front card.
		Blinking	Front card has failed to boot properly and needs to be reset or reinstalled. See <a href="#">“Installing a 16-Port QSFP+ Front Card in a QFX3008-I Interconnect Device”</a> on page 353.
Power	Unlit	Off	There is no power to the front card, or the front card is not fully seated in the chassis. See <a href="#">“Installing a 16-Port QSFP+ Front Card in a QFX3008-I Interconnect Device”</a> on page 353.
	Green	On steadily	Front card is powered on.
	Amber	Blinking	Front card is offline.

[Table 75 on page 392](#) describes the QSFP+ port LEDs.

Table 75: 16-Port QSFP+ Front Card Port LEDs on a QFX3008-I Interconnect Device

LED	Color	State	Description
Link/Activity	Unlit	Off	No link is established, there is a fault, or the link is down.
	Green	On steadily	A link is established, but there is no link activity.
		Flickering	A link is established, and there is link activity.
Status	Unlit	Off	No transceiver is installed in the port, the port is configured for a different interface, or the transceiver is not supported.
	Green	On steadily	A transceiver is installed in the port.

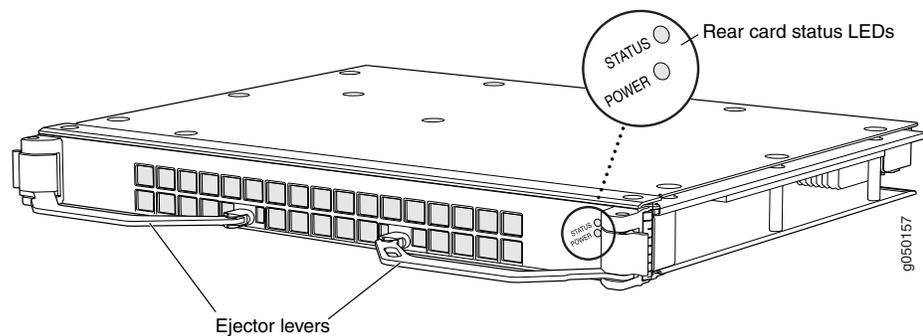
- Related Documentation**
- [16-Port QSFP+ Front Cards in a QFX3008-I Interconnect Device on page 48](#)
  - [Installing a 16-Port QSFP+ Front Card in a QFX3008-I Interconnect Device on page 353](#)

- [Taking a 16-Port QSFP+ Front Card Offline in a QFX3008-I Interconnect Device on page 351](#)
- [Removing a 16-Port QSFP+ Front Card from a QFX3008-I Interconnect Device on page 352](#)

## Rear Card LEDs on a QFX3008-I Interconnect Device

Each rear card has two LEDs on the right side of the module front panel that indicate rear card status. See [Figure 133 on page 393](#).

**Figure 133: Rear Card LEDs on a QFX3008-I Interconnect Device**



[Table 76 on page 393](#) describes these LEDs, their colors and states, and the status they indicate.

**Table 76: Rear Card LEDs on a QFX3008-I Interconnect Device**

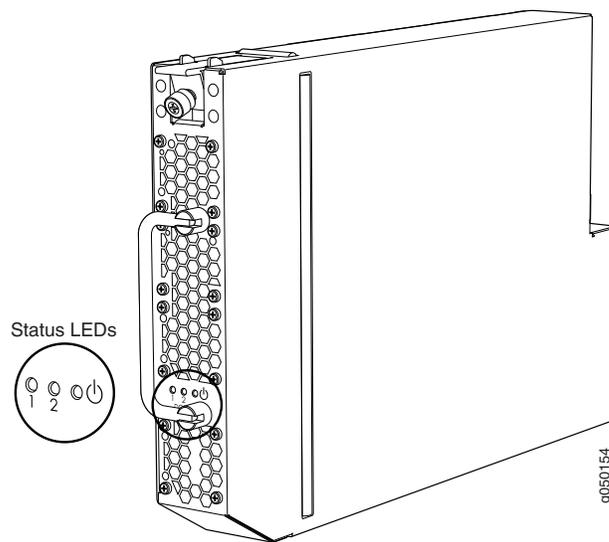
LED	Color	State	Description
Status	Green	On steadily	Rear card is operating normally.
		Intermittent blinking	The beacon feature has been enabled on the card using the <b>request chassis beacon</b> command.
	Amber	On steadily	Software is loading on the rear card.
		Blinking	Rear card has failed and needs to be replaced. See <a href="#">"Installing a 16-Port QSFP+ Front Card in a QFX3008-I Interconnect Device" on page 353</a> .
Power	Unlit	Off	There is no power to the rear card, or the rear card is not fully seated in the chassis. See <a href="#">"Installing a Rear Card in a QFX3008-I Interconnect Device" on page 358</a> .
	Green	On steadily	Rear card is powered on.
	Amber	Blinking	Rear card is offline.

- Related Documentation**
- [Installing a Rear Card in a QFX3008-I Interconnect Device on page 358](#)
  - [Taking the Rear Card Offline in a QFX3008-I Interconnect Device on page 355](#)
  - [Removing a Rear Card from a QFX3008-I Interconnect Device on page 356](#)

## AC Power Supply LEDs on a QFX3008-I Interconnect Device

An AC power supply has three LEDs on its faceplate. These LEDs display information about the status of the power supply. See [Figure 134 on page 394](#).

**Figure 134: AC Power Supply LEDs on a QFX3008-I Interconnect Device**



[Table 77 on page 394](#) describes the LEDs on an AC power supply on a QFX3008-I Interconnect device.

**Table 77: AC Power Supply LEDs on a QFX3008-I Interconnect Device**

LED	Color	State	Description
Status (1 or 2)	Unlit	Off	Indicates one of the following: <ul style="list-style-type: none"> <li>• DC output voltage is not within normal operating range.</li> <li>• Power supply is not supplying DC power correctly.</li> </ul>
	Solid	Green	DC power output is within normal operating range.
	Blinking	Amber	Power supply has been disabled internally by the system.

Table 77: AC Power Supply LEDs on a QFX3008-I Interconnect Device (*continued*)

LED	Color	State	Description
Power	Unlit	Off	Indicates one of the following: <ul style="list-style-type: none"> <li>Power supply is disconnected from power feed.</li> <li>AC input voltage is not within normal operating range.</li> <li>No power input.</li> </ul>
	Solid	Green	<ul style="list-style-type: none"> <li>Power supply is functioning normally.</li> </ul>

**Related Documentation**

- [AC Power Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 137](#)
- [Power Requirements for a QFX3008-I Interconnect Device on page 139](#)
- [AC Power Cord Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 139](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 239](#)

## Wiring Tray LEDs on a QFX3008-I Interconnect Device

A wiring tray has three LEDs on its faceplate. The text 1, 2, or 3 next to the LEDs indicates which appliance inlet on the single-phase wiring tray or which phase on the three-phase wiring tray the LED corresponds to. See [Figure 135 on page 395](#) and [Figure 136 on page 396](#).

**Figure 135: AC Single-Phase Wiring Tray LEDs on a QFX3008-I Interconnect Device**

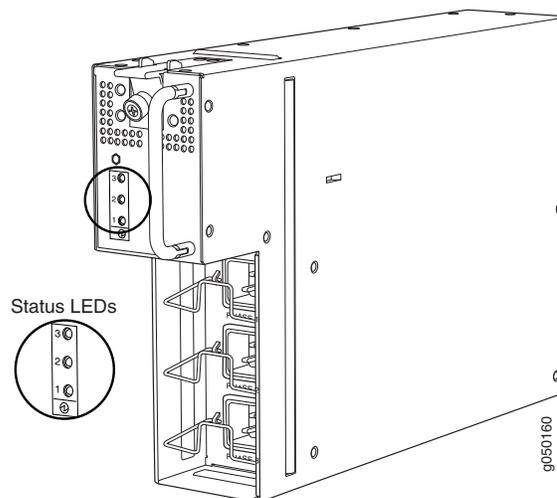


Figure 136: AC Three-Phase Wiring Tray LEDs on a QFX3008-I Interconnect Device

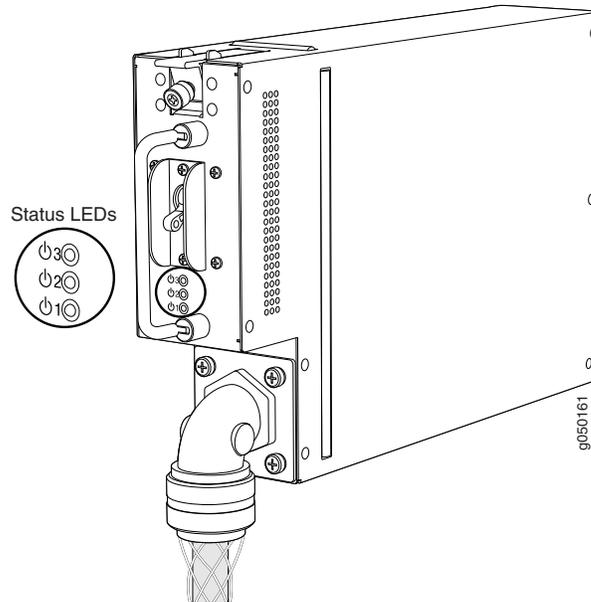


Table 78 on page 396 describes the LEDs on an AC wiring tray.

Table 78: AC Wiring Tray LEDs on a QFX3008-I Interconnect Device

LED	State	Description
Power (Phase 1, 2, or 3)	Unlit	Indicates one of the following: <ul style="list-style-type: none"> <li>Wiring tray is disconnected from power feed.</li> <li>AC power input voltage is not within normal operating range.</li> <li>No AC power input.</li> </ul>
	Green	<ul style="list-style-type: none"> <li>AC power input voltage is within normal operating range.</li> </ul>

**Related Documentation**

- [AC Power Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 137](#)
- [Power Requirements for a QFX3008-I Interconnect Device on page 139](#)
- [Connecting AC Power to a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 239](#)

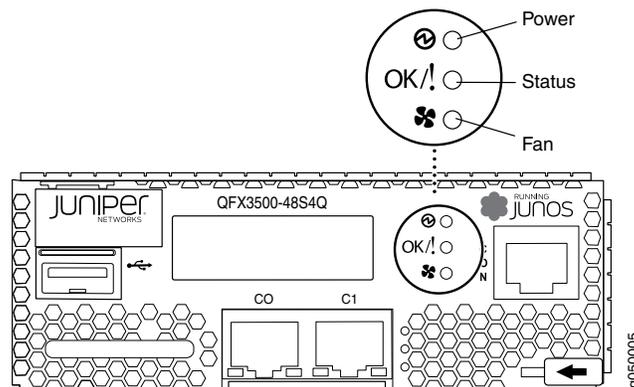
# Viewing QFX3500 System Information

- Chassis Status LEDs on a QFX3500 Device on page 397
- Management Port LEDs on a QFX3500 Device on page 398
- Access Port and Uplink Port LEDs on a QFX3500 Device on page 399
- Fan Tray LED on a QFX3500 Device on page 401
- AC Power Supply LEDs on a QFX3500 Device on page 402
- DC Power Supply LEDs on a QFX3500 Device on page 403

## Chassis Status LEDs on a QFX3500 Device

The front panel of the QFX3500 device has three LEDs on the right side of the management board, next to the LCD panel (see [Figure 137 on page 397](#)).

**Figure 137: Chassis Status LEDs on a QFX3500 Device**



[Table 79 on page 398](#) describes the chassis status LEDs on a QFX3500 device, their colors and states, and the status they indicate. You can view the colors of the three LEDs remotely through the CLI by issuing the operational mode command **show chassis lcd**.

Table 79: Chassis Status LEDs on a QFX3500 Device

Name	Color	State	Description
Power	Green	On steadily	The device is powered on.
	Amber	Blinking	A temperature or voltage error has been detected, and the device has shut down. Power off the QFX3500 device by setting the AC power source outlet to the OFF (O) position, or unplugging the AC power cords. Correct any site temperature issues, and allow the device to cool down. Power on the QFX3500 device and monitor the power supply and fan LEDs to help determine where the error is occurring. If the amber Power LED begins blinking again, power off the QFX3500 device and contact customer support. See <a href="#">“Contacting Customer Support to Obtain a Return Materials Authorization for a QFX Series Device or Component”</a> on page 435.
Status	Green	On steadily	Junos OS has been loaded on the device.
		Intermittent blinking	The beacon feature has been enabled on the device using the <b>request chassis beacon</b> command.
	Amber	Blinking	A software error has occurred. Power off the QFX3500 device by setting the AC power source outlet to the OFF (O) position, or unplugging the AC power cords. Power on the QFX3500 device and monitor the management board LEDs to ensure that Junos OS boots properly.
Fan	Green	On steadily	The fan modules on the management board are operating normally.
	Amber	Blinking	An error has been detected in the fan modules installed on the management board. Replace the management board as soon as possible. You must power off the QFX3500 device before replacing the management board. See <a href="#">“Removing a Management Board from a QFX3500 Device”</a> on page 369.

**Related Documentation**

- [Front Panel of a QFX3500 Device on page 65](#)
- [Chassis Alarm Messages on a QFX3500 Device on page 442](#)

## Management Port LEDs on a QFX3500 Device

The management ports (labeled C0 and C1) on a QFX3500 device have two LEDs that indicate link speed and activity (see [Figure 138 on page 399](#)).



**NOTE:** [Figure 138 on page 399](#) depicts the 1000BASE-T management ports. The LEDs on the SFP management ports are identical.

Figure 138: Management Port LEDs on a QFX3500 Device

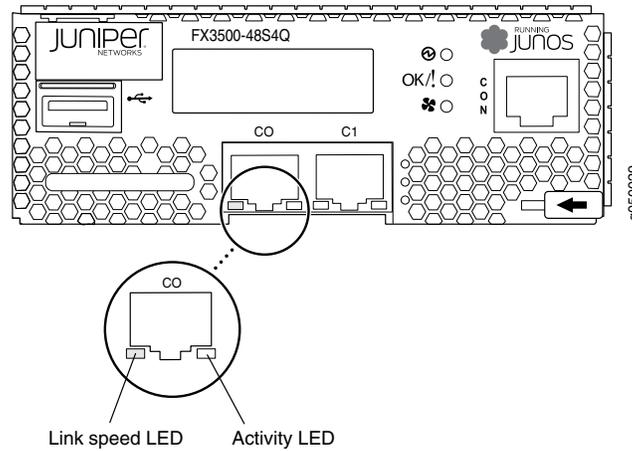


Table 80 on page 399 describes the management port LEDs.

Table 80: Management Port LEDs on a QFX3500 Device

LED	Color	State	Description
Link speed	Unlit	Off	The port is not active.
	Green	On steadily	1-Gbps link is established.
	Amber	On steadily	10/100-Mbps link is established.
Activity	Unlit	Off	There is no activity on the link.
	Green	Flickering	There is activity on the link.

- Related Documentation**
- [Front Panel of a QFX3500 Device on page 65](#)
  - [Connecting a QFX3500 Device to a Network for Out-of-Band Management](#)

## Access Port and Uplink Port LEDs on a QFX3500 Device

Each access port and uplink port on a QFX3500 device has two LEDs. The two figures in this topic show the location of those LEDs:

- [Figure 139 on page 400](#) shows the location of the LEDs on the SFP+ access ports.
- [Figure 140 on page 400](#) shows the location of the LEDs on the QSFP+ uplink ports.

Figure 139: LEDs on the SFP+ Access Ports

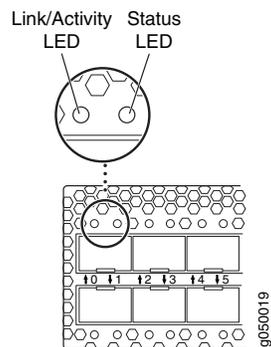
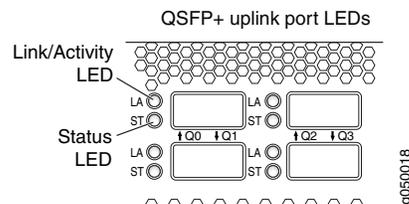


Figure 140: LEDs on the QSFP+ Uplink Ports



The LEDs labeled Link/Activity LED in [Figure 139 on page 400](#) and [Figure 140 on page 400](#) indicate link activity or faults. The LEDs labeled Status LED in [Figure 139 on page 400](#) and [Figure 140 on page 400](#) indicate link status.



**TIP:** By default, all access ports are configured as Ethernet interfaces. If you insert a Fibre Channel transceiver, the LEDs do not light until you configure the port as a Fibre Channel interface in Junos OS. Likewise, the LEDs do not light if you insert an Ethernet transceiver in a port configured as a Fibre Channel interface.

[Table 81 on page 400](#) describes the SFP+ access port LEDs.

Table 81: Network Port LEDs on SFP+ Access Ports on a QFX3500 Device

LED	Color	State	Description
Link/Activity	Unlit	Off	No link is established, there is a fault, or the link is down.
	Green	On steadily	A link is established, but there is no link activity.
		Blinking	A link is established, and there is link activity.
Status	Unlit	Off	No transceiver is installed in the port, the port is configured for a different interface, or the transceiver is not supported.
	Green	On steadily	An Ethernet transceiver is installed in the port.
	Amber	On steadily	A Fibre Channel transceiver is installed in the port.

Table 82 on page 401 describes the QSFP+ uplink port LEDs.

**Table 82: Uplink Port LEDs on QSFP+ Uplink Ports on a QFX3500 Device**

LED	Color	State	Description
Link/Activity	Unlit	Off	No link is established, there is a fault, or the link is down.  <b>NOTE:</b> The LED remains unlit only if all four of the 10-Gigabit Ethernet SFP+ breakout links are down.
		Green	A link is established, but there is no link activity.  <b>NOTE:</b> The LED is lit green when at least one of the four 10-Gigabit Ethernet SFP+ breakout links is established.
		Blinking	A link is established, and there is link activity.  <b>NOTE:</b> The LED is lit green when at least one of the four 10-Gigabit Ethernet SFP+ breakout links is established.
Status	Unlit	Off	No transceiver is installed in the port, or the transceiver is not supported.
		Green	A transceiver is installed in the port.

**Related Documentation**

- [Rear Panel of a QFX3500 Device on page 66](#)
- [Installing a Transceiver in a QFX Series Device on page 374](#)
- [Connecting a Fiber-Optic Cable to a QFX Series Device on page 377](#)

## Fan Tray LED on a QFX3500 Device

Figure 141 on page 401 shows the location of the LED on the fan tray.

**Figure 141: Fan Tray LED in a QFX3500 Device**

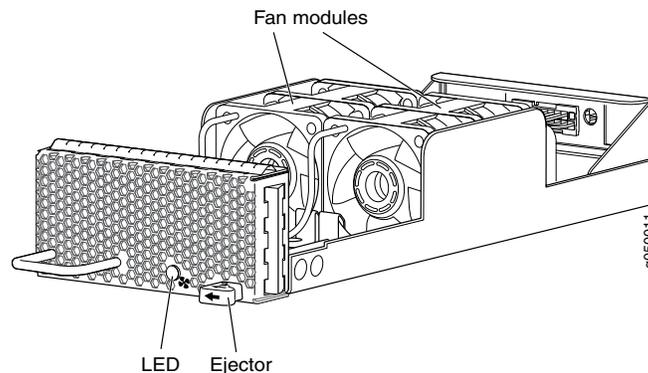


Table 83 on page 402 describes the function of the fan tray LED.

Table 83: Fan Tray LED in a QFX3500 Device

Name	Color	State	Description
Fan	Green	On steadily	The fan tray is operating normally.
	Amber	Blinking	An error has been detected in the fan tray. Replace the fan tray as soon as possible. To maintain proper airflow through the chassis leave the fan tray installed in the chassis, until you are ready to replace it.

- Related Documentation**
- [Cooling System and Airflow for a QFX3500 Device on page 68](#)
  - [Installing a Fan Tray in a QFX3500 Device on page 365](#)
  - [Removing a Fan Tray from a QFX3500 Device on page 367](#)

## AC Power Supply LEDs on a QFX3500 Device

Figure 142 on page 402 shows the location of the LEDs on the power supply.

Figure 142: Power Supply LEDs in a QFX3500 Device

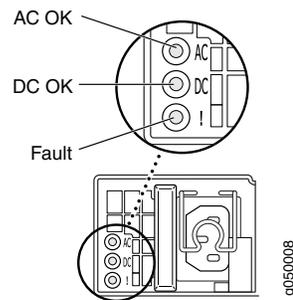


Table 84 on page 402 describes the LEDs on the AC power supplies in QFX3500 devices.

Table 84: AC Power Supply LEDs in QFX3500 Devices

LED	Color	State	Description
AC OK	Unlit	Off	The power supply is disconnected from power, or power is not coming into the power supply.
	Green	On steadily	Power is coming into the power supply.
DC OK	Unlit	Off	The power supply is disconnected from power, or the power supply is not sending out power correctly.
	Green	On steadily	The power supply is sending out power correctly.
Fault	Amber	On steadily	An error has been detected in the power supply. Replace the power supply as soon as possible. To maintain proper airflow through the chassis, leave the power supply installed in the chassis until you are ready to replace it.



**NOTE:** If the AC OK LED and the DC OK LED are unlit, either the AC power cord is not installed properly or the power supply fuse has failed. If the AC OK LED is lit and the DC OK LED is unlit, the AC power supply is installed properly, but the power supply has an internal failure.

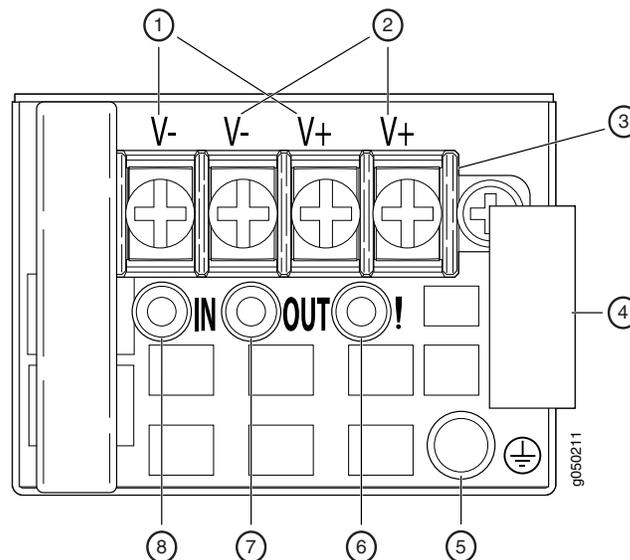
**Related Documentation**

- [AC Power Supply for a QFX3500 Device on page 73](#)
- [Connecting AC Power to a QFX3500 Device on page 265](#)

## DC Power Supply LEDs on a QFX3500 Device

Figure 143 on page 403 shows the location of the LEDs on the DC power supply.

**Figure 143: DC Power Supply Faceplate on a QFX3500 Device**



1—Feed A input terminals	5—ESD grounding point
2—Feed B input terminals	6—Fault LED
3—Terminal block	7—Output LED
4—Ejector lever	8—Input LED

Table 85 on page 403 describes the LEDs on the DC power supplies.

**Table 85: DC Power Supply LEDs on a QFX3500 Device**

Name	Color	State	Description
Input	Unlit	Off	The power supply is disconnected from power, or power is not coming into the power supply.
	Green	On steadily	Power is coming into the power supply.

Table 85: DC Power Supply LEDs on a QFX3500 Device (*continued*)

Name	Color	State	Description
Output	Unlit	Off	The power supply is disconnected from power, or the power supply is not sending out power correctly.
	Green	On steadily	The power supply is sending out power correctly.
Fault	Amber	On steadily	An error has been detected in the power supply. Replace the power supply as soon as possible. To maintain proper airflow through the chassis, leave the power supply installed in the chassis until you are ready to replace it.

- Related Documentation**
- [DC Power Supply for a QFX3500 Device on page 75](#)
  - [Connecting DC Power to a QFX3500 Device on page 267](#)

## PART 6

# Troubleshooting

- [Restoring Junos OS on page 407](#)
- [Returning Hardware on page 423](#)
- [Alarms and System Log Messages on page 437](#)



# Restoring Junos OS

- [Creating an Emergency Boot Device for a QFX Series Device on page 407](#)
- [Performing a Recovery Installation on a QFX3500 Device and QFX3008-I Interconnect Device on page 409](#)
- [Performing a QFabric Switch Recovery Installation on the Director Group on page 410](#)
- [Performing a Recovery Installation of the Director Group on page 420](#)

## Creating an Emergency Boot Device for a QFX Series Device

---

If Junos OS on your QFX Series device is damaged in some way that prevents the software from loading properly, you can use an emergency boot device to repartition the primary disk and load a fresh installation of Junos OS. Use the following procedure to create an emergency boot device.

Before you begin, you need to download the installation media image for your device and Junos OS release from <http://www.juniper.net/customers/support/>.



**NOTE:** The following procedure assumes that you are creating the device on a QFX3500 device. You can create the emergency boot device on another Juniper Networks switch or router, or any PC or laptop that supports Linux. The steps you take to create the emergency boot device vary, depending on the device.

To create an emergency boot device from a QFX3500 device:

1. Use FTP to copy the installation media image into the `/var/tmp` directory on the QFX3500 device.
2. Insert a USB device into the USB port.
3. From the Junos OS command-line interface (CLI), start the shell:

```
user@device> start shell
%
```

4. Switch to the `root` account using the `su` command:

```
% su
```

Password: *password*



**NOTE:** The password is the root password for the QFX3500 device. If you logged in to the device as root, you do not need to perform this step.

5. Enter the following command:

```
root@device% dd if=/var/tmp/filename of=/dev/da1 bs=16k
```

The device writes the installation media image to the USB device:

```
root@device% dd if=/var/tmp/install-media-qfx3500.junos_11.1 of=/dev/da1
bs=16k
11006+1 records in
11006+1 records out
180332544 bytes transferred in 71.764266 secs (2512846 bytes/sec)
```

6. Log out of the shell:

```
root@device% exit
% exit
user@device>
```

**Related  
Documentation**

- [USB Port Specifications for the QFX Series on page 105](#)
- [Performing a Recovery Installation on a QFX3500 Device and QFX3008-I Interconnect Device on page 409](#)
- [Performing a QFabric Switch Recovery Installation on the Director Group on page 410](#)
- [Performing a Recovery Installation of the Director Group on page 420](#)

## Performing a Recovery Installation on a QFX3500 Device and QFX3008-I Interconnect Device

If Junos OS on your device is damaged in some way that prevents the software from loading correctly, you may need to perform a recovery installation using an emergency boot device (for example, a USB flash drive) to restore the default factory installation. Once you have recovered the software, you need to restore the device configuration. You can either create a new configuration as you did when the device was shipped from the factory, or if you saved the previous configuration, you can simply restore that file to the device.

If at all possible, you should try to perform the following steps before you perform the recovery installation:

1. Ensure that you have an emergency boot device to use during the installation.
2. Copy the existing configuration in the file `/config/juniper.conf.gz` from the device to a remote system, such as a server, or to an emergency boot device. For extra safety, you can also copy the backup configurations (the files named `/config/juniper.conf.n`, where *n* is a number from 0 through 9) to a remote system or to an emergency boot device.



**WARNING:** The recovery installation process completely overwrites the entire contents of the internal flash storage.

3. Copy any other stored files to a remote system as desired.

To reinstall Junos OS:

1. Insert the emergency boot device into the QFX3500 device..
2. Reboot the QFX3500 device.



**NOTE:** Do not power off the device if it is already on.

```
[edit system]
user@device> request system reboot
```

3. When the software prompts you with the following question, type **y**:

```
WARNING: The installation will erase the contents of your disk. Do you
wish to continue (y/n)? y
```

4. The device copies the software from the emergency boot device, occasionally displaying status messages. Copying the software can take up to 10 minutes.

When the device is finished copying the software, you are presented with the following prompt:

```
*** Mon Mar 21 21:08:41 UTC 2011 ***
Installation successful..
```

```

Please select one of the following options:
Reboot to installed Junos after removing install media (default) ... 1
Reboot to installed Junos by disabling install media ..... 2
Exit to installer debug shell ..... 3
Install Junos to alternate slice ..... 4
Your choice: 4
NOTE: System installer will now install Junos to alternate slice
Do not power off or remove the external installer media or
interrupt the installation mechanism.

```

5. Select 4 to install Junos OS to the alternate slice of the partition, and then press **Enter**.
6. Remove the emergency boot device when prompted and then press **Enter**. The device then reboots from the internal flash storage on which the software was just installed. When the reboot is complete, the device displays the login prompt.
7. Create a new configuration as you did when the device was shipped from the factory, or restore the previously saved configuration file to the device.

**Related  
Documentation**

- [Creating an Emergency Boot Device for a QFX Series Device on page 407](#)

## Performing a QFabric Switch Recovery Installation on the Director Group

If the software on your QFabric switch is damaged in some way that prevents the software from loading correctly, or you need to upgrade the software on your QFabric switch, you may need to perform a recovery installation on the Director group.

If possible, perform the following steps before you perform the recovery installation:

1. Ensure that you have an emergency boot device (for example, an external USB flash drive) for each of your Director devices to use during the recovery installation.

You can either use the external USB flash drive containing the software supplied by Juniper Networks, or you can use an external USB flash drive supplied by Juniper Networks on which you install the QFabric switch install media.

2. Back up any configuration files and initial setup information on a different external USB flash drive and then restore this information as part of the recovery process. Use the **request system software configuration-backup** command to back up your configuration files and initial setup information:

```
user@swi tch> request system software configuration-backup path
```

Backing up the files to an external USB flash drive is the recommended method.



**NOTE:** To recover the Director group, you must upgrade both Director devices in parallel. If you are recovering only one Director device in a Director group, and the software version will remain the same between the two Director devices, make sure that the other Director device is powered on and operational. If the software version of the Director device you are recovering will be different, make sure that the other Director device is powered off and is not operational.



**NOTE:** The recovery installation process deletes the existing QFabric switch ID on the Director device and generates another one. If you encounter any licensing issues due to the changed QFabric switch ID, please contact the Juniper Technical Assistance Center (JTAC).

This topic describes the two ways to perform the recovery installation:

- [Performing a Recovery Installation Using a Juniper Networks External USB Flash Drive with Preloaded Software on page 411](#)
- [Performing a Recovery Installation Using a Juniper Networks External Blank USB Flash Drive on page 415](#)

## Performing a Recovery Installation Using a Juniper Networks External USB Flash Drive with Preloaded Software

This procedure describes how to perform a recovery installation using the external USB flash drive you received from Juniper Networks.

1. Insert the external USB flash drive supplied by Juniper Networks into the Director device.
2. If you have access to the default partition, reboot the Director device by issuing the **request system reboot director-group** command.
3. If you do not have access to the default partition, power cycle the Director device.

The following menu appears on the Director device console when the Director device boots up:

```
Juniper Networks QFabric Director Install/Recovery Media
- To boot from the local disk, wait 10 seconds or press the Enter key.
- To reinstall the QFabric software on this Director device, type: install
```

4. Type **install** and then press **Enter** to install the software on the Director device.

Once the installation process is complete, the Director device reboots, and the following menu appears on the Director device console:

```
Juniper Networks QFabric Director Install/Recovery Media
- To boot from the local disk, wait 10 seconds or press the Enter key.
- To reinstall the QFabric software on this Director device, type: install
```

5. Press **Enter**.

The Director device reboots from the local disk on which the software was just installed.



**NOTE:** Since the recovery installation process completely overwrites the entire contents of the Director device, you will need to restore the required configuration files and initial setup information. Ensure that you have this information backed up on an external USB flash drive before you perform the following steps.

6. Log in as root on the Director device.

The following menu appears on the Director device console:

```
Before you can access the QFabric switch, you must complete the initial
setup of the Director group by using the steps that follow.
If the initial setup procedure does not complete successfully, log out of
the Director device and then log back in to restart
this setup menu.
```

```
Continue?[y/n]
```

7. Enter **n** to bypass the initial setup script and enter the Director device root directory, where you can mount the external USB flash drive containing the configuration files and initial setup information.

8. Issue the **ls /mnt** command to list the **mount** directory.

```
root@dg0 ~]# ls /mnt
```

9. Issue the **mkdir** command to create a directory within the mount directory.

```
root@dg0 ~]# mkdir /mnt/myusb
```

10. Issue the **mount /dev/sdb2 /mnt/myusb/** command to mount the external USB flash drive to the local drive of the Director device.

```
root@dg0 ~]# mount /dev/sdb2 /mnt/myusb/
```

11. Issue the **ls -la /mnt/mnt/myusb/** command to verify the contents of your mounted external USB flashdrive.

```
root@dg0 ~]# ls -la /mnt/mnt/myusb/
```

```
total 1770884
drwxr-xr-x 2 root root      4096 Sep  7 05:16 .
drwxr-xr-x 3 root root      4096 Sep  7 10:15 ..
-rw-r--r-- 1 root root     4249 Sep  7 03:52 mybackup-20110907
```

12. Exit the Director device and log back in as root on the Director device.

The following menu appears:

```
Before you can access the QFabric switch, you must complete the initial
setup of the Director group by using the steps that follow.
If the initial setup procedure does not complete successfully, log out of
the Director device and then log back in to restart
this setup menu.
```

```
Continue?[y/n] y
Initial Configuration
```

You may enter the configuration manually or restore from a backup.

```
Specify a backup file? [y/n] : y
Please specify the full path of the configuration backup file. :
/mnt/myusb/mybackup-20110907
```

13. Enter **y** to continue.

14. Enter **y** and specify the path to the backup configuration file located on the external USB flash drive.

```
/mnt/myusb/mybackup-20110907
```

The following messages appear:

```

Saving temporary configuration...
Configuring peer...
connect error for 1.1.1.2:9001
Configuring local interfaces...
Configuring interface eth0 with [10.49.213.163/24:10.49.213.254]
Configured interface eth0 with [10.49.213.163/24:10.49.213.254]
Configuring QFabric software with initial pool of 4000 MAC addresses
[00:10:00:00:00:00 - 00:10:00:00:0f:3b]
Configuring QFabric address [10.49.213.50]
Reconfiguring QFabric software static configuration
Applying the new Director Device password
Applying the QFabric component password
First install initial configuration, generating and sharing SSH keys.
First install initial configuration, generating SSH keys.
connect error for 1.1.1.2:9001
Shared SSH keys.
Configuration complete. Director Group services will auto start within 30
seconds.

```

The Director device reboots from the local disk on which the software was just installed.

- From the default partition, issue the **request system reboot all** command to reboot all of the components of the QFabric switch and to make sure that all components are running the same version of software.

```
user@switch> request system reboot all
```

- Log in to the default partition and issue the **show version component all** command to verify that all components are running the same version of software.

```
user@switch> show version component all
```

```

dg1:
-
Hostname: qfabric
Model: qfx3100
JUNOS Base Version [11.3X30.6]

dg0:
-
Hostname: qfabric
Model: qfx3100
JUNOS Base Version [11.3X30.6]

NW-NG-0:
-
Hostname: qfabric
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]

FC-0:
-

```

```
Hostname: qfabric
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]
```

```
FC-1:
Hostname: qfabric
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]
```

```
DRE-0:
-
Hostname: dre-0
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]
```

```
FM-0:
-
Hostname: qfabric
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]
```

```
nodedevice1:
-
Hostname: qfabric
Model: QFX3500
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]
```

```

interconnectdevice1:
-
Hostname: qfabric
Model: QFX3108
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]
warning: from interconnectdevice0: Disconnected

```

## Performing a Recovery Installation Using a Juniper Networks External Blank USB Flash Drive

If you do not have an external USB flash drive preloaded with the software from Juniper Networks to use as an emergency boot device, you can create your own, using a blank external USB flash drive provided by Juniper Networks. You need to download the install media from the Juniper Networks Support website onto your UNIX workstation, uncompress and untar the software, and then burn the software image onto your Juniper Networks external USB (4-gigabyte) flash drive. Make sure you create two emergency boot devices, one for each Director device, so you can perform a recovery installation in parallel.



**NOTE:** Because the recovery installation process completely overwrites the entire contents of the Director device, you will need to restore the required configuration files and initial setup information. Ensure that you have this information backed up on an external USB flash drive before you perform the following steps.

1. In a browser, go to <http://www.juniper.net/support> .  
The Support page appears.
2. Select **Download Software** in the **Support** section.
3. Select **Junos Canada and US** in the **Switching** section.
4. Select the number of the software version that you want to download in the **Current Releases** section.
5. Click the **Software** tab and select the complete install media you want to download in the **QFabric Switch Install Package and Media** section.  
A login screen appears.
6. Log in and save the install media file to your UNIX workstation.
7. Use FTP to access the UNIX workstation where the install media resides.  

```
ftp ftp://hostname / pathname / install-media-qfabric-<version>.img.tgz
```
8. When prompted, enter your username and password.

9. Make sure you are in binary mode by entering **binary** at the prompt.

```
binary
```

10. Use the **get** command to transfer the installation package from the FTP host to your UNIX workstation.

```
get install-media-qfabric-<version>.img.tgz
```

11. Close the FTP session:

```
bye
```

12. Untar the *install-media-qfabric-<version>.img.tgz* file on your UNIX workstation.

```
tar -xvzf install-media-qfabric-11.3X30.6.img.tgz
```

13. Insert a blank external USB (4-gigabyte) flash drive supplied by Juniper Networks into your UNIX workstation.

14. Burn the software image you just downloaded to your UNIX workstation onto your external USB flash drive using the **dd** command:

```
dd if=install-media-qfabric-11.3X30.6.img of=/dev/sdb bs=16k
```

```
250880+0 records in
250880+0 records out
4110417920 bytes (4.1 GB) copied, 5.10768 seconds, 805 MB/s
```

15. If you have access to the default partition, reboot the Director device by issuing the **request system reboot director-group** command.

16. If you do not have access to the default partition, power cycle the Director device.

The following menu appears on the Director device console when the Director device boots up:

```
Juniper Networks QFabric Director Install/Recovery Media
- To boot from the local disk, wait 10 seconds or press the Enter key.
- To reinstall the QFabric software on this Director device, type: install
```

17. Type **install** and then press **Enter** to install the software on the Director device.

Once the installation process is complete, the Director device reboots, and the following menu appears on the Director device console:

```
Juniper Networks QFabric Director Install/Recovery Media
- To boot from the local key, wait 10 seconds or press the Enter key.
- To reinstall the QFabric software on this Director device, type: install
```

18. Press **Enter**. The Director device reboots from the local disk on which the software was just installed.

19. Log in as root from the Director device.



**NOTE:** Because the recovery installation process completely overwrites the entire contents of the Director device, you need to restore the required configuration files and initial setup information. Ensure that you have this information backed up on an external USB flash drive.

The following menu appears on the Director device console:

```
Before you can access the QFabric switch, you must complete the initial
setup of the Director group by using the steps that follow.
If the initial setup procedure does not complete successfully, log out of
the Director device and then log back in to restart
this setup menu.
```

```
Continue?[y/n]
```

20. Enter **n** to bypass the initial setup script and enter the Director device **root** directory, where you can mount the external USB flash drive containing the configuration files and initial setup information.

21. Issue the **ls /mnt** command to list the **mount** directory.

```
root@dg0 ~]# ls /mnt
```

22. Issue the **mkdir** command to create a directory within the **mount** directory.

```
root@dg0 ~]# mkdir /mnt/myusb
```

23. Issue the **mount /dev/sdb2 /mnt/myusb/** command to mount the external USB flash drive to the local drive of the Director device.

```
root@dg0 ~]# mount /dev/sdb2 /mnt/myusb/
```

24. Issue the **ls -la /mnt/mnt/myusb/** command to verify the contents of your mounted external USB flash drive.

```
root@dg0 ~]# ls -la /mnt/mnt/myusb/

total 1770884
drwxr-xr-x 2 root root      4096 Sep  7 05:16 .
drwxr-xr-x 3 root root      4096 Sep  7 10:15 ..
-rw-r--r-- 1 root root    4249 Sep  7 03:52 mybackup-20110907
```

25. Exit the Director device and log back in as root on the Director device.

The following menu appears:

```
Before you can access the QFabric switch, you must complete the initial
setup of the Director group by using the steps that follow.
If the initial setup procedure does not complete successfully, log out of
the Director device and then log back in to restart
this setup menu.
```

```
Continue?[y/n] y
Initial Configuration
```

```
You may enter the configuration manually or restore from a backup.
```

```
Specify a backup file? [y/n] : y
Please specify the full path of the configuration backup file. :
/mnt/myusb/mybackup-20110907
```

26. Enter **y** to continue.

27. Enter **y** and specify the path to the backup configuration file located on the external USB flash drive.

```
/mnt/myusb/mybackup-20110907
```

The following messages appear:

```
Saving temporary configuration...
Configuring peer...
connect error for 1.1.1.2:9001
Configuring local interfaces...
Configuring interface eth0 with [10.49.213.163/24:10.49.213.254]
Configured interface eth0 with [10.49.213.163/24:10.49.213.254]
Configuring QFabric software with initial pool of 4000 MAC addresses
[00:10:00:00:00:00 - 00:10:00:00:0f:3b]
Configuring QFabric address [10.49.213.50]
Reconfiguring QFabric software static configuration
Applying the new Director Device password
Applying the QFabric component password
First install initial configuration, generating and sharing SSH keys.
First install initial configuration, generating SSH keys.
connect error for 1.1.1.2:9001
Shared SSH keys.
Configuration complete. Director Group services will auto start within 30
seconds.
```

28. From the default partition, issue the **request system reboot all** command to reboot all of the components of the QFabric switch and to make sure that all components are running the same version of software.

```
user@switch> request system reboot all
```

29. From the default partition, issue the **show version component all** command to verify that all components are running the same version of software.

```
user@switch> show version component all
```

```
dg1:
-
Hostname: qfabric
Model: qfx3100
JUNOS Base Version [11.3X30.6]

dg0:
-
Hostname: qfabric
Model: qfx3100
JUNOS Base Version [11.3X30.6]

NW-NG-0:
-
Hostname: qfabric
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS OnLine Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]

FC-0:
-
Hostname: qfabric
Model: qfx-jvre
```

```
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]
```

FC-1:

```
Hostname: qfabric
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]
```

DRE-0:

```
-
Hostname: dre-0
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]
```

FM-0:

```
-
Hostname: qfabric
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]
```

nodedevicel:

```
-
Hostname: qfabric
Model: QFX3500
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]
```

interconnectdevicel:

```
-
Hostname: qfabric
Model: QFX3108
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]
warning: from interconnectdevice0: Disconnected
```

- Related Documentation**
- [Configuring the QFabric System Initial Setup on a QFX3100 Director Group on page 287](#)
  - [Upgrading Software on a QFX3000 QFabric Switch](#)
  - [request system software configuration-backup](#)
  - [request system software configuration-restore](#)

## Performing a Recovery Installation of the Director Group

---

If Junos OS on your Director group is damaged in some way that prevents the software from loading correctly, you may need to perform a recovery installation using an emergency boot device (external USB flash drive) to restore the default factory installation. Once you have recovered the software, you need to restore the Director group configuration. You can either create a new configuration as you did when the Director group was shipped from the factory, or if you saved the previous configuration, you can simply restore that file to the Director group.

You can reinstall Junos OS with or without access to the QFabric system default partition.

- This procedure describes how to boot and reinstall Junos OS on a Director group with no access to the QFabric system default partition.
1. Ensure that you have an emergency boot device (external USB device) with Junos OS installed to use during the installation.
  2. Insert the external USB device in the USB port.

A menu like the following appears once you are connected to the Director group:

```
Juniper Networks QFabric Director Install/Recovery Media
```

- To boot from the USB device, wait 10 seconds or press the <ENTER> key.
- To reinstall the QFabric software on this Director device, type: `install` and then press the <ENTER> key.
- To perform a network installation on this Director device, type: `network` <ENTER>

3. To reinstall the software on the Director group, type `install` and then press **Enter**.

The Director group copies the software from the external USB device, occasionally displaying status messages. Copying the software can take up to 10 minutes.

4. Remove the external USB device when prompted, and then press Enter.

The Director group then reboots from the internal flash storage on which the software was just installed. When the reboot is complete, the Director group displays the login prompt.

5. Create a new configuration as you did when the Director group was shipped from the factory, or restore the previously saved configuration file to the Director group.

- This procedure describes how to boot and reinstall Junos OS on a Director group with access to the QFabric system default partition:

1. Ensure that you have an emergency boot device (external USB device) to use during the installation.

2. Log in to the QFabric system default partition.

3. To download the software from the external USB device, issue the **request system software download** command and specify the path and the package name on the external USB device:

```
request system software download /media/usbdisk/jinstall-qlabric-11.3R1.4.rpm
```

4. To install the software, issue the **request system software add *package-name* component director-group** reboot command and specify the name of the software package:

```
request system software add jinstall-qlabric-11.3R1.4.rpm component director-group  
reboot
```

The Director group copies the software from the external USB device, occasionally displaying status messages. Copying the software can take up to 10 minutes.

5. Remove the external USB device when prompted, and then press Enter.

The Director group then reboots from the internal flash storage on which the software was just installed. When the reboot is complete, the Director group displays the login prompt.

6. Create a new configuration as you did when the Director group was shipped from the factory, or restore the previously saved configuration file to the Director group.



# Returning Hardware

- [Returning a QFX3100 Director Device or Component for Repair or Replacement on page 423](#)
- [Locating the Serial Number on a QFX3100 Director Device or Component on page 424](#)
- [Packing a QFX3100 Director Device or Component for Shipping on page 425](#)
- [Returning a QFX3008-I Interconnect Device or Component for Repair or Replacement on page 427](#)
- [Locating the Serial Number on a QFX3008-I Interconnect Device or Component on page 427](#)
- [Packing a QFX3008-I Interconnect Device or Component for Shipping on page 428](#)
- [Returning a QFX3500 Device or Component for Repair or Replacement on page 430](#)
- [Locating the Serial Number on a QFX3500 Device or Component on page 431](#)
- [Packing a QFX3500 Device or Component for Shipping on page 432](#)
- [Contacting Customer Support to Obtain a Return Materials Authorization for a QFX Series Device or Component on page 435](#)

## Returning a QFX3100 Director Device or Component for Repair or Replacement

---

If you need to return a QFX3100 Director device or component to Juniper Networks for repair or replacement, follow this procedure:

1. Determine the serial number of the component. For instructions, see [“Locating the Serial Number on a QFX3100 Director Device or Component” on page 424](#).
2. Obtain a Return Materials Authorization (RMA) number from the Juniper Networks Technical Assistance Center (JTAC) as described in [“Contacting Customer Support to Obtain a Return Materials Authorization for a QFX Series Device or Component” on page 435](#).



**NOTE:** Do not return any component to Juniper Networks unless you have first obtained an RMA number. Juniper Networks reserves the right to refuse shipments that do not have an RMA. Refused shipments are returned to the customer through collect freight.

---

- Pack the device or component for shipping as described in “[Packing a QFX3100 Director Device or Component for Shipping](#)” on page 425.

For more information about return and repair policies, see the customer support page at <http://www.juniper.net/support/guidelines.html>.

#### Related Documentation

- [Powering Off a QFX3100 Director Device on page 295](#)

## Locating the Serial Number on a QFX3100 Director Device or Component

If you are returning a device or component to Juniper Networks for repair or replacement, you must locate the serial number of the device or component. You must provide the serial number to the Juniper Networks Technical Assistance Center (JTAC) when you contact them to obtain a Return Materials Authorization (RMA). See “[Contacting Customer Support to Obtain a Return Materials Authorization for a QFX Series Device or Component](#)” on page 435.

If the device is operational and you can access the command-line interface (CLI), you can list serial numbers for the device and for some components with a CLI command. If you do not have access to the CLI or if the serial number for the component does not appear in the command output, you can locate the serial number ID label on the physical device or component.



**NOTE:** If you want to find the serial number on the physical device component, you will need to remove the component from the device chassis, for which you must have the required parts and tools available.

This topic includes:

- [Listing the Chassis and Components Details with the CLI on page 424](#)
- [Locating the Serial Number ID Label on a QFX3100 Director Device on page 424](#)
- [Locating Serial Number ID Labels on FRU Components on page 425](#)

### Listing the Chassis and Components Details with the CLI

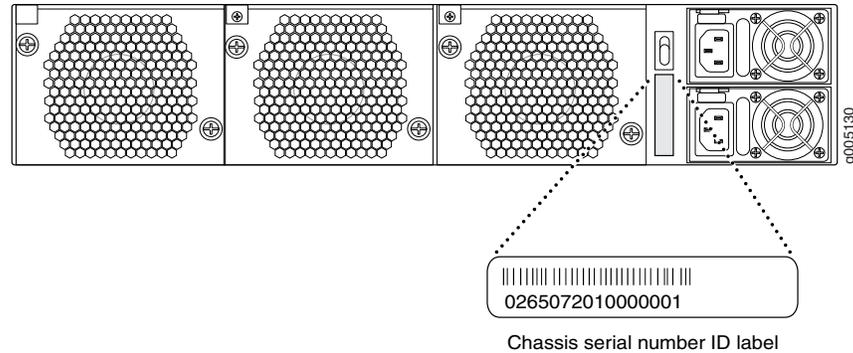
To list the QFX3100 device and components and their serial numbers, use the **show chassis hardware** CLI command:

```
user@device> show chassis hardware
Hardware inventory:
ItemVersion  Part number  Serial number  Description
Chassis     AL0207391164  QFX3100
```

### Locating the Serial Number ID Label on a QFX3100 Director Device

The serial number ID label is located on the back of the chassis on a QFX3100 Director device. See [Figure 144 on page 425](#).

Figure 144: Location of the Serial Number ID Label on a QFX3100 Director Device



### Locating Serial Number ID Labels on FRU Components

The power supplies, fan modules, HDD modules, and network modules are field-replaceable units (FRUs). For most of these FRUs, you must remove the FRU from the device chassis to see the FRU serial number ID label.

- AC power supply—The serial number ID label is on the right side of the AC power supply.
- Fan module—The serial number ID label is on the top of the fan module.
- HDD module—The serial number ID label is on the top of the HDD module.
- Network module—The serial number ID label is on the left of the network module.

#### Related Documentation

- [Returning a QFX3100 Director Device or Component for Repair or Replacement on page 423](#)

### Packing a QFX3100 Director Device or Component for Shipping

If you are returning a QFX3100 Director device or component to Juniper Networks for repair or replacement, pack the item as described in this topic.

Before you begin packing QFX3100 Director device or component, ensure that you have:

- Taken the necessary precautions to prevent ESD damage (see [“Prevention of Electrostatic Discharge Damage” on page 192](#)).
- Retrieved the original shipping carton and packing materials. Contact your JTAC representative if you do not have these materials, to learn about approved packing materials. See [“Contacting Customer Support to Obtain a Return Materials Authorization for a QFX Series Device or Component” on page 435](#).

Ensure that you have the following parts and tools available:

- Antistatic bag, one for each component
- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 2

This topic describes:

- [Packing a QFX3100 Director Device for Shipping on page 426](#)
- [Packing QFX3100 Director Device Components for Shipping on page 426](#)

## Packing a QFX3100 Director Device for Shipping

To pack a QFX3100 Director device for shipping:

1. Attach the grounding strap to your bare wrist and to a site ESD point.
2. Power down the device. See [“Powering Off a QFX3100 Director Device” on page 295](#).
3. Disconnect power from the device by performing one of the following:
  - If the power source outlet has a power switch, set it to the OFF (O) position.
  - If the power source outlet does not have a power switch, gently pull out the male end of the power cord connected to the power source outlet.
4. Remove the cables that connect the device to all external devices.
5. Have one person support the weight of the device while another person unscrews and removes the mounting screws. Use the Phillips (+) screwdriver, number 2 to remove the screws.
6. Remove the device from the rack or cabinet (see [“Chassis Lifting Guidelines for a QFX3100 Director Device” on page 175](#)) and place the device in an antistatic bag.
7. Place the device in the shipping carton.
8. Place the packing foam on top of and around the device.
9. If you are returning accessories or FRUs with the device, pack them as instructed in [“Packing QFX3100 Director Device Components for Shipping” on page 426](#).
10. Replace the accessory box on top of the packing foam.
11. Close the top of the cardboard shipping box and seal it with packing tape.
12. Write the RMA number on the exterior of the box to ensure proper tracking.

## Packing QFX3100 Director Device Components for Shipping



**CAUTION:** Do not stack device components. Return individual components in separate boxes if they do not fit together on one level in the shipping box.

---

To pack and ship QFX3100 Director device components:

- Place individual FRUs in antistatic bags.
- Ensure that the components are adequately protected with packing materials and packed so that the pieces are prevented from moving around inside the carton.
- Close the top of the cardboard shipping box and seal it with packing tape.
- Write the RMA number on the exterior of the box to ensure proper tracking.

- Related Documentation**
- [Returning a QFX3100 Director Device or Component for Repair or Replacement on page 423](#)

## Returning a QFX3008-I Interconnect Device or Component for Repair or Replacement

If you need to return a QFX3008-I Interconnect device or component to Juniper Networks for repair or replacement, follow this procedure:

1. Determine the serial number of the component. For instructions, see [“Locating the Serial Number on a QFX3008-I Interconnect Device or Component” on page 427](#).
2. Obtain a Return Materials Authorization (RMA) number from Juniper Networks Technical Assistance Center (JTAC) as described in [“Contacting Customer Support to Obtain a Return Materials Authorization for a QFX Series Device or Component” on page 435](#).



**NOTE:** Do not return any component to Juniper Networks unless you have first obtained an RMA number. Juniper Networks reserves the right to refuse shipments that do not have an RMA. Refused shipments are returned to the customer through collect freight.

3. Pack the device or component for shipping as described in [“Packing a QFX3008-I Interconnect Device or Component for Shipping” on page 428](#).

For more information about return and repair policies, see the customer support page at <http://www.juniper.net/support/guidelines.html>.

- Related Documentation**
- [QFX3008-I Interconnect Device Overview on page 33](#)

## Locating the Serial Number on a QFX3008-I Interconnect Device or Component

If you are returning a device or component to Juniper Networks for repair or replacement, you must locate the serial number of the device or component. You must provide the serial number to the Juniper Networks Technical Assistance Center (JTAC) when you contact them to obtain a Return Materials Authorization (RMA). See [“Contacting Customer Support to Obtain a Return Materials Authorization for a QFX Series Device or Component” on page 435](#).

If the device is operational and you can access the command-line interface (CLI), you can list serial numbers for the device and for some components with a CLI command. If you do not have access to the CLI or if the serial number for the component does not appear in the command output, you can locate the serial number ID label on the physical device or component.



**NOTE:** If you want to find the serial number on the physical device component, you will need to remove the component from the device chassis, for which you must have the required parts and tools available.

1. [Listing the Chassis and Component Details with the CLI on page 428](#)

## Listing the Chassis and Component Details with the CLI

To list the QFX3008-I Interconnect device and components and their serial numbers, use the **show fabric administration inventory interconnect-devices *device-name*** CLI command.

For information about the **show fabric administration inventory interconnect-devices** command, see [show fabric administration inventory interconnect-devices](#).

### Related Documentation

- [Returning a QFX3008-I Interconnect Device or Component for Repair or Replacement on page 427](#)

---

## Packing a QFX3008-I Interconnect Device or Component for Shipping

If you are returning a QFX3008-I Interconnect device or component to Juniper Networks for repair or replacement, pack the item as described in this topic.

Before you begin packing a QFX3008-I Interconnect device or component, ensure that you have:

- Taken the necessary precautions to prevent ESD damage (see [“Prevention of Electrostatic Discharge Damage” on page 192](#)).
- Retrieved the original shipping carton and packing materials. Contact your Juniper Networks Technical Assistance Center (JTAC) representative if you do not have these materials, to learn about approved packing materials. See [“Contacting Customer Support to Obtain a Return Materials Authorization for a QFX Series Device or Component” on page 435](#).

Ensure that you have the following parts and tools available:

- Antistatic bag, one for each component
- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 2

This topic describes:

1. [Packing a QFX3008-I Interconnect Device for Shipping on page 429](#)
2. [Packing QFX3008-I Interconnect Device Components for Shipping on page 430](#)

## Packing a QFX3008-I Interconnect Device for Shipping

If you need to transport the device to another location or return the device to Juniper Networks, you need to pack the device securely in its original packaging to prevent damage during transportation.

Before you pack the device:

1. Power off the device. See [“Powering Off a QFX3008-I Interconnect Device” on page 296](#).
2. Remove all wires, plugs, and power cords from the device.

Leave components that came installed in the device in the chassis.

Ensure that you have the following parts and tools available to pack the device:

- Phillips (+) screwdriver, number 2
- A 5/16-in. open-end or socket wrench to install the bracket bolts on the shipping pallet
- The original device packing material (wooden pallet, cardboard box, accessory box and its contents, foam padding, and brackets and bracket bolts for attaching the chassis to the pallet)
- Electrostatic discharge (ESD) grounding strap

The QFX3008-I Interconnect device is shipped in a cardboard box that has a two-layer wooden pallet base with foam cushioning between the layers. The device chassis is bolted to the pallet base with four brackets, two on each side of the chassis.



**CAUTION:** The device is maximally protected inside the shipping box. Pack the device only in its original shipping box, securely bolted to the original wooden shipping pallet.

Do not pack the device in anything except its original container, or the device might be damaged in transit.

To pack the device:

1. Move the wooden pallet and packing material to a staging area as close to the device as possible. Make sure there is enough space to move the chassis from the rack or cabinet to the wooden pallet.
2. Remove the device from the rack or cabinet. See [“Removing a QFX3008-I Interconnect Device from a Rack or Cabinet” on page 300](#).

Move the chassis to the shipping pallet (see [“Chassis Lifting Guidelines for a QFX3008-I Interconnect Device” on page 175](#)). The pallet is marked to allow you to determine which direction the chassis should face.

3. Use the 5/16-in. open-end or socket wrench and number 2 Phillips screwdriver to install the four sets of brackets and bolts that secure the chassis to the wooden pallet.

4. Remove the adjustable mounting brackets from the rack or cabinet and place them in the box.
5. Slide the plastic cover over the device chassis. The plastic cover is part of the device's original packing materials.
6. Replace the foam padding on top of the chassis.
7. Place the power cords in the box.
8. Place the accessory box in its slot in the foam padding. See [“Parts Inventory \(Packing List\) for a QFX3008-I Interconnect Device” on page 225](#) to verify that you have included all the proper contents of the accessory box.
9. Slide the cardboard box over the chassis and secure it to the wooden pallet.
10. Write the Return Materials Authorization (RMA) number on the exterior of the box to ensure proper tracking.

## Packing QFX3008-I Interconnect Device Components for Shipping

---



**CAUTION:** Do not stack device components. Return individual components in separate boxes if they do not fit together on one level in the shipping box.

---

To pack and ship QFX3008-I Interconnect device components:

- Place individual FRUs in antistatic bags.
- Ensure that the components are adequately protected with packing materials and packed so that the pieces are prevented from moving around inside the carton.
- Close the top of the cardboard shipping box and seal it with packing tape.
- Write the RMA number on the exterior of the box to ensure proper tracking.

### Related Documentation

- [Returning a QFX3008-I Interconnect Device or Component for Repair or Replacement on page 427](#)

## Returning a QFX3500 Device or Component for Repair or Replacement

---

If you need to return a QFX3500 device or component to Juniper Networks for repair or replacement, follow this procedure:

1. Determine the serial number of the component. For instructions, see [“Locating the Serial Number on a QFX3500 Device or Component” on page 431](#).
2. Obtain a Return Materials Authorization (RMA) number from the Juniper Technical Assistance Center (JTAC) as described in [“Contacting Customer Support to Obtain a Return Materials Authorization for a QFX Series Device or Component” on page 435](#).



**NOTE:** Do not return any component to Juniper Networks unless you have first obtained an RMA number. Juniper Networks reserves the right to refuse shipments that do not have an RMA. Refused shipments are returned to the customer through collect freight.

3. Pack the device or component for shipping as described in “[Packing a QFX3500 Device or Component for Shipping](#)” on page 432.

For more information about return and repair policies, see the customer support page at <http://www.juniper.net/support/guidelines.html>.

#### Related Documentation

- [QFX3500 Device Overview on page 59](#)

## Locating the Serial Number on a QFX3500 Device or Component

If you are returning a device or component to Juniper Networks for repair or replacement, you must locate the serial number of the device or component. You must provide the serial number to the Juniper Networks Technical Assistance Center (JTAC) when you contact them to obtain a Return Materials Authorization (RMA). See “[Contacting Customer Support to Obtain a Return Materials Authorization for a QFX Series Device or Component](#)” on page 435.

If the device is operational and you can access the command-line interface (CLI), you can list serial numbers for the device and for some components with a CLI command. If you do not have access to the CLI or if the serial number for the component does not appear in the command output, you can locate the serial number ID label on the device or component.



**NOTE:** If you want to find the serial number ID label on a component, you need to remove the component from the device chassis, for which you must have the required parts and tools available.

- [Listing the Chassis and Components Details Using the CLI on page 431](#)
- [Locating the Chassis Serial Number ID Label on a QFX3500 Device on page 432](#)
- [Locating the Serial Number ID Labels on FRU Components on page 432](#)

## Listing the Chassis and Components Details Using the CLI

Use the **show chassis hardware** CLI operational-mode command to list the device and component serial numbers:

```
user@device> show chassis hardware
Hardware inventory:
Item          Version  Part number  Serial number  Description
Chassis
Routing Engine 0
FPC 0         REV 05   750-036931  EE0823        QFX 48x10G 4x40G Switch
```

CPU		BUILTIN	BUILTIN	FPC CPU
PIC 0		BUILTIN	BUILTIN	48x 10G-SFP+
MGMT BRD	REV 08	750-036946	EE0731	QFX3500-MB
Power Supply 0	Rev 04	740-032091	UI00690	QFX PS 650W AC
Power Supply 1	Rev 04	740-032091	UI00679	QFX PS 650W AC
Fan Tray 0				QFX Fan Tray
Fan Tray 1				QFX Fan Tray
Fan Tray 2				QFX Fan Tray

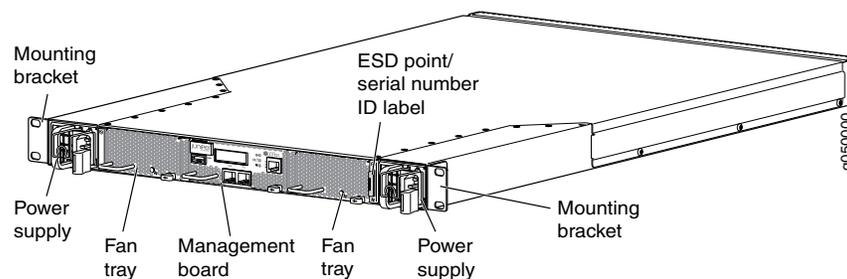


**NOTE:** You must remove the fan tray to read the fan tray serial number from the serial number ID label. The fan tray serial number cannot be viewed through the CLI. Fan Tray 2 refers to the fan modules located in the management board.

### Locating the Chassis Serial Number ID Label on a QFX3500 Device

The chassis serial number ID label is located on a sliding panel to the right of the fan tray on a QFX3500 device. See [Figure 145 on page 432](#).

**Figure 145: Location of the Serial Number ID Label on a QFX3500 Device**



### Locating the Serial Number ID Labels on FRU Components

The power supplies, fan trays, and management board installed in QFX3500 devices are field-replaceable units (FRUs). For each FRU, you must remove the FRU from the device chassis to see the FRU serial number ID label.

- AC power supply—The serial number ID label is on the top of the AC power supply.
- Fan tray—The serial number ID label is on the top of the fan tray.
- Management board—The serial number ID label is on the circuit board.

#### Related Documentation

- [Returning a QFX3500 Device or Component for Repair or Replacement on page 430](#)

### Packing a QFX3500 Device or Component for Shipping

If you are returning a QFX3500 device or component to Juniper Networks for repair or replacement, pack the item as described in this topic.

Before you pack a QFX3500 device or component:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage”](#) on page 192.
- Retrieve the original shipping carton and packing materials. Contact your JTAC representative if you do not have these materials, to learn about approved packing materials. See [“Contacting Customer Support to Obtain a Return Materials Authorization for a QFX Series Device or Component”](#) on page 435.

Ensure that you have the following parts and tools available:

- ESD grounding strap.
- Antistatic bag, one for each component.
- If you are returning the chassis, an appropriate screwdriver for the mounting screws used on your rack or cabinet.

This topic describes:

- [Packing a QFX3500 Device for Shipping](#) on page 433
- [Packing QFX3500 Device Components for Shipping](#) on page 434

## Packing a QFX3500 Device for Shipping

To pack a QFX3500 device for shipping:

1. Connect a management device to the console (**CON**) port in a QFX3500 device. For instructions about connecting a management device to the console (**CON**) port, see [“Connecting a QFX Series Device to a Management Console”](#) on page 285.



**TIP:** You can also shut down the QFX3500 device from a management device on your out-of-band management network. For instructions about connecting a management device to the management (**C0** or **C1**) port, see [Connecting a QFX3500 Device to a Network for Out-of-Band Management](#).

2. Shut down the QFX3500 device from the external management device by issuing the **request system halt** operational mode CLI command. This command shuts down the device gracefully and preserves system state information. A message appears on the console confirming that the operating system has halted.

You see the following output (or something similar, depending on the hardware being shutdown) after entering the command:

```
Shutdown NOW!
[pid 1764]

user@device>

*** FINAL System shutdown message from user@device ***
System going down IMMEDIATELY

JWaiting (max 300 seconds) for system process `vn1ru_mem' to stop...done
```

```

Waiting (max 300 seconds) for system process `vn1ru' to stop...done
Waiting (max 300 seconds) for system process `bufdaemon' to stop...done
Waiting (max 300 seconds) for system process `syncer' to stop...
Syncing disks, vnodes remaining...4 1 1 1 0 0 done

syncing disks... All buffers synced.
Uptime: 1d19h22m25s

The operating system has halted.
Please press any key to reboot.

```



**CAUTION:** The final output of any version of the `request system halt` command is the “The operating system has halted. Please press any key to reboot” message. Wait at least 60 seconds after first seeing this message before following the instructions in Step 4 through Step 6 to power off the device.

3. Attach the grounding strap to your bare wrist and to a site ESD point.
4. If the AC power source outlet has a power switch, set it to the OFF (O) position for both power supplies.
5. Gently pull out the male end of the power cords connected to the power source outlets.
6. Remove the power cords from each power supply faceplate by detaching the power cord retainer and gently pulling out the female end of the power cords connected to each power supply faceplate.
7. Remove the cables that connect the device to all external devices.
8. Remove all field-replaceable units (FRUs) from the device.
9. Have one person support the weight of the device while another person unscrews and removes the mounting screws.
10. Remove the device from the rack or cabinet (see “[Chassis Lifting Guidelines for a QFX3500 Device](#)” on page 176) and place the device in an antistatic bag.
11. Place the device in the shipping carton.
12. Place the packing foam on top of and around the device.
13. If you are returning accessories or FRUs with the device, pack them as instructed in “[Packing QFX3500 Device Components for Shipping](#)” on page 434.
14. Replace the accessory box on top of the packing foam.
15. Close the top of the cardboard shipping box and seal it with packing tape.
16. Write the RMA number on the exterior of the box to ensure proper tracking.

## Packing QFX3500 Device Components for Shipping



**CAUTION:** Do not stack device components. Return individual components in separate boxes if they do not fit together on one level in the shipping box.

To pack and ship QFX3500 device components:

- Place individual FRUs in antistatic bags.
- Ensure that the components are adequately protected with packing materials and packed so that the pieces are prevented from moving around inside the carton.
- Close the top of the cardboard shipping box and seal it with packing tape.
- Write the RMA number on the exterior of the box to ensure proper tracking.

**Related  
Documentation**

- [Returning a QFX3500 Device or Component for Repair or Replacement on page 430](#)

## Contacting Customer Support to Obtain a Return Materials Authorization for a QFX Series Device or Component

If you are returning a QFX Series device or component to Juniper Networks for repair or replacement, obtain a Return Materials Authorization (RMA) from the Juniper Networks Technical Assistance Center (JTAC).

After locating the serial number of the device or component you want to return, open a case with Juniper Networks Technical Assistance Center (JTAC) on the Web or by telephone.

For instructions on locating the serial number of the device or component you want to return, see “[Locating the Serial Number on a QFX3500 Device or Component](#)” on page 431, “[Locating the Serial Number on a QFX3008-I Interconnect Device or Component](#)” on page 427, or “[Locating the Serial Number on a QFX3100 Director Device or Component](#)” on page 424.

Before you request an RMA from JTAC, be prepared to provide the following information:

- Your existing case number, if you have one
- Serial number of the component
- Your name, organization name, telephone number, fax number, and shipping address
- Details of the failure or problem
- Type of activity being performed on the device when the problem occurred
- Configuration data displayed by one or more **show** commands

You can contact JTAC 24 hours a day, seven days a week on the Web or by telephone:

- Case Manager at CSC: <http://www.juniper.net/cm/>
- Telephone: +1-888-314-JTAC (+1-888-314-5822), toll-free in the USA, Canada, and Mexico



**NOTE:** For international or direct-dial options in countries without toll-free numbers, see <http://www.juniper.net/support/requesting-support.html>.

If you are contacting JTAC by telephone, enter your 11-digit case number followed by the pound (#) key for an existing case, or press the star (\*) key to be routed to the next available support engineer.

The support representative validates your request and issues an RMA number for return of the component.

**Related  
Documentation**

- [Returning a QFX3500 Device or Component for Repair or Replacement on page 430](#)
- [Packing a QFX3500 Device or Component for Shipping on page 432](#)

# Alarms and System Log Messages

- [Understanding Alarms on page 437](#)
- [Chassis Alarm Messages on a QFX3008-I Interconnect Device on page 438](#)
- [Chassis Alarm Messages on a QFX3500 Device on page 442](#)
- [Interface Alarm Messages on page 445](#)

## Understanding Alarms

QFX Series devices support different alarm types and severity levels. [Table 86 on page 437](#) provides a list of alarm terms and definitions that may help you in monitoring the device.

**Table 86: Alarm Terms and Definitions**

Term	Definition
Alarm	Signal alerting you to conditions that might prevent normal operation. On the device, alarm indicators include the LCD panel and LEDs on the front. The LCD panel displays the chassis alarm message count. Blinking amber LEDs indicate yellow alarm conditions for chassis components.
Alarm condition	Failure event that triggers an alarm.
Alarm severity levels	<p>Seriousness of the alarm. The level of severity can be either major (red) or minor (yellow).</p> <ul style="list-style-type: none"> <li>• Major (red)—Indicates a critical situation on the device that has resulted from one of the following conditions. A red alarm condition requires immediate action. <ul style="list-style-type: none"> <li>• One or more hardware components have failed.</li> <li>• One or more hardware components have exceeded temperature thresholds.</li> <li>• An alarm condition configured on an interface has triggered a critical warning.</li> </ul> </li> <li>• Minor (yellow or amber)—Indicates a noncritical condition on the device that, if left unchecked, might cause an interruption in service or degradation in performance. A yellow alarm condition requires monitoring or maintenance. For example, a missing rescue configuration generates a yellow system alarm.</li> </ul>

Table 86: Alarm Terms and Definitions (*continued*)

Term	Definition
Alarm types	<p>Alarms include the following types:</p> <ul style="list-style-type: none"> <li>• Chassis alarm—Predefined alarm triggered by a physical condition on the device such as a power supply failure or excessive component temperature.</li> <li>• Interface alarm—Alarm you configure to alert you when an interface link is down. Applies to <b>ethernet</b>, <b>fibre-channel</b>, and <b>management-ethernet</b> interfaces. You can configure a red (major) or yellow (minor) alarm for the link-down condition, or have the condition ignored.</li> <li>• System alarm—Predefined alarm triggered by a missing rescue configuration or failure to install a license for a licensed software feature.</li> </ul>

- Related Documentation**
- [Chassis Alarm Messages on a QFX3008-I Interconnect Device on page 438](#)
  - [Chassis Alarm Messages on a QFX3500 Device on page 442](#)
  - [Interface Alarm Messages on page 445](#)

## Chassis Alarm Messages on a QFX3008-I Interconnect Device

Chassis alarms indicate a failure on the device or one of its components. Chassis alarms are preset and cannot be modified.

The chassis alarm message count is displayed on the LCD panel on the front of the device. To view the chassis alarm message text remotely, use the **show chassis lcd** CLI command.

Chassis alarms on a QFX3008-I Interconnect device have two severity levels:

- Major (red)—Indicates a critical situation on the device that has resulted from one of the conditions described in [Table 87 on page 439](#). A red alarm condition requires immediate action.
- Minor (yellow or amber)—Indicates a noncritical condition on the device that, if left unchecked, might cause an interruption in service or degradation in performance. A yellow alarm condition requires monitoring or maintenance.

[Table 87 on page 439](#) describes the chassis alarm messages on a QFX3008-I Interconnect device.

Table 87: QFX3500 Chassis Alarm Messages

Component	Alarm Type	CLI Message	Recommended Action
Control Board and Routing Engine  <i>NOTE:</i> The Routing Engine is located on the Control Board	Major (red)	<b>CB <i>slot-number</i> Not online</b>	Replace the Control Board and report the failure to customer support
		<b>Backup RE Active</b>	No action is required if the backup Routing Engine was intentionally made active.  If the master Routing Engine failed, replace it.
		<b>Loss of communication with Backup RE</b>	Replace the failed Control Board.
		<b>Mixed Master and Backup RE types</b>	Both Routing Engines must be the same model number.  Replace one of the Control Boards.
	Minor (yellow)	<b>CB <i>slot-number</i> Removed</b>	Indicates the chassis was powered on with both Control Boards installed, but one has been removed. The chassis can continue to operate without the Control Board, but airflow can be affected by the empty slot. Replace the missing Control Board as soon as possible.

Table 87: QFX3500 Chassis Alarm Messages (*continued*)

Component	Alarm Type	CLI Message	Recommended Action
Fans	Major (red)	<i>Fan-name</i> Failure	Replace the fan and report the failure to customer support.
		<i>Fan-name</i> I2C Failure	Check the system log for one of the following messages and report the error message to customer support: <ul style="list-style-type: none"> <li>• <b>CM ENV Monitor: Get fan speed failed.</b></li> <li>• <b><i>Fan-name</i> is NOT spinning @ correct speed</b></li> </ul>
	Minor (yellow)	<i>Fan-name</i> Absent	Indicates the chassis was powered on without all the fan trays installed. The chassis can continue to operate without the fan tray for a limited time, but airflow can be affected by the empty slot. Replace the missing fan tray as soon as possible.
		<i>Fan-name</i> No Fan	Indicates the chassis was powered on with all power supplies installed, but one has been removed. The chassis can continue to operate without the power supply, but airflow can be affected by the empty slot. Replace the missing power supply as soon as possible.
		<i>Fan-name</i> Overspeed	The fan is spinning faster than necessary. There is no action required. If the problem persists, report the error to customer support.
Front and rear cards	Major (red)	<i>FPC slot-number</i> Hard errors	Replace the specified card and report the failure to customer support.
		<i>FPC slot-number</i> Volt Sensor Fail	Replace the specified card and report the failure to customer support.

Table 87: QFX3500 Chassis Alarm Messages (*continued*)

Component	Alarm Type	CLI Message	Recommended Action
Power supplies	Major (red)	<b>PEM <i>pem-number</i> Input Failure</b>	Indicates a problem with the incoming AC power. Replace the power supply.
		<b>PEM <i>pem-number</i> Not OK</b>	Indicates a problem with the incoming AC or outgoing DC power. Replace the power supply.
		<b>PEM <i>pem-number</i> Output Failure</b>	Indicates a problem with the outgoing DC power. Replace the power supply.
		<b>PEM <i>pem-number</i> Too Many I2C Failures</b>	Check the system log for one of the following messages and report the error message to customer support: <ul style="list-style-type: none"> <li>• <b>I2C Read failed for device <i>number</i></b></li> <li>• <b>PS <i>number</i>: Transitioning from online to offline</b></li> </ul>
		<b>Too Many PEMs Missing</b>	Too many power supplies have been removed from the chassis. Replace missing power supplies.
	<b>Unrecognized</b>	There is a problem with the power supply, replace the power supply and contact Juniper Technical Assistance Center (JTAC).	
	Minor (yellow)	<b>PEM <i>pem-number</i> Absent</b>	Indicates the chassis was powered on without all the power supplies installed. The chassis can continue to operate without the power supply, but airflow can be affected by the empty slot. Replace the missing power supply as soon as possible.
		<b>PEM <i>pem-number</i> Removed</b>	Indicates the chassis was powered on with all power supplies installed, but one has been removed. The chassis can continue to operate without the power supply, but airflow can be affected by the empty slot. Replace the missing power supply as soon as possible.

Table 87: QFX3500 Chassis Alarm Messages (*continued*)

Component	Alarm Type	CLI Message	Recommended Action
Temperature sensors	Major (red)	<i>sensor-location</i> Temp Sensor Fail	Check the system log for the following message and report it to customer support:  <b>Temp sensor <i>sensor-number</i> failed</b> , where <i>sensor-number</i> may range from 1 through 10.
		<i>sensor-location</i> Temp Sensor Too Hot	Check environmental conditions and alarms on other devices. Ensure that environmental factors (such as hot air blowing around the equipment) are not affecting the temperature sensor. If the condition persists, the switch may shut down.
	Minor (yellow)	<i>sensor-location</i> Temp Sensor Too Warm	For information only. Check environmental conditions and alarms on other devices. Ensure that environmental factors (such as hot air blowing around the equipment) are not affecting the temperature sensor.

#### Related Documentation

- [Chassis Status LEDs on a QFX3008-I Interconnect Device on page 387](#)
- [Configuring the Junos OS to Determine Conditions That Trigger Alarms on Different Interface Types](#)
- [alarm](#)

## Chassis Alarm Messages on a QFX3500 Device

Chassis alarms indicate a failure on the device or one of its components. Chassis alarms are preset and cannot be modified.

The chassis alarm message count is displayed on the LCD panel on the front of the device. To view the chassis alarm message text remotely, use the **show chassis lcd** CLI command.

Chassis alarms on QFX3500 devices have two severity levels:

- **Major (red)**—Indicates a critical situation on the device that has resulted from one of the conditions described in [Table 88 on page 443](#). A red alarm condition requires immediate action.
- **Minor (yellow or amber)**—Indicates a noncritical condition on the device that, if left unchecked, might cause an interruption in service or degradation in performance. A yellow alarm condition requires monitoring or maintenance.

[Table 88 on page 443](#) describes the chassis alarm messages on QFX3500 devices.

Table 88: QFX3500 Chassis Alarm Messages

Component	Alarm Type	CLI Message	Recommended Action
Fans	Major (red)	Fan/Blower Absent	The fan is missing. Install a fan.
		Fan Failure	Replace the fan and report the failure to customer support.
		Fan I2C Failure	Check the system log for one of the following messages and report the error message to customer support: <ul style="list-style-type: none"> <li>• <b>CM ENV Monitor: Get fan speed failed.</b></li> <li>• <b>Fan-number is NOT spinning @ correct speed</b>, where <i>fan-number</i> may be 1, 2, or 3.</li> </ul>
		Fan <i>fan-number</i> Not Spinning	Remove and check the fan for obstructions, and then reinsert the fan. If the problem persists, replace the fan.

Table 88: QFX3500 Chassis Alarm Messages (*continued*)

Component	Alarm Type	CLI Message	Recommended Action
Power supplies	Major (red)	<b>PEM <i>pem-number</i> Airflow not matching Chassis Airflow</b>	The power supply airflow direction is the opposite of the chassis airflow direction. Replace the power supply with a power supply that supports the same airflow direction as the chassis.
		<b>PEM <i>pem-number</i> I2C Failure</b>	Check the system log for one of the following messages and report the error message to customer support: <ul style="list-style-type: none"> <li>• <b>I2C Read failed for device <i>number</i></b>, where <i>number</i> may be from 123 to 125.</li> <li>• <b>PS <i>number</i>: Transitioning from online to offline</b>, where power supply (PS) <i>number</i> may be 1 or 2.</li> </ul>
		<b>PEM <i>pem-number</i> is not powered</b>	For information only. Check the power cord connection and reconnect it if necessary.
		<b>PEM <i>pem-number</i> is not supported</b>	Indicates a power supply problem, or the power supply is not supported on the device. Report the problem to customer support.
		<b>PEM <i>pem-number</i> Not OK</b>	Indicates a problem with the incoming AC or outgoing DC power. Replace the power supply.
	Minor (yellow)	<b>PEM <i>pem-number</i> Absent</b>	For information only. Indicates the device was powered on with two power supplies installed, but now one is missing. The device can continue to operate with a single power supply. If you wish to remove this alarm message, reboot the device with one power supply.
		<b>PEM <i>pem-number</i> Power Supply Type Mismatch</b>	For information only. Indicates that an AC power supply and DC power supply have been installed in the same chassis. If you wish to remove this alarm message, reboot the device with two AC power supplies or two DC power supplies.
		<b>PEM <i>pem-number</i> Removed</b>	For information only. Indicates the device was powered on with two power supplies installed, but one has been removed. The device can continue to operate with a single power supply. If you wish to remove this alarm message, reboot the device with one power supply.

Table 88: QFX3500 Chassis Alarm Messages (*continued*)

Component	Alarm Type	CLI Message	Recommended Action
Temperature sensors	Major (red)	<i>sensor-location</i> Temp Sensor Fail	Check the system log for the following message and report it to customer support:  <b>Temp sensor <i>sensor-number</i> failed</b> , where <i>sensor-number</i> may range from 1 through 10.
		<i>sensor-location</i> Temp Sensor Too Hot	Check environmental conditions and alarms on other devices. Ensure that environmental factors (such as hot air blowing around the equipment) are not affecting the temperature sensor. If the condition persists, the device may shut down.
	Minor (yellow)	<i>sensor-location</i> Temp Sensor Too Warm	For information only. Check environmental conditions and alarms on other devices. Ensure that environmental factors (such as hot air blowing around the equipment) are not affecting the temperature sensor.

- Related Documentation**
- [Front Panel of a QFX3500 Device on page 65](#)
  - [Configuring the Junos OS to Determine Conditions That Trigger Alarms on Different Interface Types](#)
  - [alarm](#)

## Interface Alarm Messages

Interface alarms are alarms that you configure to alert you when an interface is down. By default, interface alarms are not configured.

To configure an interface link-down condition to trigger a red or yellow alarm, or to configure the link-down condition to be ignored, use the **alarm** statement at the [**edit chassis**] hierarchy level. You can specify the **ethernet**, **fibre-channel**, or **management-ethernet** interface type.

- Related Documentation**
- [Understanding Alarms on page 437](#)
  - [alarm](#)

