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PTX10003-80C and PTX10003-160C Fixed Packet Transport Router Hardware Guide

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Juniper Networks, Inc.
1133 Innovation Way
Sunnyvale, California 94089
USA
408-745-2000
www.juniper.net

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PTX10003-80C and PTX10003-160C Fixed Packet Transport Router Hardware Guide
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About This Guide

Use this guide to install hardware and perform initial software configuration, routine maintenance, and troubleshooting for the PTX10003-80C and PTX10003-160C Fixed Packet Transport Router. Once you complete installation and perform the basic configuration procedures covered in this guide, refer to the Junos OS documentation for information about further software configuration.

CHAPTER 1

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PTX10003 System Overview

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Occupying only 3 U, the PTX10003 is the industry's first fixed-configuration core router to support 400 GbE. The PTX10003 is easy to deploy in space constrained Internet exchange locations, remote central offices, and embedded peering points throughout the network, including cloud-hosted services. It uniquely addresses power-constrained environments by providing unprecedented power efficiency of 0.2 watts/Gbps. The PTX10003 provides high density ports with line rate of 10 GbE, 25 GbE, 40 GbE, 100 GbE, 200 GbE, and 400 GbE. The PTX10003 delivers inline AES-256 MACsec encryption with no compromise in throughput or latency. Two models with differing capacities are available. The PTX10003-160C supports 16 Tbps throughput and the PTX10003-80C supports 8 Tbps throughput—each in a compact 3 U footprint.

TIP: For information about features supported on PTX Series routers, see Feature Explorer.

Benefits of the PTX10003

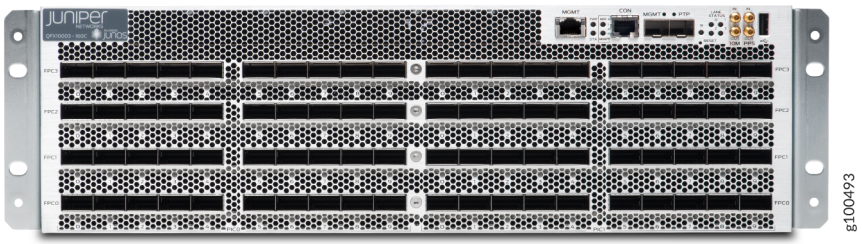
- Juniper Networks ExpressPlus™ Silicon: The PTX10003 is powered by our custom ExpressPlus silicon, providing predictable IP/MPLS packet performance and functionality, along with inline AES-256 MACsec encryption on all the ports. The MACsec encryption is supported up to 100 GbE line rate.
- Peering Scale: To match the expanding traffic demands, the The PTX10003 delivers a peering scale of up to 4 million Forwarding Information Base (FIB) routes and up to 60 million Routing Information Base (RIB) routes, also known as forwarding and routing tables, respectively.

- QSFP-DD: The PTX10003 supports universal multi-rate QSFP-DD optics, quadrupling aggregate switch bandwidth while maintaining port density. QSFP-DD supports continuing growth in network bandwidth demand and data center traffic. Systems designed with QSFP-DD are backwards compatible, allowing them to support existing QSFP optical modules and provide flexibility for end users and system designers.
- Juniper Networks Junos OS Evolved: The PTX10003 operates on Junos OS Evolved, Juniper Networks next-generation Junos OS. Junos OS Evolved has the same CLI user interface, the same code base for applications and features, and the same management and automation tools as Junos OS. However, the Junos OS Evolved infrastructure is entirely modernized, delivering the high availability, portability, faster innovation, and simplified upgrades you need.
- Interoperability: The PTX10003 provides seamless interoperability with existing Juniper routing deployments.

PTX10003-160C

The PTX10003-160C scales to 16 Tbps in a single chassis. Operating in a fixed core router configuration, the PTX10003-160C has flexible interface configuration options, with universal multirate QSFP-DD for 100 GbE/400 GbE to support 320 (QSFP +) 10 GbE ports, 80 (QSFP +) 40 GbE ports, 160 (QSFP28) 100 GbE ports, 64 (QSFP28-DD) 200 GbE ports, or 32 (QSFP56-DD) 400 GbE ports. Refer to Figure 1 on page 3.

Figure 1: PTX10003-160C Port Panel



NOTE: 200 Gbps and 400 Gbps data rates are supported on Juniper Junos OS Evolved release 19.3R1 and later.

The FRU panel for the PTX10003-160C has four power supplies, five fan modules, two chassis grounding points, and an ESD grounding point. Refer to Figure 2 on page 4.

Figure 2: PTX10003-160C FRU Panel (AC/HVDC Power Supplies)



For more information about the components on the FRU panel, see "PTX10003 Field-Replaceable Units Panel" on page 19.

PTX10003-80C

The PTX10003-80C scales to 8 Tbps in a single chassis. Operating in a fixed core router configuration, the PTX10003-80C has flexible interface configuration options, with universal multirate QSFP-DD for 100GE/400GE to support 160 (QSFP +) 10 GbE ports, 40 (QSFP +) 40 GbE ports, 80 (QSFP28) 100 GbE ports, 32 (QSFP28-DD) 200 GbE ports, or 16 (QSFP56-DD) 400 GbE ports. Refer to Figure 3 on page 4.

Figure 3: PTX10003-80C



NOTE: 200 Gbps and 400 Gbps data rates are supported on Juniper Junos OS Evolved release 19.3R1 and later.

The FRU panel for the PTX10003-80C has two power supplies, three fan modules, two chassis grounding points, and an ESD grounding point. Refer to Figure 4 on page 5.

Figure 4: PTX10003-80C FRU Panel



For more information about the components on the FRU panel, see "PTX10003 Field-Replaceable Units Panel" on page 19.

PTX10003 System Architecture

Using Juniper Networks custom ExpressPlus silicon, the PTX10003 system architecture cleanly separates control operations from packet forwarding operations. This design eliminates processing and traffic bottlenecks, permitting the PTX10003 to achieve high performance.

Control operations are performed by the Routing Engine, which runs Junos OS Evolved. The Routing Engine handles routing protocols, traffic engineering, policy, policing, monitoring, and configuration management. Junos OS Evolved is pre-installed on the PTX10003 internal solid-state drives (SSDs).

Forwarding operations are performed by the Packet Forwarding Engines (PFE) on the ports at line rate. The PFE delivers inline MACsec on all the ports up to 100 GbE line rate.

PTX10003 System Software

The PTX10003 runs Junos OS Evolved, which provides Layer 2 and Layer 3 switching, routing, and security services. Junos OS Evolved runs natively on Linux, giving it direct access to all the Linux utilities and operations. It is designed to be modular, allowing for upgrades to be done on a component-by-component basis without a system reboot. Only those components changed are restarted. Junos OS Evolved is easily portable and minimal work is required to make it work on any platform. It has the same CLI user interface, the same code base for applications and features, and the same management and automation tools as Junos OS. However, the Junos OS Evolved infrastructure is entirely modernized,

giving you the high availability, portability, faster innovation, and simplified upgrades you need. Junos OS Evolved software is installed on the PTX10003 200 GB internal NAND solid state flash drive.

For information about which features are supported on PTX Series devices, see Feature Explorer.

PTX10003 Fixed-Configuration Router Specifications

Table 1: PTX10003 Specifications

Hardware	PTX10003-160C	PTX10003-80C
System Throughput	16 Tbps	8 Tbps
Forwarding Capacity	Up to 10.6 Bpps	Up to 5.3 Bpps
Dimension (WxHxD)	17.4 x 5.25 x 31 in (44.2 x 13.3 x 78.7 cm)	17.4 x 5.25 x 31 in (44.2 x 13.3 x 78.7 cm)
Rack units	3 U	3 U
Weight	110 lb (50 kg)	88 lb (40 kg)
CPU	Intel Broadwell CPU with 12 Cores	Intel Broadwell CPU with 12 Cores
RAM	64 Gigabit SDRAM	64 Gigabit SDRAM
SSD	200 GBx2	200 GBx2
Maximum power draw	~4000 W (AC.HVDC), 13640 BTU/hr	~2500 W (AC,HVDC), 8525 BTU/hr
Typical power draw	~3100W (AC,HVDC), 10571 BTU/hr	~1600 W (AC,HVDC), 5456 BTU/hr
Power supply	4x3000 watts (AC/HVDC)	2x3000 watts (AC/HVDC)

Table 1: PTX10003 Specifications *(Continued)*

Hardware	PTX10003-160C	PTX10003-80C
Cooling (front-to-back fan)	5 hot-swappable fans	3 hot-swappable fans
Packet buffer	128 Gb	64 Gb
Latency	2.5 µs within PFE, 5 µs between PFEs	2.5 µs within PFE, 5 µs between PFEs
Power Efficiency (watts/ Gbps)	0.2	0.2
Power Supply Slots	4	2
Power Rating AC	4 KW	2.5 KW
Power Rating HVDC	4 KW	2.5 KW

PTX10003 Port Panel

IN THIS SECTION

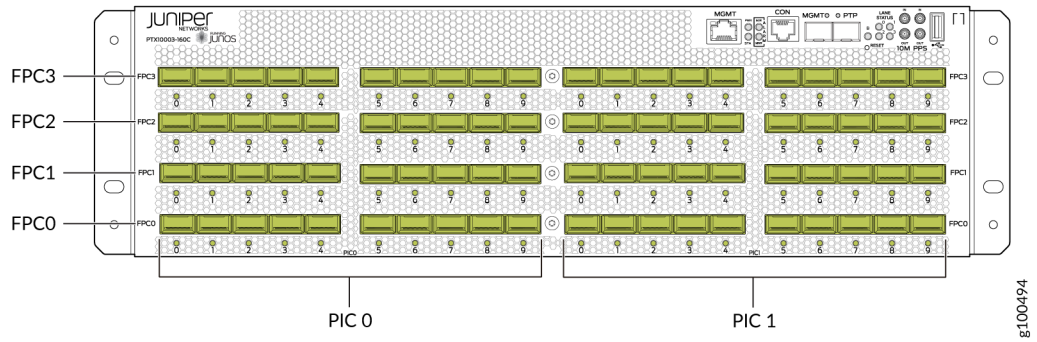
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PTX10003-160C Port Panel

Operating in a fixed core router configuration, the PTX10003-160C features flexible interface configuration options with universal multi-rate double-density Quad Small Form-factor Pluggable (QSFP-DD) optics. The port panel has 80 optical interfaces which support data rates of 10 Gbps, 25 Gbps, 40 Gbps, 100 Gbps, 200 Gbps, and 400 Gbps. Each of the 16 Juniper Networks 1 Tbps ExpressPlus ASICs in the PTX10003-160C connect to a group of five QSFP-DD ports. You can configure different data rates for each port group as long as the total throughput for the group does not exceed 1 Tbps. For more details, see "Understanding QSFP-DD Interfaces and Configurations" on page 10.

Figure 5 on page 8 illustrates the PTX10003-160C port panel.

Figure 5: PTX10003-160C Port Panel



1– 80 optical interfaces with 80 port LEDs

As illustrated in Figure 5 on page 8, the interfaces for the PTX10003-160C are divided into logical FPCs, logical PICs, and physical optical ports as follows:

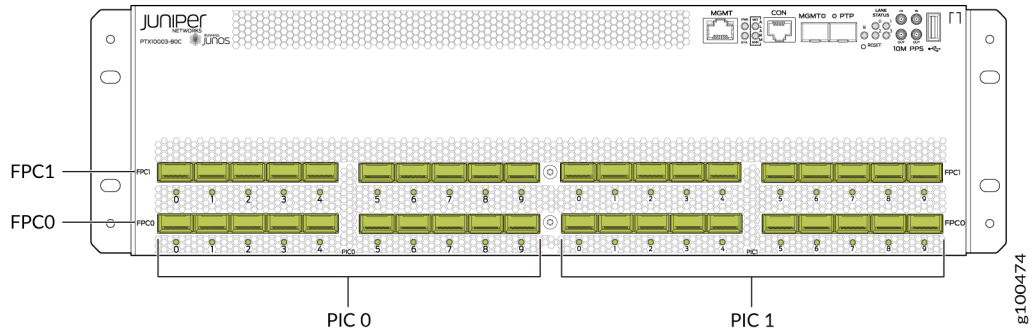
- **FPCs:** The PTX10003-160C has four FPCs, numbered 0, 1, 2, and 3 from the bottom up in the chassis.
- **PICs:** Each FPC has two logical PICs, numbered 0 and 1 from left to right.
- **Ports:**: Each PIC controls 10 QSFP-DD optical interfaces, numbered 0 through 9 from left to right.
- The 10 QSFP-DD optical interfaces are divided into two groups of five ports.
- Each port group is controlled by two PFEs.

PTX10003-80C Port Panel

Operating in a fixed core router configuration, the PTX10003-80C features flexible interface configuration options with universal multi-rate double-density Quad Small Form-factor Pluggable (QSFP-DD) optics. The port panel has 40 optical interfaces which support data rates of 10 Gbps, 25 Gbps, 40 Gbps, 100 Gbps, 200 Gbps, and 400 Gbps. Each of the eight Juniper Networks 1 Tbps ExpressPlus ASICs in the PTX10003-80C connect to a group of five QSFP-DD ports. You can configure different data rates for each port group as long as the total throughput for the group does not exceed 1 Tbps. See "Understanding QSFP-DD Interfaces and Configurations" on page 10 for more details.

Figure 6 on page 9 illustrates the PTX10003-80C port panel.

Figure 6: PTX10003-80C Port Panel



1– 40 optical interfaces with 40 port LEDs

As illustrated in Figure 6 on page 9, the interfaces for the PTX10003-80C are divided into logical FPCs, logical PICs, and physical optical ports as follows:

- **FPCs:** The PTX10003-80C has two FPCs, numbered 0 and 1 from the bottom up in the chassis.
- **PICs:** Each FPC has two logical PICs, numbered 0 and 1 from left to right.
- **Ports:** Each PIC controls 10 QSFP-DD optical interfaces, numbered 0 through 9 from left to right.
- The 10 QSFP-DD optical interfaces are divided into two groups of five ports.
- Each port group is controlled by two Packet Forwarding Engines (PFE).

Understanding QSFP-DD Interfaces and Configurations

Each Juniper Networks 1 Tbps ExpressPlus ASIC contains two logically independent PFEs which can provide 500 Gbps throughput. Each QSFP-DD port group is controlled by two PFEs with the middle QSFP-DD interface (port 2 and port 7) being shared by the PFEs.

Any port can be used as a 100-Gigabit Ethernet interface, 40-Gigabit Ethernet interface, or 10-Gigabit Ethernet interface. You choose the speed by plugging in the appropriate optical transceiver. You can also channelize the 100 Gbps and 200 Gbps ports to create multiple independent 25 Gbps interfaces. You can channelize the 40 Gbps ports to create multiple independent 10 Gbps ports. See *Channelization Configuration on PTX10003* for more details.

Given the design of the Juniper Networks ExpressPlus ASIC and chassis level thermal considerations, there are certain limitations for some QSFP-DD interfaces and configurations. Each QSFP-DD port group can be configured to achieve the maximum 1 Tbps throughput with the following limitations:

- Only the interfaces at the outer edge of each QSFP-DD group can be configured for 1x400 Gbps (using QSFP56-DD optics).
- The middle QSFP-DD port that is shared across two PFE's (port 2 and port 7) cannot support a data rate of 1x200 Gbps. These ports can only support 2x100 Gbps (QSFP28-DD).
- The highest QSFP-DD data rate that can be used across all QSFP-DD groups is 200 Gbps (2x100 Gbps). This provides 16 Tbps throughput for the PTX10003-160C, and 8 Tbps throughput for the PTX10003-80C.
- Aside from running all interfaces with 2x100 Gbps optics, there are other ways to attain the maximum system throughput. The 400 Gbps optics can be used in combination with 100 Gbps optics and 200 Gbps optics as shown in the following examples.

Allowable QSFP-DD Interface Configurations for the PTX10003-160C

Assuming the limitations described previously, Table 2 on page 10 lists the allowable interface configurations for the PTX10003-160C.

Table 2: PTX10003-160C Port Density per Optical Interface

Number of Ports	QSFP Transceiver	Data Rate	Maximum Number of Interfaces
80	QSFP+	4x10 Gbps	320 10 Gbps

Table 2: PTX10003-160C Port Density per Optical Interface *(Continued)*

Number of Ports	QSFP Transceiver	Data Rate	Maximum Number of Interfaces
		1x40 Gbps	80 40 Gbps
80	QSFP28	1x100 Gbps or 4x25 Gbps	80 100 Gbps
64	QSFP28-DD	1x200 Gbps or 8x25Gbps	64 200 Gbps
80		2x100 Gbps	160 100 Gbps
32	QSFP56-DD	1x400 Gbps	32 400 Gbps
		4x100 Gbps	128 100 Gbps

Allowable QSFP-DD Interface Configurations for the PTX10003-80C

Assuming the limitations described previously, Table 3 on page 11 lists the allowable interface configurations for the PTX10003-80C.

Table 3: PTX10003-80C Port Density per Optical Interface

Number of Ports	QSFP Transceiver	Data Rate	Maximum Number of Interfaces
40	QSFP+	4x10 Gbps	160 10 Gbps
		1x40 Gbps	40 40 Gbps
40	QSFP28	1x100 Gbps or 4x25 Gbps	40 100 Gbps

Table 3: PTX10003-80C Port Density per Optical Interface *(Continued)*

Number of Ports	QSFP Transceiver	Data Rate	Maximum Number of Interfaces
32	QSFP28-DD	1x200 Gbps or 8x25 Gbps	32 200 Gbps
40		2x100 Gbps	80 100 Gbps
16	QSFP56-DD	1x400 Gbps	16 400 Gbps
		4x100 Gbps	64 100 Gbps

Examples of PTX10003 QSFP-DD Configurations

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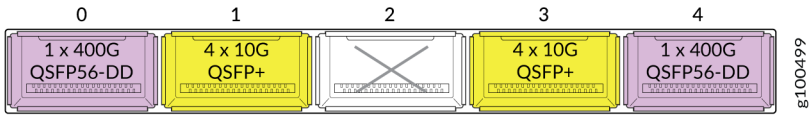
By default, all PTX10003 QSFP-DD interfaces are configured for a data rate of 2x100 Gbps. You can change the port configuration to achieve different throughput using the following Junos OS Evolved command:

`set chassis fpc` *`slot-number`* `pic` *`pic-number`* `port` *`port-number`* `number-of-subports` *`[1 | 2 | 4 |8]`* `speed` *`[10G | 25G | 40G | 100G | 200G |400G]`* command.

For example, to configure the second port in the first port group as a 4x10 Gbps interface, use the `set chassis fpc 0 pic 0 port 1 number-of-subports 4 speed 10g` command. After you commit this configuration, the second port in PIC 0 will operate at 4x10 Gbps.

NOTE: When a port speed and sub-port-number are configured, the configured values override the default port speed for the transceiver. If you try to configure a port speed that is not supported by the transceiver, the port will be disabled. If there isn't a port speed configured on a valid optical port, the PTX10003 uses a default port speed of 2x100 Gbps. Also, if `number-of-subports` is not configured, a 1x *40G / 100G /200G /400G]* data rate is assumed. A 1x10G sub-port is not supported.

Example: Using Network Ports as 10 Gbps or 40 Gbps Ethernet Interfaces



With QSFP+ transceivers, you can configure 10 Gbps or 40 Gbps interfaces on any port. To attain the maximum 1 Tbps throughput for a port group, you can configure the 10 Gbps and 40 Gbps ports with combinations of 1x100 Gbps, 2x100 Gbps, and 400 Gbps, data rates. Refer to Table 4 on page 13.

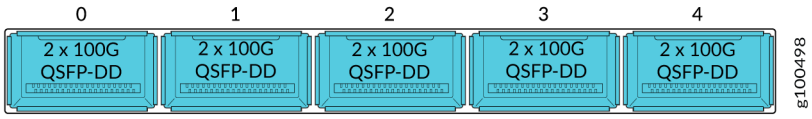
NOTE: 1x10 Gbps and 2x10 Gbps are not supported.

NOTE: Only the ports at the outer edge of each group can be configured for 1x400 Gbps (using QSFP56-DD transceivers).

Table 4: Using Network Ports as 10 Gbps or 40 Gbps Ethernet Interfaces

Data Rate	QSFP Transceiver	Allowable Port Numbers	Maximum Number of Ports (PTX10003-160C)	Maximum Number of Ports (PTX10003-80C)
4x10 Gbps	QSFP+	0-9	320	160
1x40 Gbps	QSFP+	0-9	80	40

Example: Using Network Ports as 100 Gbps Ethernet Interfaces

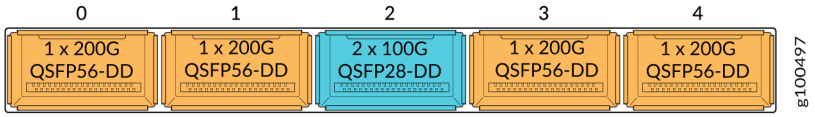


With QSFP28 and QSFP28-DD transceivers, you can configure a 2x100 Gbps data rate on any port. This is the default port configuration. To attain the maximum 1 Tbps throughput for a port group using 100 Gbps interfaces, you can configure combinations of 1x100 Gbps, 2x100 Gbps, and 4x100 Gbps data rates. Refer to Table 5 on page 14.

Table 5: Using Network Ports as 100 Gbps Interfaces

Data Rate	QSFP Transceiver	Allowable Port Numbers	Maximum Number of Ports (PTX10003-160C)	Maximum Number of Ports (PTX10003-80C)
1x100 Gbps	QSFP28	0-9	80	40
2x100 Gbps	QSFP28-DD	0-9	160	80
4x100 Gbps	QSFP56-DD	0, 4, 5, 9	128	64

Example: Using Network Ports as 200 Gbps Ethernet Interfaces



With QSFP28-DD transceivers, you can configure select ports in each port group as a 1x200 Gbps Ethernet interface. To attain the maximum 1 Tbps throughput for a port group, you can configure combinations of 1x400 Gbps, 1x100 Gbps, 2x100 Gbps, and 1x200 Gbps data rates. Refer to Table 6 on page 15.

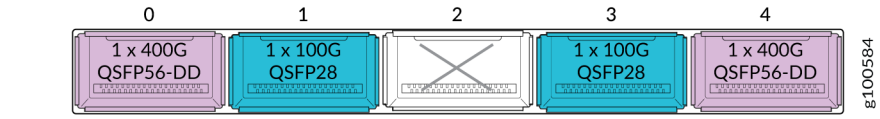
NOTE: The center port in each port group (port 2 and port 7) cannot support 1x200 Gbps. To configure a 200 Gbps data rate for those ports, you'll need to configure them as 2x100 Gbps.

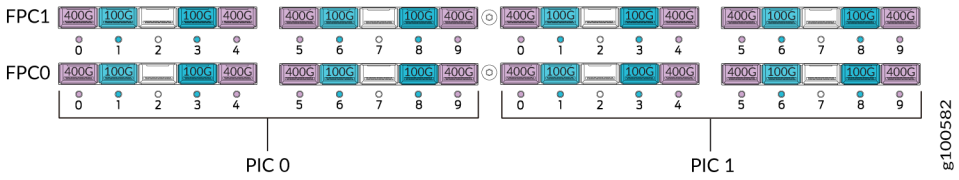
Table 6: Using Network Ports as 200 Gbps Interfaces

Data Rate	QSFP Transceiver	Allowable Port Numbers	Maximum Number of Ports (PTX10003-160C)	Maximum Number of Ports (PTX10003-80C)
1x200 Gbps	QSFP28-DD	0, 1, 3, 4, 5, 6, 8, 9	64	32
2x100 Gbps	QSFP28-DD	0-9	160	80

NOTE: 200 Gbps data rates are supported on Juniper Junos OS Evolved release 19.3R1 and later.

Example: Using Network Ports as 1x400 Gbps Ethernet Interfaces





With QSFP56-DD transceivers, you can configure a data rate of 1x400 Gbps on the two outer ports in a port group. To attain the maximum 1 Tbps throughput, you can configure combinations of two ports of 1x400 Gbps and two ports of 1x100 Gbps data rates in a port group with the following limitations:

- Only the ports at the outer edge of each group can be configured for 1x400 Gbps (using QSFP56-DD transceivers).
- When ports 0, 4, 5, 9 are configured as 1x400 Gbps, the center ports 2 and 7 must be blank.

Table 7: Using Network Ports as 400 Gbps Interfaces

Data Rate	QSFP Transceiver	Allowable Port Numbers	Maximum Number of Ports (PTX10003-160C)	Maximum Number of Ports (PTX10003-80C)
1x400 Gbps	QSFP56-DD	0, 4, 5, 9	32	16
4x100 Gbps	QSFP56-DD	0, 4, 5, 9	128	64
2x100 Gbps	QSFP28-DD	0-9	160	80

NOTE: 400 Gbps data rates are supported in Junos OS Evolved release 19.3R1 and later.

Example: Using Network Ports as 4x100 Gbps Ethernet Interfaces

With QSFP56-DD transceivers, you can configure a data rate of 4x100 Gbps on the two outer ports in a port group. You can configure combinations of two ports of 4x100 Gbps with the following limitations:

- You can configure only the ports at the outer edge of each group to operate at 4x100 Gbps speeds (by using QSFP56-DD transceivers).
- When you configure port 0 to operate at 4x100 Gbps speeds, you cannot use port 1.
- When you configure port 4 to operate at 4x100 Gbps speeds, you cannot use port 3.

PTX10003 Port LEDs

Each PTX10003 port uses a single bi-colored LED to indicate link status and activity. See Table 8 on page 17 for how to interpret the port LEDs.

NOTE: After you insert an optical transceiver, the LINK UP LED flashes red and green during the first 60 seconds. This means the link is unstable. It may take up to 60 seconds for the LED to stop flashing.

Table 8: Network Port LEDs on a PTX10003

Color	State	Description
—	Off	The transceiver is not present or loopback configuration is present.
Green	On steadily	A link is established and all channels are up.
Amber	On steadily	One or more channels are up. However, at least one channel has activity, but not all connections are active.
Red	On steadily	All channels are down.

Channelizing Interfaces on PTX10003 Routers with Junos OS Evolved

PTX10003 Packet Transport Routers feature flexible interface configuration options with universal multi-rate double-density Quad Small Form-factor Pluggable (QSFP-DD) optics. The PTX10003-80C port panel has 40 physical ports and the PTX10003-160C port panel has 80 physical ports. The physical ports are in groups of five QSFP-DD ports. You can configure different data rates for each port group as long as the total throughput for the group does not exceed 1 Tbps. Any port can be used as a 100-Gigabit Ethernet interface, 40-Gigabit Ethernet interface, or 10-Gigabit Ethernet interface. You choose the speed by plugging in the appropriate transceiver.

NOTE: The center port in each port group (port 2 and port 7) cannot support 1x200 Gbps. To configure a 200 Gbps data rate for those ports, you'll need to configure them as 2x100 Gbps. For more details, see "Understanding QSFP-DD Interfaces and Configurations" on page 10.

You can channelize the Gigabit Ethernet interfaces on PTX10003 routers to create multiple independent Gigabit Ethernet interfaces and then use breakout cables to connect the channelized ports to other servers, storage devices, and routers. Here's the allowable channelization configurations for the optical transceivers supported by the PTX10003:

QSFP Transceiver	Native Port Speeds	Channelization Options
QSFP28-DD	1x200 Gbps 2x100 Gbps	8x25 Gbps
QSFP28	1x100 Gbps	4x25 Gbps
QSFP+	1x40 Gbps 4x10 Gbps	4x10 Gbps

NOTE: For more details about supported transceivers and cable specifications, see the PTX10003 Packet Transport Router Hardware Guide .

By default, all PTX10003 QSFP-DD interfaces are configured for a data rate of 2x100 Gbps. The interface names appear in the et-fpc/pic/port:channel format.

The port speed can be configured at the PIC-level. To view the port speed capability of a logical PIC, issue the `show chassis pic fpc-slot slot-number pic-slot slot-number` command.

For details on how to channelize a port, see *PTX10003 Router Port Speed Overview*.

SEE ALSO

- *number-of-sub-ports*
- *speed (Ethernet)*
- *fpc*
- *pic*

PTX10003 Field-Replaceable Units Panel

IN THIS SECTION

- PTX10003-160C FRU Panel | 20
- PTX10003-80C FRU Panel | 22

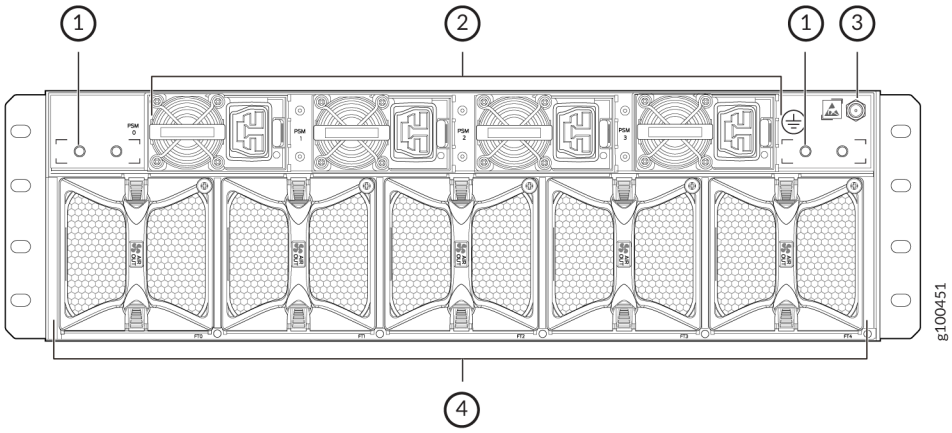
The PTX10003 field-replaceable units (FRU) panel contains fan modules, power supply modules, two grounding points, and an ESD grounding point. The PTX10003 FRUs are hot-removable and hot-insertable—you can remove and replace them without powering off the PTX10003 or disrupting the routing function.

NOTE: If you have a Juniper Care service contract, register any addition, change, or upgrade of hardware components at https://www.juniper.net/customers/support/tools/updateinstallbase/. 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.

PTX10003-160C FRU Panel

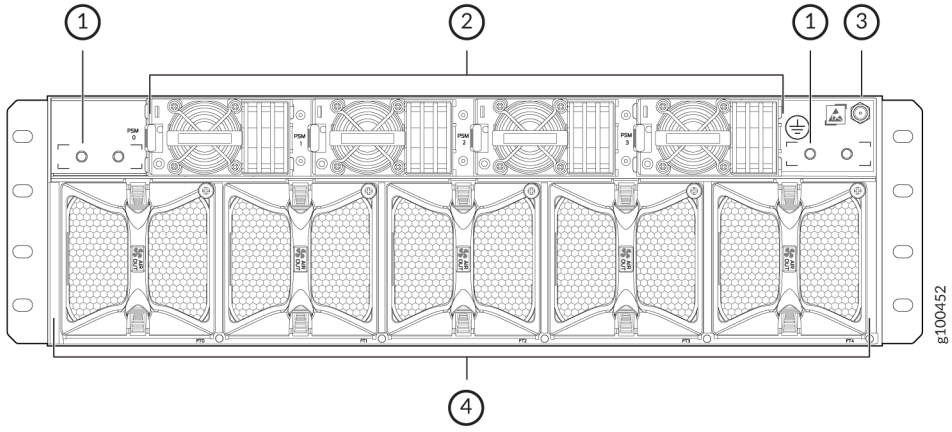
The FRU panel for the PTX10003-160C has four power supplies, five fan modules, two chassis grounding points, and an ESD grounding point. Refer toFigure 7 on page 20 (AC/HVDC power supplies) and Figure 8 on page 20 (DC power supplies).

Figure 7: PTX10003-160C FRU Panel with AC/HVDC Power Supplies



1– Chassis grounding points	3– ESD grounding point
2– Power supplies (4)	4– Fan modules (5)

Figure 8: PTX0003-160C FRU Panel with DC Power Supplies



1– Chassis grounding points	3– ESD grounding point
2– Power supplies (4)	4– Fan modules (5)

Table 9 on page 21 lists the component part numbers for PTX10003-160C FRUs.

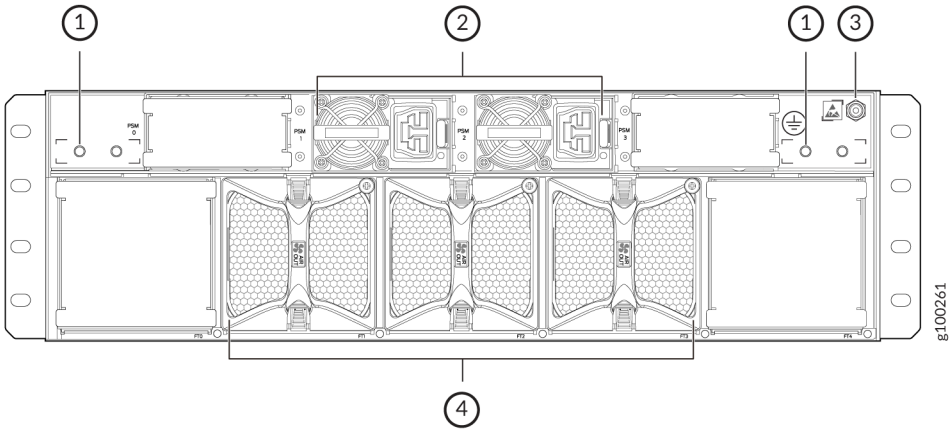
Table 9: List of PTX10003-160C FRUs

Component	Model Number	Description
PTX10003-160C Base System (AC)	PTX10003-160C-AC	PTX10003-160C base system with 160 100 GbE ports or 32 400 GbE ports, 4 3000 W AC power supplies, 4 power cables, and 5 fan trays, with standard tier right-to-use license.
PTX10003-160C Base System (DC)	PTX10003-160C-DC	PTX10003-160C base system with 160 100 GbE ports or 32 400 GbE ports, 4 3000 W DC power supplies, and 5 fan trays, with standard tier right-to-use license
PTX10003-160C Chassis Spare	JNP10003-160C-CHAS	JNP10003-160C spare chassis with 160 100 GbE ports or 32 400 GbE ports.
Fan Tray	JNP10003-FAN	Fan tray for 3 RU 8 T and 16 T fixed platforms.
AC Power Supply	JNP-3000W-AC-AFO	AC power supply for JNP10003-160C and JNP10003-80C fixed platforms.
DC Power Supply	JNP-3000W-DC-AFO	DC power supply for JNP10003-160C and JNP10003-80C fixed platforms

PTX10003-80C FRU Panel

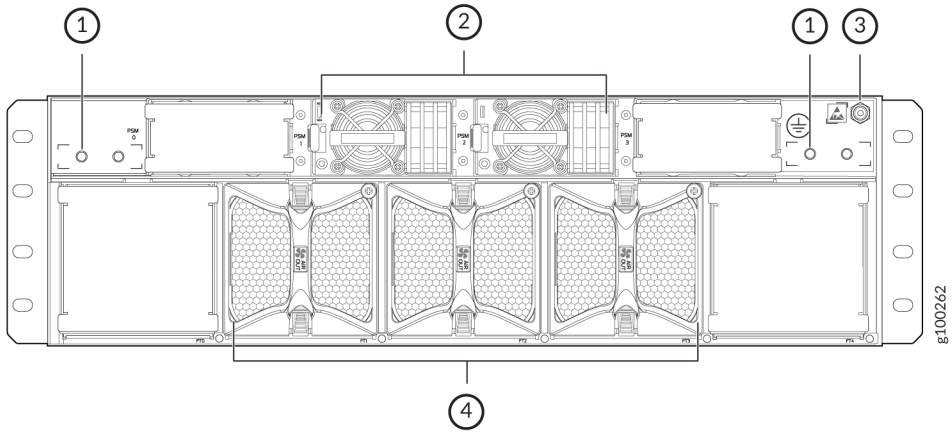
The FRU panel for the PTX10003-80C has two power supplies, three fan modules, two chassis grounding points, and an ESD grounding point. Refer toFigure 9 on page 22 (AC/HVDC power supplies) and Figure 10 on page 22(DC power supplies).

Figure 9: PTX10003-80C with AC/HVDC Power Supplies



1– Chassis grounding points	3– ESD grounding point
2– Power supplies (2)	4– Fan modules (3)

Figure 10: PTX10003-80C with DC Power Supplies



1– Chassis grounding points	3– ESD grounding point
2– Power supplies (2)	4– Fan modules (3)

Table 10 on page 23 lists the component part numbers for PTX10003-80C FRUs.

Table 10: List of PTX10003-80C FRUs

Component	Model Number	Description
PTX10003-80 Base System (AC)	PTX10003-80C-AC	PTX10003-80C base system with 80 100 GbE ports or 16 400 GbE ports, 2 3000 W AC power supplies, 2 power cables, and 3 fan trays, with standard tier right-to-use license.
PTX10003-80C Base System (DC)	PTX10003-80C-DC	PTX10003-80C base system with 80 100 GbE ports or 16 400 GbE ports, 2 3000 W DC power supplies, and 3 fan trays, with standard tier right-to-use license.
PTX10003-80C Chassis (Spare)	JNP10003-80C-CHAS	JNP10003-80C spare chassis with 80 100 GbE ports or 16 400 GbE ports.
Fan Tray	JNP10003-FAN	Fan tray for 3 RU 8T and 16T fixed platforms.
AC Power Supply	JNP-3000W-AC-AFO	AC power supply for JNP10003-160C and JNP10003-80C fixed platforms.
DC Power Supply	JNP-3000W-DC-AFO	DC power supply for JNP10003-160C and JNP10003-80C fixed platforms.

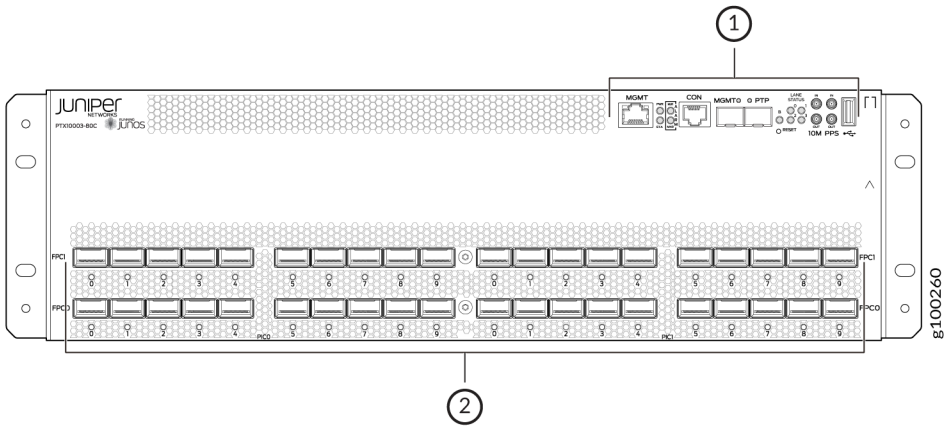
PTX10003 Management Panel

IN THIS SECTION

- PTX10003 Management Panel Components | **24**
- PTX10003 Management Panel LEDs | **25**

The PTX10003-8T management panel is in the upper right corner of the port panel (see Figure 11 on page 24).

Figure 11: PTX10003-8T Port Panel and Management Panel

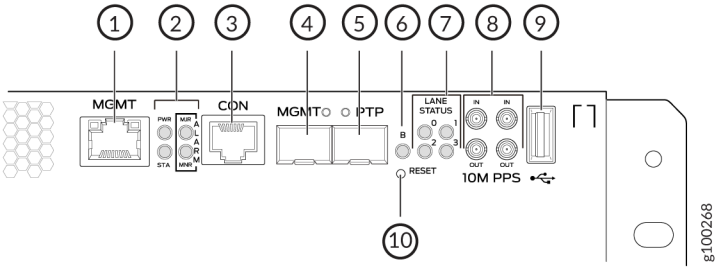


1– Management panel	2– Port panel

PTX10003 Management Panel Components

You manage the PTX10003 by using the Junos OS Evolved software CLI, which is accessible through the console and out-of-band management ports on the management panel. The management panel, located in the upper right corner of the port panel, has system status LEDs that alert you to minor and major alarms, and other issues with the router. It also has external clock synchronization ports and a USB port to support software installation and recovery. Figure 12 on page 24 shows the management panel in detail.

Figure 12: PTX10003 Management Panel Components



1– RJ-45 Ethernet management port(**MGMT**)	6– Beacon LED

2– Power (**PWR**) Status (**STA**) and alarm LEDs (**MJR**= major alert; **MNR**=minor alert)	7– Four **LANE STATUS** LEDs numbered **0, 1, 2, 3** for lane identification of the QSFP channel. The lane ID LEDs work in conjunction with the activity LEDs that appear beneath the optics. These optics can support up to four independent lanes. Since there is only one LED per QSFP, the lane ID LEDs indicate which physical QSFP lane corresponds to the LED indicator that is currently active.
3– RJ-45 console UART (**CON**) port. An optional GPS Time of Day (TOD) is also supported.	8– Four co-axial input/output (**IN/OUT** SMB connectors for external 1PPS and 5MHz/ 10MHz simultaneous I/O bi-directional timing. BITS is not supported.
4– SFP (**MGMT**) port for 1G system management	9– USB 2.0 port for connection to the CPU
5– SFP (**PTP**) port for an IEEE 1588 PTP timing source	10– Reset (**RESET**) push button for resetting the CPU

PTX10003 Management Panel LEDs

Table 11 on page 25 describes the management panel LEDs on the PTX10003.

Table 11: PTX10003 Management Panel LEDs

LED Name	Color/State	Definition
RJ-45 10/100/1000 Management Port LED **MGMT**	Off	Link up, no activity
	Yellow/Blinking	Link up, activity
Power LEDs **PWR**	Green/On	Power is ok
	Yellow/Blinking	Power fault
	Off	Offline

Table 11: PTX10003 Management Panel LEDs *(Continued)*

LED Name	Color/State	Definition
SFP Optic Management Port LED **MGMT**	Green	Link up, no activity
	Green/Blinking	Link up, activity
	Off	Link down
PTP Port LED **PTP**	Green	Link up, no activity
	Green/Blinking	Link, activity
	Off	Link down
Alarm LEDs **MJR**	Red/On	Alarm is active
	Off	No alarm
MNR	Yellow/On	Minor alarm is active
No alarms	Off	No alarms are active
Beacon (**B**)	Blue/off	Used as chassis locator
LANE STATUS	Green/off, 2x2 LED matrix	Indicates which lane of optics corresponds to LED traffic indicator beneath optics. Upper left corner LED corresponds to lane 0, proceeding clock wise – lane 1,2,3

For power and temperature alarms, use the `show chassis environment fpc` operational mode command to get detailed information on the internal state of the chassis. For example:

```
user@device> show chassis environment fpc
```

```
FPC 0 status:
  State                       Online
  Temperature                 51 degrees C / 123 degrees F
  Voltage:
    PE0 VDD Core 0.9V           949 mV
    PE0 AVDD 1.0V              1000 mV
    PE0 HMC VDD 0.9V            897 mV
    PE0 HMC AVDD 1.2V          1197 mV
    PE01 HMC VDD 1.2V          1197 mV
    PE1 VDD Core 0.9V           949 mV
    PE1 AVDD Core 1.0V          999 mV
    PE1 HMC VDD 0.9V            899 mV
    PE1 HMC AVDD 1.2V          1197 mV
    PE2 VDD Core 0.9V           950 mV
    PE2 AVDD Core 1.0V          999 mV
    PE2 HMC VDD 0.9V            897 mV
    PE2 HMC AVDD 1.2V          1197 mV
    PE23 HMC AVDD 1.2V         1197 mV
    PE3 VDD Core 0.9V           949 mV
    PE3 AVDD Core 1.0V          999 mV
    PE3 HMC VDD 0.9V            899 mV
    PE3 HMC AVDD 1.2V          1200 mV
    PE4 VDD Core 0.9V           949 mV
    PE4 AVDD Core 1.0V          999 mV
    PE4 HMC VDD 0.9V            899 mV
    PE4 HMC AVDD 1.2V          1197 mV
    PE45 HMC AVDD 1.2V         1197 mV
    PE5 VDD Core 0.9V           949 mV
    PE5 AVDD Core 1.0V         1000 mV
    PE5 HMC VDD 0.9V            899 mV
    PE5 HMC AVDD 1.2V          1200 mV
    XMB VDD 3.3V               3316 mV
    MAIN VDD 3.3V              3298 mV
    RT VDD 1.0V                 999 mV
    MAIN VDD 2.5V              2502 mV
    MAIN PFE 1.5V              1502 mV
    PE6 VDD Core 0.9V           949 mV
    PE6 AVDD 1.0V              1000 mV
    PE6 HMC VDD 0.9V            897 mV
    PE6 HMC AVDD 1.2V          1204 mV
    PE67 HMC VDD 1.2V          1197 mV
    PE7 VDD Core 0.9V           949 mV
    PE7 AVDD Core 1.0V          999 mV
```

```
PE7 HMC VDD 0.9V              897 mV
PE7 HMC AVDD 1.2V            1197 mV
PE8 VDD Core 0.9V             949 mV
PE8 AVDD Core 1.0V            999 mV
PE8 HMC VDD 0.9V              897 mV
PE8 HMC AVDD 1.2V            1200 mV
PE78 HMC AVDD 1.2V           1197 mV
PE9 VDD Core 0.9V             950 mV
PE9 AVDD Core 1.0V            999 mV
PE9 HMC VDD 0.9V              897 mV
PE9 HMC AVDD 1.2V            1200 mV
PE10 VDD Core 0.9V            949 mV
PE10 AVDD Core 1.0V           999 mV
PE10 HMC VDD 0.9V             899 mV
PE10 HMC AVDD 1.2V           1200 mV
PE910 HMC AVDD 1.2V          1200 mV
PE11 VDD Core 0.9V            950 mV
PE11 AVDD Core 1.0V           999 mV
PE11 HMC VDD 0.9V             899 mV
PE11 HMC AVDD 1.2V           1200 mV
PF0 VDD Core 0.9V             950 mV
PF0 AVDD Core 1.0V            999 mV
PF1 VDD Core 0.9V             950 mV
PF1 AVDD Core 1.0V            999 mV
XDB VDD 3.3V                 3298 mV
XDB RT VDD 1.0V               999 mV
MEZZ VDD 2.5V                2502 mV
MEZZ PFE 1.5V                1502 mV
MEZZ GEX 1.0V                 999 mV
VCC 1.0V                     1009 mV
VCC 0.85V                     862 mV
VDD RAIL 12.0V                  0 mV
VCC 1.8V                     1793 mV
VDD 1.2V                     1215 mV
PCH VCC 1.0V                  999 mV
CPU VCC 1.8V                 1803 mV
BIAS 1 3.3V                  3312 mV
AUX VCC 5.0V                 4165 mV
DDR VDD 1.5V                 1499 mV
VTT SA CPU 0.8V               803 mV
VTT CPU 1.05V                1048 mV
CORE CPU 1.0V                 940 mV
PCH VCC 1.5V                 1509 mV
```

```
PCH VCC 1.05V              1058 mV
VDD 2.5V                   2508 mV
```

SEE ALSO

show chassis alarms

PTX10003 Cooling System Description and Airflow

IN THIS SECTION

- PTX10003 Fan Modules | **30**
- PTX10003 Chassis Airflow | **31**
- Fan Module Status and LED Description | **31**

The PTX10003 is cooled front to back with five fan modules (PTX10003-160C) or three fan modules (PTX10003-80C). Located in the rear of the chassis, the 98.4-W fan modules operate at 164 cubic feet per minute (CFM) at full speed under zero static pressure. Each fan module is a redundant unit containing dual counter-rotating fans. The fan modules can be hot-swapped and hot-inserted, meaning that you can replace a fan module without powering off the router or disrupting the router function.

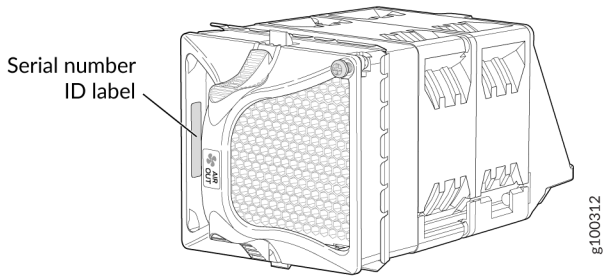
The fan modules pull air through the front panel around the gaps between the optical transceivers. Cooling for the power supplies is also front to back, utilizing fans inside the power supplies. A separate air plenum provides air circulation to the power supplies in the entrance at the top of the chassis. There are no air filters in the PTX10003. Fans are field replaceable. Access to the fans is from the Field Replaceable Units (FRU) end of the chassis. Each fan module is composed of two individual fans per tray (10 fans per PTX10003-160C chassis and six fans per PTX10003-80C chassis). The power requirements of the PTX10003 do not allow for redundant fan modules.

PTX10003 Fan Modules

The PTX10003 fan modules are hot-removable and hot-insertable FRUs designed for front-to-back airflow. For the PTX10003-160C, the fan modules are numbered **0** through **4**. For the PTX10003-80C, the fan modules are numbered **1** through **3**. Fan modules are installed in fan trays located below the power supplies. Each fan tray has a fan icon label on the handle.

Figure 13 on page 30 shows a PTX10003 fan module.

Figure 13: PTX10003 Fan Module



You remove and replace a fan module from the FRU end of the chassis. The router continues to operate for a limited period of time during the replacement of the fan module without thermal shutdown. See "PTX10003 Cooling System Shutdown" on page 33.

NOTE: All fan modules must be installed for optimal operation of the router.

NOTE: If a fan module fails and the remaining fan modules are unable to keep the PTX10003 within the desired temperature thresholds, chassis alarms are raised and the PTX10003 might shut down.

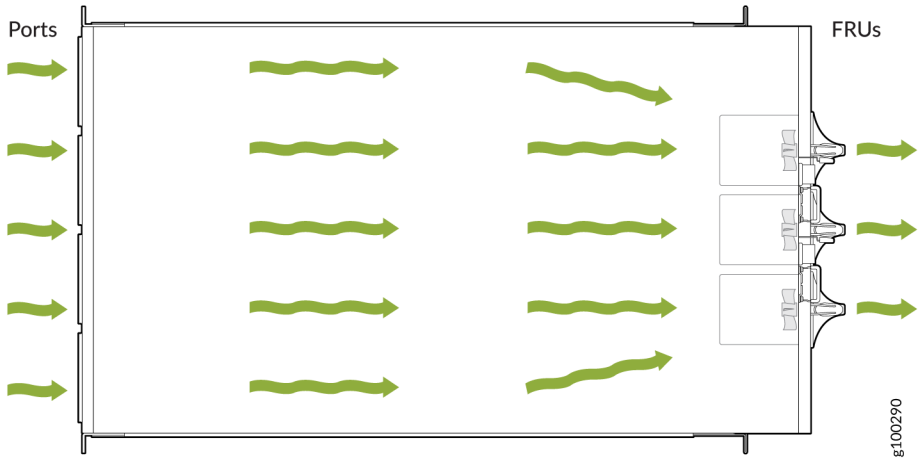
SEE ALSO

Maintaining the PTX10003 Fan Modules | **127**

PTX10003 Chassis Airflow

In data center deployments, position the router in such a manner that the **AIR OUT** labels on router components are next to the hot aisle. Figure 14 on page 31 shows the airflow through the chassis.

Figure 14: Front-to-Back Airflow Through the PTX10003 Chassis



Fan Module Status and LED Description

IN THIS SECTION

- PTX10003 Temperature Sensor Behavior | 33
- PTX10003 Cooling System Shutdown | 33

You can check the status of fan modules by using the `show system alarms` or `show chassis fan` commands or by looking at the LEDs next to each fan module. For example:

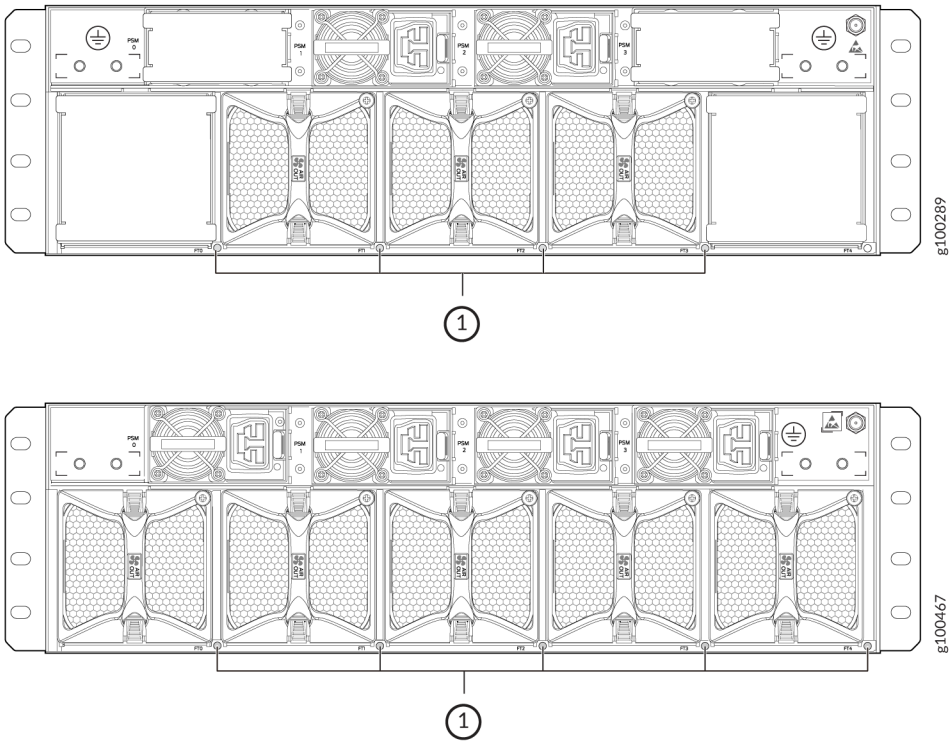
```
user@device> show chassis fan
Item                      Status   RPM     Measurement
      Tray 0 Fan 0              Absent
      Tray 0 Fan 1              Absent
```

```
        Tray 1 Fan 0              OK        5000    Spinning at normal speed
        Tray 1 Fan 1              OK        4400    Spinning at normal speed
        Tray 2 Fan 0              OK        5000    Spinning at normal speed
        Tray 2 Fan 1              OK        4400    Spinning at normal speed
```

Each router has a status LED (labeled **ST**) for each fan module on the left of the corresponding fan module slot. The LED indicates the fan module status.

Figure 15 on page 32 shows the location of the LED next to the PTX10003-80C and PTX10003-160C fan modules.

Figure 15: PTX10003 Fan Module LEDs



1– Fan module LEDs

Table 12 on page 33 describes the fan module LED states.

Table 12: PTX10003 Fan Module LED

Color	State	Description
Green	On steadily	The fan module is operating normally. The system has verified that the module is engaged, and that the fan is operating correctly.
Yellow	Blinking	An error has been detected in the fan module. Replace the fan module as soon as possible. Either the fan has failed or it is seated incorrectly. To maintain proper airflow through the chassis, leave the fan module installed in the chassis until you are ready to replace it.

PTX10003 Temperature Sensor Behavior

Under normal operating conditions, the fan modules operate at a moderate speed. Temperature sensors in the chassis monitor the temperature within the chassis.

The system raises an alarm if a fan module fails or if the ambient temperature inside the chassis rises above the acceptable range. If the temperature inside the chassis rises above the threshold temperature, the router shuts down automatically.

PTX10003 Cooling System Shutdown

The PTX10003 cooling system will immediately shut down if:

- A single fan tray is out of the chassis for more than 240 seconds. The cooling system will shut down regardless of the temperature of the chassis or chassis components.
- More than one fan is out of the PTX10003 chassis. The cooling system will shut down regardless of the temperature of the chassis or chassis components.

PTX10003 Power System

IN THIS SECTION

- PTX10003 AC/HVDC Power Supply Description | 34
- PTX10003 DC Power Supply Description | 49

The PTX10003 is powered by 3000 W redundant AC/HDVC or DC power supplies that are pre-installed at the factory. The PTX10003-160C is powered by four power supplies for 2+2 redundancy. The PTX10003-80C is powered by two power supplies for 1 + 1 redundancy. The power supplies are hot-removable and hot-insertable. If one power supply module fails, you can replace it without powering off or disrupting the routing function. The other power supply module balances the electrical load without interruption. Each power supply module has two outputs: 12 V and 12 V standby. Two counter-rotating fans in each power supply module provide front to back cooling. The input voltages are as follows:

- AC input voltage range: 200–277 V/50–60 Hz
- DC input voltage range: 40 VDC Min, 72 VDC maximum

CAUTION: Do not mix AC/HVDC and DC power supplies in the same chassis.

PTX10003 AC/HVDC Power Supply Description

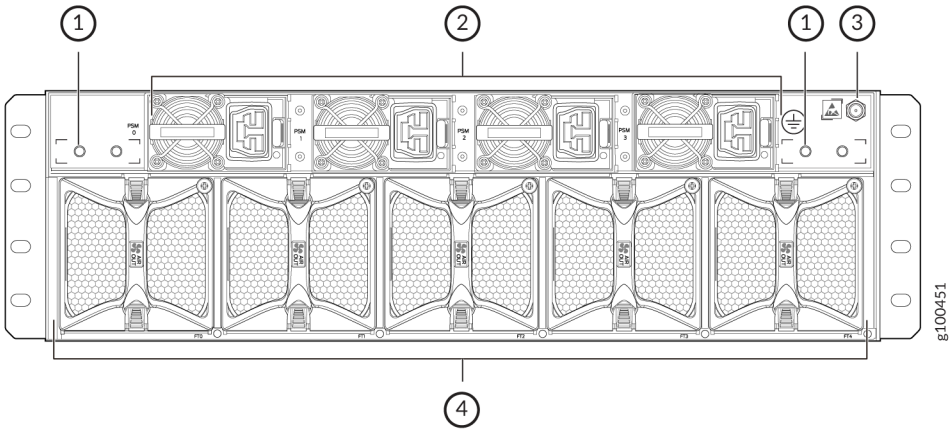
IN THIS SECTION

- PTX10003 AC/HVDC Power Supply LED | 37
- PTX10003 AC/HVDC Power Specifications | 41
- PTX10003 AC Power Cord Specifications | 41

The input power to the AC/HVDC power supplies can be AC power or HVDC power. The power supplies automatically detect whether there is AC or HVDC input voltage and manage the power accordingly. AC power can be 180–305 VAC input voltage and HVDC power can be 190–400 VDC input voltage. Each 3000- W AC/HVDC power supply module has a single AC or HVDC input and provides 12 V power to the system.

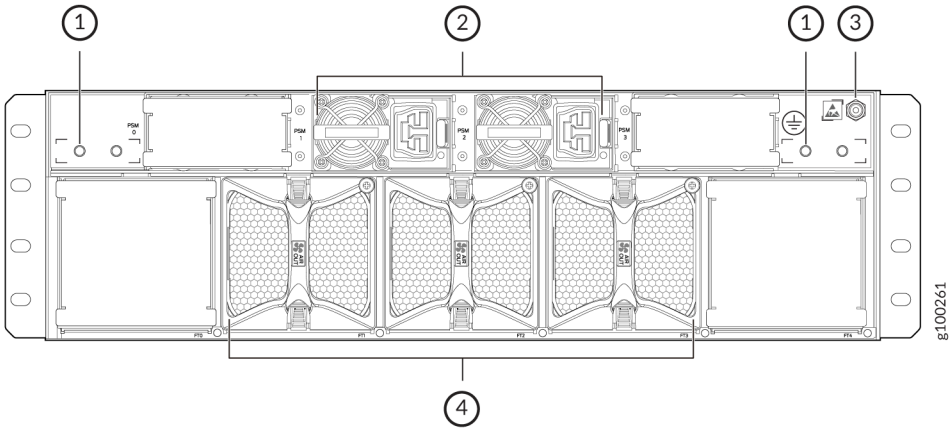
Figure 16 on page 35 shows the location of the AC/HVDC power supplies on the PTX10003-160C FRU panel, and Figure 17 on page 35 shows the location of the AC/HVDC power supplies on the PTX10003-80C FRU panel.

Figure 16: PTX10003-160C FRU Panel (AC Power Supplies Installed)



1– Chassis grounding points (2)	3– ESD grounding point
2– AC/HVDC Power supplies (4)	4– Fan modules (5)

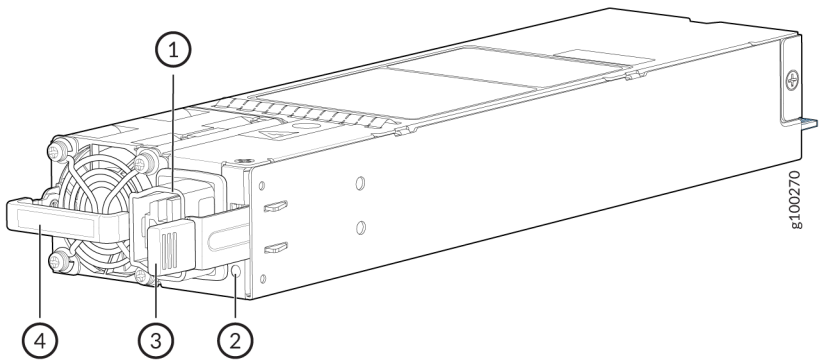
Figure 17: PTX10003-80C FRU Panel (AC/HVDC Power Supplies Installed)



1– Chassis grounding points (2)	3– ESD grounding point
2– AC/HVDC power supplies (2)	4– Fan modules (3)

Figure 18 on page 36 shows the AC/HVDC power supply module components.

Figure 18: PTX10003 AC/HVDC Power Supply



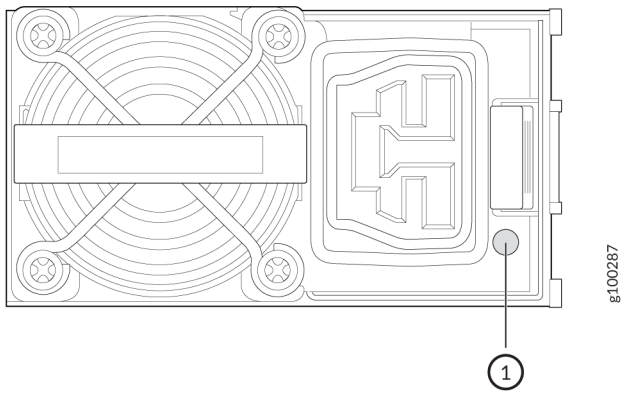
1– Power plug connector	3– Ejector lever
2– Status LED	4– Orange handle

CAUTION: To avoid electrical injury, carefully follow the instructions in "Maintaining the PTX10003 Power Supplies" on page 130.

PTX10003 AC/HVDC Power Supply LED

Each PTX10003 AC/HVDC power supply module has a status LED on the power supply module faceplate. Refer to Figure 19 on page 37.

Figure 19: PTX10003 AC/HVDC Power Supply LED



1– Power supply LED

The PTX10003 AC/HVDC power supply module uses an amber and green bi–color LED to indicate the operating state. Refer to Table 13 on page 37.

Table 13: PTX10003 AC/HVDC Power Supply States

State	Green	Amber
The power supply module is on and operating properly	On	Off
One or both power supplies do not have AC power	Off	Off
The power supply module shut down due to a critical event. Possible causes: high temperature, high power, high current, fan failure	Off	On

Table 13: PTX10003 AC/HVDC Power Supply States *(Continued)*

State	Green	Amber
The power supply module is operating but there are warning events. Possible conditions: high temp (inlet temperature is greater than 53 degrees or a hot spot temperature is greater than 95 degrees), high power, high current, slow fan (less than 1200 rpm)	Off	Blinking amber
There is no input power but the power supply module from another slot in the same system is on with 12 VSB active	Blinking	Off
The AC power cord is unplugged	Off	On

You can get additional information about the status of the power supply modules using the `show chassis power` command and the `show chassis power detail` command. Here's some examples of the CLI output:

PTX10003-160C Power with Four AC/HVDC Power Supplies

```
user@device> show chassis power
Chassis Power    Input(V)    Used(W)

Total Power 2052

PDU 0 2052
    PSM 0
        Input 1 226 489
        Capacity: 3000 W (maximum 3000 W)
    PSM 1
        Input 1 227 546
        Capacity: 3000 W (maximum 3000 W)
    PSM 2
        Input 1 226 435
        Capacity: 3000 W (maximum 3000 W)
    PSM 3
        Input 1 227 582
        Capacity: 3000 W (maximum 3000 W)
```

```
user@device> show chassis power detail
Chassis Power Input(V) Used(W)

Total Power 2044

PDU 0 2044
    PSM 0
        Input 1 226 489
        Capacity: 3000 W (maximum 3000 W)
    PSM 1
        Input 1 227 534
        Capacity: 3000 W (maximum 3000 W)
    PSM 2
        Input 1 226 432
        Capacity: 3000 W (maximum 3000 W)
    PSM 3
        Input 1 227 589
        Capacity: 3000 W (maximum 3000 W)

Item Used(W)
Routing Engine 0 147
CB 0 382
FPC 0 308
FPC 1 297
FPC 2 290
FPC 3 318
Fan Tray 0 17
Fan Tray 1 13
Fan Tray 2 17
Fan Tray 3 15
Fan Tray 4 12

System:
Zone 0:
Capacity: 12000 W (maximum 12000 W)
Allocated power: 4650 W (7350 W remaining)
Actual usage: 2047 W
Total system capacity: 12000 W (maximum 12000 W)
Total remaining power: 7350 W
```

PTX10003-80C with Two AC/HVDC Power Supplies

```
user@device> show chassis power
Chassis Power        Input(V)      Used(W)

Total Power                         1498

  PDU 0                             1498
    PSM 1
      Input 1           204          798
      Capacity:          3000 W (maximum 3000 W)
    PSM 2
      Input 1           206          700
      Capacity:          3000 W (maximum 3000 W)


user@device> show chassis power detail

Chassis Power        Input(V)      Used(W)

Total Power                         1497

  PDU 0                             1497
    PSM 1
      Input 1           204          802
      Capacity:          3000 W (maximum 3000 W)
    PSM 2
      Input 1           205          695
      Capacity:          3000 W (maximum 3000 W)

Item                 Used(W)
  Routing Engine 0       76
  CB 0                  266
  FPC 0                 435
  FPC 1                 443
  Fan Tray 1              8
  Fan Tray 2              7
  Fan Tray 3              8

System:
  Zone 0:
      Capacity:          6000 W (maximum 6000 W)
```

```
    Allocated power:   2807 W (3193 W remaining)
    Actual usage:      1495 W
Total system capacity: 6000 W (maximum 6000 W)
Total remaining power: 3193 W
```

PTX10003 AC/HVDC Power Specifications

The PTX10003 operates within the AC/HVDC input voltage range listed in Table 14 on page 41.

Table 14: PTX10003 AC/HVDC Power Specifications

Parameter	Minimum	Rated	Maximum
Input voltage (AC)	180 VAC	200–277 VAC	305 VAC
Input voltage (HVDC)	190 VDC	240–380 VDC	400 VDC
AC input line frequency	47 Hz	50–60 Hz	63 Hz

PTX10003 AC Power Cord Specifications

Detachable AC power cords are shipped with the AC power supplies. PTX10003 Default Power Cords Supplied on page 44 lists the default power cord that is provided for each country. The plug end of the power cord fits into the power source outlet that is standard for your geographical location.

NOTE: In North America, AC power cords must not exceed 14.75 feet (approximately 4.5 meters) 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 that can be ordered for the PTX10003 are in compliance.

Table 15 on page 42 lists AC power cord specifications provided for each country or region.

Table 15: PTX10003 Power Cord Specifications

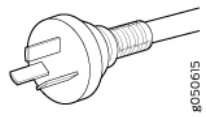
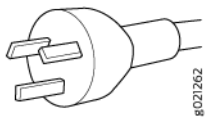
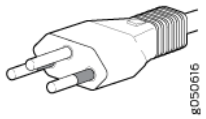
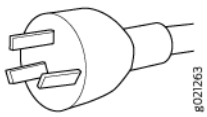
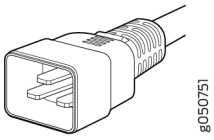
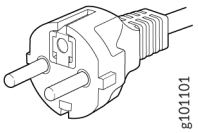
Locale	Cord Set Rating	Plug Standards	Spare Juniper Model Number	Graphic
Argentina	16 A, 250 VAC	IRAM 2073 Type RA/3	CBL-JNP-SG4-AR	
Australia and New Zealand	15 A, 250 VAC	AS/NZS 4417	CBL-JNP-SG4-AU	
Brazil	16 A, 250 VAC	NBR 14136 Type BR/3	CBL-JNP-SG4-BR	
China	16 A, 250 VAC	GB2099	CBL-JNP-SG4-CH	
China, Europe, and Japan	16 A, 250 VAC	C20 to Anderson 3-5958p4	CBL-JNP-SG4-C20-CH	
Europe (except Italy, Switzerland, and United Kingdom)	20 A, 250 VAC	CEE 7/7 STRAIGHT	CBL-JNP-SG4-EU	
Great Britain	13 A, 250 VAC,	BS1363	CBL-JNP-SG4-UK	

Table 15: PTX10003 Power Cord Specifications *(Continued)*

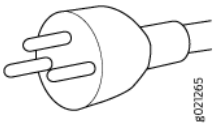
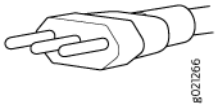
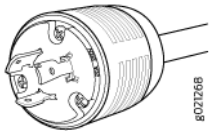
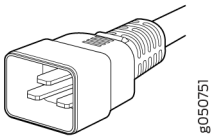
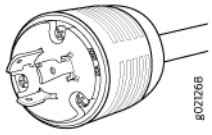
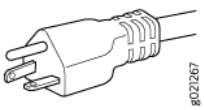
Locale	Cord Set Rating	Plug Standards	Spare Juniper Model Number	Graphic
India	16 A, 250 VAC	SANS 164/1	CBL-JNP-SG4-SA	
Israel	16 A, RA, 250 VAC	SI 32/1971 Type IL/3G	CBL-JNP-SG4-IL	
Italy	16 A, 250 VAC	CEI 23-16	CBL-JNP-SG4-IT	
Japan	20 A, 250 VAC	Nema L-20	CBL-JNP-SG4-JPL	
North America	20 A, 250 VAC	C20 to Anderson 3-5958p4	CBL-JNP-SG4-C20	
North America	16 A, 250 VAC	Locking NEMA L6-20P	CBL-JNP-SG4-US-L	
North America	16 A, 250 VAC	NEMA 6-20P	CBL-JNP-SG4-US	

Table 15: PTX10003 Power Cord Specifications *(Continued)*

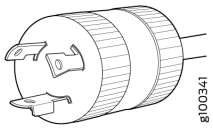
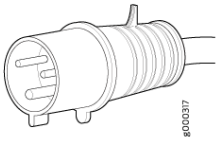
Locale	Cord Set Rating	Plug Standards	Spare Juniper Model Number	Graphic
North America	15 A, 277 V	NEMA I7-20P	CBL-JNP-SG4-HVAC	
North America	20 A, 250 V	IEC 320P6W	CG_CBL-APP-400-02	
South Africa	16 A, 250 VAC	SANS 164/1	CBL-JNP-SG4-SA	
Switzerland	16 A, 250 VAC	CEI 23-50	CBL-JNP-SG4-SZ	

Table 16: PTX10003 Default Power Cords Supplied

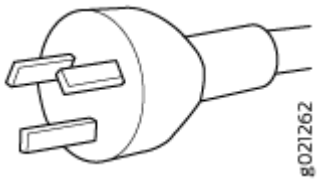
Locale	Spare Juniper Model Number	Graphic
Australia, Cook Islands, Fiji, Kiribati, Nauru, New Zealand, Papua New CBL-JNP-SG4-AU Guinea, Samoa, Tonga, and Vanuatu	CBL-JNP-SG4-AU	

Table 16: PTX10003 Default Power Cords Supplied *(Continued)*

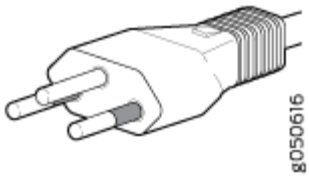
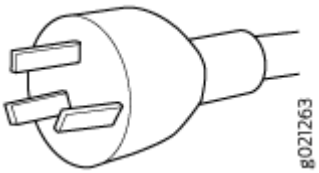
Locale	Spare Juniper Model Number	Graphic
Brazil	CBL-JNP-SG4-BR	
China	CBL-JNP-SG4-CH	

Table 16: PTX10003 Default Power Cords Supplied *(Continued)*

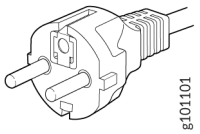
Locale	Spare Juniper Model Number	Graphic
Afghanistan, Albania, Algeria, Andorra, Angola, Argentina, Armenia, Austria, Azerbaijan, Bangladesh, Belarus, Belgium, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Bulgaria, Burundi, Burkina Faso, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Cocos Islands, Comoros, Croatia, Czech Republic, Democratic Republic of the Congo, Denmark, Djibouti, Dominica, East Timor, Egypt, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Faroe Islands, Finland, France, French Guiana, Gabon, Georgia, Germany, Ghana, Gibraltar, Greece, Greenland, Guinea, Guinea-Bissau, Hungary, Iceland, Indonesia, Iran, Iraq, Isle of Man, Ivory, Coast, Jordan, Kuwait, Kazakhstan, Latvia, Libya, Lithuania, Luxembourg, Macau, Macedonia, Madagascar, Mali, Martinique, Mauritania, Mauritius, Moldova, Monaco, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, New Caledonia, Netherlands, Nepal, Nigeria, Norway, Pakistan, Paraguay, Poland, Portugal, Qatar, Republic of the Congo, Romania, Russia, Rwanda, Saint Barthelemy, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Senegal, Serbia, Serbia and Montenegro, Sierra Leone, Slovakia, Slovenia, Somalia, Spain, Sri Lanka, Sudan, Suriname, Sweden, Syria, Tajikistan, Tanzania, Togo, Tunisia, Turkey,	CBL-JNP-SG4-EU	 g101101

Table 16: PTX10003 Default Power Cords Supplied *(Continued)*

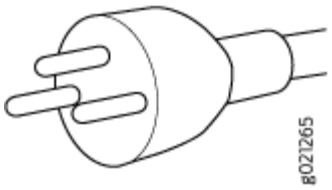
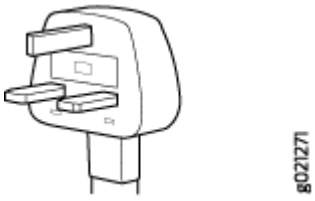
Locale	Spare Juniper Model Number	Graphic
Turkmenistan, Ukraine, Uruguay, Uzbekistan, Vietnam, and Yemen		
Israel	CBL-JNP-SG4-IL	
Chile, Italy, and San Marino	CBL-JNP-SG4-IT	
South Africa	CBL-JNP-SG4-SA	
Maldives and United Kingdom	CBL-JNP-SG4-UK	

Table 16: PTX10003 Default Power Cords Supplied *(Continued)*

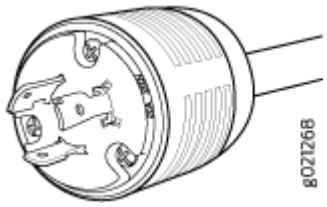
Locale	Spare Juniper Model Number	Graphic
American Samoa, Anguilla, Antigua and Barbuda, Aruba, Barbados, Bahamas, Belize, Bermuda, British Virgin Islands, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guam, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Laos, Lebanon, Liberia, Mexico, Montserrat, Micronesia, Netherlands Antilles, Niger, Panama, Peru, Philippines, Puerto Rico, Saudi Arabia, Taiwan, Thailand, Trinidad and Tobago, U.S. Virgin Islands, United States, and Venezuela	CBL-JNP-SG4-US-L	

Table 17: PTX10003 HVDC Cable Specifications (Bare Wire)

Locale	Cord Set Rating	Spare Juniper Model Number
HVDC power cord	16 A, 400 VAC	CBL-PWR2-BARE

NOTE: The insulation color for wires in the HVDC cables are color coded. Green is ground, black is line, and white is neutral. For HVDC, the black and white wires are not polarity-sensitive. The black wire can be positive (+) or neutral (–) and the white wire can be positive (+) or negative (–).

PTX10003 DC Power Supply Description

IN THIS SECTION

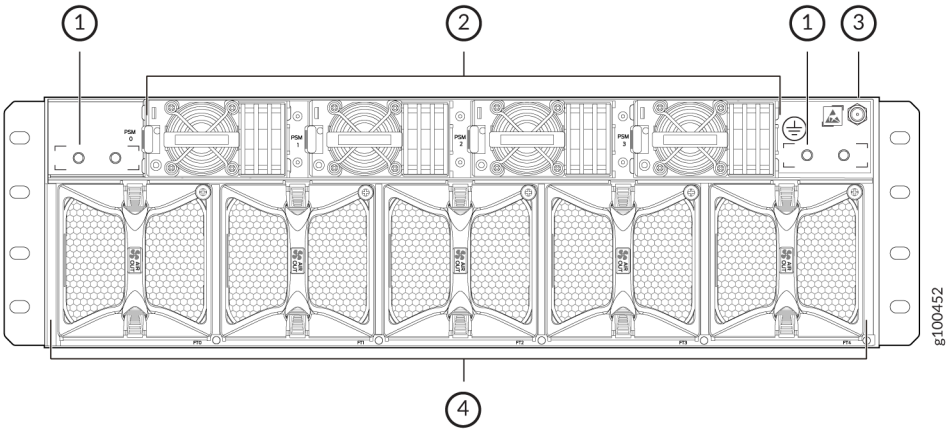
- PTX10003 DC Power Supply LED | 52
- PTX10003 DC Input Current Selector (DIP Switch) | 53
- PTX10003 Input DC Voltage Specification | 53
- 60 A Input Feed Power Management | 54
- PTX10003 DC Power Cables | 56
- PTX10003 DC Power Lugs | 56
- Viewing Power Statistics | 57

The PTX10003 DC power supplies are hot-removable and hot-insertable FRUs. Each 3000 W power supply module has a single DC input and provides 12 VDC output with a standby voltage of 12 VDC. The PTX10003 DC power supplies can operate with an input current of 80 A or 60 A.

NOTE: Support for a 60 A power source was added in Junos OS Evolved Release 19.4. If you are using an earlier release, you'll need to use an 80 A power source. Be sure you set the DIP switch to 80 A when installing the PTX10003 DC power supply module.

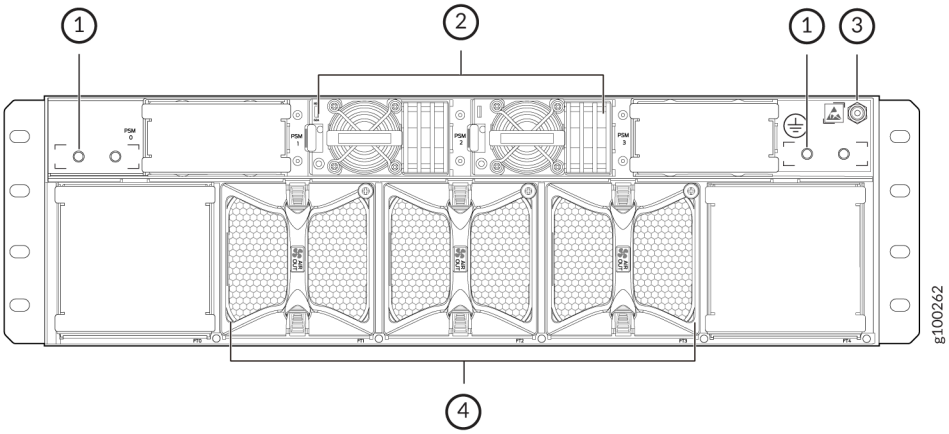
Figure 20 on page 50 shows the location of the DC power supplies on the PTX10003-160C FRU panel, and Figure 21 on page 50 shows the location of the DC power supplies on the PTX10003-80C FRU panel.

Figure 20: PTX10003-160C FRU Panel (DC Power Supplies Installed)



1– Chassis grounding points (2)	3– ESD grounding point
2– DC power supplies (4)	4– Fan modules (5)

Figure 21: PTX10003-80C FRU Panel (DC Power Supplies Installed)

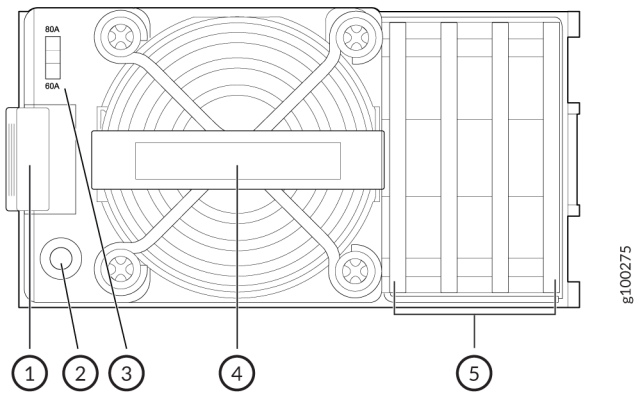


1– Chassis grounding points (2)	3– ESD grounding point
2– DC power supplies (2)	4– Fan modules (3)

Figure 22 on page 51 shows the DC power supply module components.

CAUTION: Do not mix AC/HVDC and DC power supplies in the same chassis.

Figure 22: PTX10003 DC Power Supply



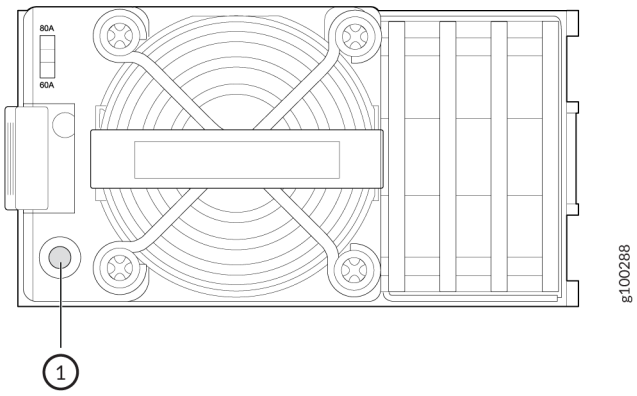
1– Ejector lever	4– Handle
2– Status LED	5– Terminal block cover
3– DC input current selector (DIP switch)	

CAUTION: To avoid electrical injury, carefully follow instructions in "Maintaining the PTX10003 Power Supplies" on page 130.

PTX10003 DC Power Supply LED

Each PTX10003 DC power supply module has a status LED on the power supply module faceplate. Refer to Figure 23 on page 52.

Figure 23: PTX10003 DC Power Supply Status LED



1– Power supply status LED

Use Table 18 on page 52 to interpret the state of the power supply module status LED.

Table 18: PTX10003 DC Power Supply LED

LED Color	Power Supply State
Solid green	The power supply module is on and in the OK state.
Off	The power supplies do not have DC power
Blinking green	The power supply module is in cold redundant state
Solid amber	The DC power cord is unplugged but the second power supply module still has DC power
Blinking amber	The power supply module is operating but there are warning events. Possible causes: high temp, high power, high current, slow fan

Table 18: PTX10003 DC Power Supply LED *(Continued)*

LED Color	Power Supply State
Solid amber	The power supply module shut down due to a critical event. Possible causes: high temperature, high power, high current, slow fan
Blinking green	The power supply module is uploading firmware

PTX10003 DC Input Current Selector (DIP Switch)

The PTX10003 DC power supply module can operate with an input current of 80 A or 60 A. You select the input rating by moving the DC input current selector (DIP switch) to the desired setting. If you select 60 A, the power supply module limits the output power so that the input current does not exceed 60 A under normal steady-state operation. If you select 80 A, the power supply module limits the output power so that the input current does not exceed 80 A.

For example:

If you select...	Then...
60 A	The power supply module limits the output power to 2200 W when the input voltage is between 40V and 48V. It linearly increases the output power if the input voltage increases. The power supply module provides 2700 W output power when the input voltage is between 48V and 72V.
80 A	The power supply module provides 3000 W output power throughout the input voltage range from 40 VDC to 72 VDC.

PTX10003 Input DC Voltage Specification

The PTX10003 DC power supply modules operate within the DC input voltage range listed in Table 19 on page 54.

NOTE: Support for a 60 A power source was added in Junos OS Evolved Release 19.4. If you are using an earlier release, you'll need to use an 80 A power source. Be sure you set the DIP switch to 80 A when installing the PTX10003 DC power supply module.

NOTE: Depending on the available input source, Juniper recommends that the 48-VDC facility DC source be equipped with a circuit breaker rated at a minimum of 60 A (48 VDC) or 80 A (48 VDC), or as required by local code.

Table 19: PTX10003 DC Power Specifications

Input Switch Setting	Minimum Input DC Voltage	Rated Input DC Voltage	Maximum Input DC Voltage	Maximum Input DC Current	Maximum Output Power
60 A	40 VDC	48 VDC to 60 VDC	72 VDC	60 ADC	2700 W
80 A	40 VDC	48 VDC to 60 VDC	72 VDC	90 ADC	3000 W

60 A Input Feed Power Management

The 60 A DC power supply module capacity changes when the input voltage is below or above the under voltage limit as follows:

- When the 60 A DC power supply module input voltage is above the input under voltage warning limit, its capacity is 2700 W.
- When the input voltage is below the input under voltage warning limit, the power supply module capacity is reduced to 2200 W.

When the input voltage is above the input under voltage warning limit, the software adjusts the system capacity and reallocates power to the FRUs based on the new system capacity. Table 20 on page 55 shows system behavior in different scenarios with 60 A DC power supply modules.

Table 20: System Behavior in Different Scenarios with 60 A DC power supply modules

	Input voltage: < 40V	Input voltage: > 40V and < 48V	Input voltage: 48V to 72V
60 A DC mode	The power supply module is powered off and won't turn on when the system is powering up.	Alarms are raised but as long as there is sufficient power, the power supply module and system will remain online. If you need more power, power off the FPC first.	Normal operation
PTX10003-80C with two power supply modules	The power supply modules are offline and the system is powered down.	All FPCs are online but there's no power supply module redundancy.	Normal operation.
PTX10003-80C with one power supply modules	The power supply modules are offline and the system is powered down.	Power off FPC1 and keep FPC0 online. There's no power supply module redundancy.	Normal operation, but there's no power supply module redundancy.
PTX10003-160C with four power supply modules	The power supply modules are offline and the system is powered down.	All FPCs are online but there's no N + 2 power supply module redundancy.	Normal operation.
PTX10003-160C with three power supply modules	The power supply modules are offline and the system is powered down.	All FPCs are online but there's no power supply module redundancy.	Normal operation, but there's no N + 2 power supply module redundancy.
PTX10003-160C with two power supply modules	The power supply modules are offline and the system is powered down.	Power off FPC3 and keep the remaining three FPCs online. There's no power supply module redundancy	Normal operation, but there's no power supply module redundancy.

Table 20: System Behavior in Different Scenarios with 60 A DC power supply modules *(Continued)*

	Input voltage: < 40V	Input voltage: > 40V and < 48V	Input voltage: 48V to 72V
PTX10003-160C with one power supply module	The power supply modules are offline and the system is powered down.	Power off FPC1, FPC2, and FPC3, and keep FPC0 online. There's No power supply module redundancy.	Power off FPC1, FPC2,and FPC3, and keep FPC0 online. There's no power supply module redundancy.

The worst case scenario is when all power supply module inputs are at the same voltage level. It's possible that FPC1, FPC2, or FPC3 of the four power supply modules are operating in a reduced capacity and the rest of the power supply modules are operating at a normal capacity. In all those scenarios, power management actions can be different but deterministic based on the total system capacity and total system power required. Use the `show chassis power detail` command to determine the behavior.

PTX10003 DC Power Cables

You must supply the DC power cables that meet the specifications required by the local code, laws, and standards. The insulation color of the wires are color coded. Green is ground, black is line, and white is neutral. The wires are labeled **(+)** and **(–)** to indicate their polarity.

CAUTION: You must ensure that power connections maintain the proper polarity.

WARNING: For field-wiring connections, use copper conductors only.

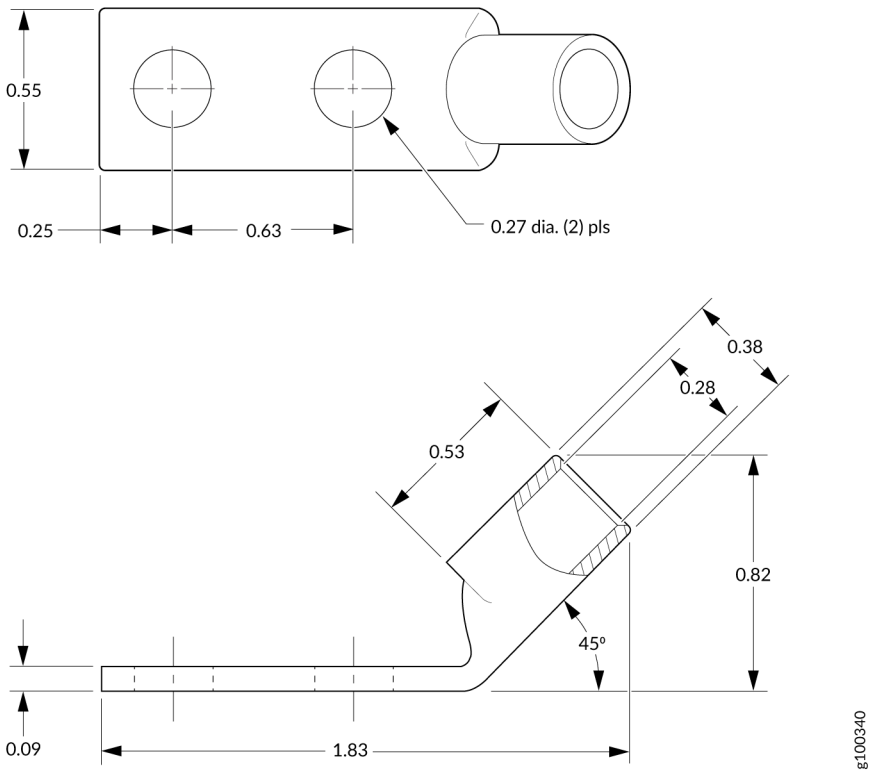
WARNING: DC Power cables must not block access to PTX10003 components or drape where people could trip on them.

PTX10003 DC Power Lugs

The accessory box shipped with the PTX10003 includes the cable lugs that attach to the terminal studs of each power supply module. (The cable lug shown in Figure 24 on page 57 is also used for grounding

the chassis.) The cable lugs are dual hole and sized to fit 1/4-20 UNC terminal studs at 15.86-mm (0.625-in.) center line.

Figure 24: DC Power Cable Lugs



CAUTION: Before you begin to install the PTX10003, a licensed electrician must attach a cable lug to the power cables that you supply. A cable with an incorrectly attached lug can damage the PTX10003.

Viewing Power Statistics

You can get additional information about the status of the power modules using the `show chassis power` command and `show chassis power detail` command. Here's some examples of the CLI output:

PTX10003-160C with Four DC Power Supplies

```
user@device> show chassis power
Chassis Power        Input(V)      Used(W)

Total Power                          126
  PDU 0                              126
    PSM 0
      Input 1            51            2
      Capacity:          3000 W (maximum 3000 W)
    PSM 1
      Input 1            51           11
      Capacity:          3000 W (maximum 3000 W)
    PSM 2
      Input 1            51           60
      Capacity:          3000 W (maximum 3000 W)
    PSM 3
      Input 1            51           53
      Capacity:          3000 W (maximum 3000 W)


user@device> show chassis power detail

Chassis Power        Input(V)      Used(W)

Total Power                          176

  PDU 0                              176
    PSM 0
      Input 1            51            2
      Capacity:          3000 W (maximum 3000 W)
    PSM 1
      Input 1            51           53
      Capacity:          3000 W (maximum 3000 W)
    PSM 2
      Input 1            51           62
      Capacity:          3000 W (maximum 3000 W)
    PSM 3
      Input 1            51           59
      Capacity:          3000 W (maximum 3000 W)

Item                 Used(W)
```

```
  Routing Engine 0      101
  Fan Tray 0              7
  Fan Tray 1              7
  Fan Tray 2              8
  Fan Tray 3              9
  Fan Tray 4              5

System:
  Zone 0:
      Capacity:          12000 W (maximum 12000 W)
      Allocated power:   1607 W (10393 W remaining)
      Actual usage:      174 W
  Total system capacity: 12000 W (maximum 12000 W)
  Total remaining power: 10393 W
```

PTX10003-80C with two DC Power Supplies

```
user@device>show chassis power
Chassis Power        Input(V)      Used(W)

Total Power                         1558

  PDU 0                             1558
    PSM 1
      Input 1           203          777
      Capacity:          3000 W (maximum 3000 W)
    PSM 2
      Input 1           204          781
      Capacity:          3000 W (maximum 3000 W)

root@re0> show chassis power detail
Chassis Power        Input(V)      Used(W)

Total Power                         1561

  PDU 0                             1561
    PSM 1
      Input 1           203          804
      Capacity:          3000 W (maximum 3000 W)
    PSM 2
      Input 1           204          757
      Capacity:          3000 W (maximum 3000 W)
```

```
Item                 Used(W)
  Routing Engine 0       85
  CB 0                  274
  FPC 0                 465
  FPC 1                 467
  Fan Tray 1             12
  Fan Tray 2             12
  Fan Tray 3              9

System:
  Zone 0:
      Capacity:          6000 W (maximum 6000 W)
      Allocated power:   2750 W (3250 W remaining)
      Actual usage:      1563 W
  Total system capacity: 6000 W (maximum 6000 W)
  Total remaining power: 3250 W
```

RELATED DOCUMENTATION

- PTX10003 System Overview | **2**
- Prevention of Electrostatic Discharge Damage | **195**
- Maintaining the PTX10003 Power Supplies | **130**

CHAPTER 2

Site Planning, Preparation, and Specifications

PTX10003 Site Preparation Checklist | 62

PTX10003 Site Guidelines and Requirements | 63

PTX10003 Network Cable and Transceiver Planning | 70

PTX10003 Management Cable Specifications and Pinouts | 82

PTX10003 Site Preparation Checklist

The checklist in Table 21 on page 62 summarizes the tasks you need to perform when preparing a site for a PTX10003 installation.

Table 21: Site Preparation Checklist

Item or Task	For More Information	Performed by	Date
Environment			
Verify that environmental factors such as temperature and humidity do not exceed router tolerances.	"PTX10003 Environmental Requirements and Specifications" on page 64		
Power			
Measure the distance between external power sources and the router installation site.			
Calculate the power consumption and requirements.	• "PTX10003 Power System" on page 34		
Rack			
Verify that your rack meets the minimum requirements for the installation of the router.	"PTX10003 Rack Requirements" on page 68		
Plan rack location, including required space clearances.	"PTX10003 Clearance Requirements for Airflow and Hardware Maintenance" on page 67		
Secure the rack to the floor and building structure.			
Cables			

Table 21: Site Preparation Checklist *(Continued)*

Item or Task	For More Information	Performed by	Date
Acquire cables and connectors: • Determine the number of cables needed based on your planned configuration. • Review the maximum distance allowed for each cable. Choose the length of cable based on the distance between the hardware components being connected.	See the Hardware Compatibility Tool.		
Plan the cable routing and management.			

RELATED DOCUMENTATION

- Installation Instructions Warning | **175**
- Chassis and Component Lifting Guidelines | **176**
- Restricted Access Warning | **176**
- Ramp Warning | **178**
- Rack-Mounting and Cabinet-Mounting Warnings | **178**
- Grounded Equipment Warning | **182**

PTX10003 Site Guidelines and Requirements

IN THIS SECTION

- PTX10003 Environmental Requirements and Specifications | **64**
- General Site Guidelines | **65**
- PTX10003 Chassis Grounding Cable and Lug Specifications | **66**
- PTX10003 Clearance Requirements for Airflow and Hardware Maintenance | **67**

PTX10003 Chassis Physical Specifications | 67
PTX10003 Rack Requirements | 68

PTX10003 Environmental Requirements and Specifications

The PTX10003 must be installed in a rack. It must be 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 PTX10003 cooling system.
- Maintain ambient airflow for normal PTX10003 operation. If the airflow is blocked or restricted, or if the intake air is too warm, the chassis might overheat, leading to the PTX10003 temperature monitor shutting down the router to protect the hardware components.

Table 22 on page 64 provides the required environmental conditions for normal PTX10003 operation.

Table 22: PTX10003 Environmental Tolerances

Description	Tolerance
Altitude	No performance degradation up to 6000 feet (1828.8 meters).
Relative humidity	• Normal operation ensured in relative humidity range of 5% through 90%, noncondensing. • Short-term operation ensured in relative humidity range of 5% through 93%, noncondensing. **NOTE**: 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.

Table 22: PTX10003 Environmental Tolerances *(Continued)*

Description	Tolerance
Temperature	• Normal operation ensured in temperature range of 32° F (0° C) through 104° F (40° C). • Nonoperating storage temperature in shipping container: –40° F (40° C) through 158° F (70° C).
Seismic	Complies with Zone 4 earthquake requirements per NEBS GR-3160-CORE, Issue 3.

NOTE: Install the PTX10003 only in restricted access 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.

General Site Guidelines

Efficient device operation requires proper site planning and maintenance. It also requires proper layout of the equipment, rack or cabinet, 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. Ensure that exhaust from other equipment does not blow into the intake vents of the device.
- Follow the prescribed electrostatic discharge (ESD) prevention procedures to prevent 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.

PTX10003 Chassis Grounding Cable and Lug Specifications

For installations that require a separate grounding conductor to the chassis, the PTX10003 must be adequately grounded before power is connected to ensure proper operation and to meet safety and electromagnetic interference (EMI) requirements. To ground a PTX10003, connect a grounding cable to earth ground and then attach it to the chassis grounding point.

WARNING: The device is a 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.

WARNING: To comply with GR-1089 requirements, all intrabuilding copper cabling used for transceiver ports must be shielded and grounded at both ends.

CAUTION: Before device installation begins, a licensed electrician must attach a cable lug to the grounding cables that you supply. See "Connecting the PTX10003 to Ground" on page 104. A cable with an incorrectly attached lug can damage the PTX10003.

Before connecting the PTX10003 to earth ground, review the following information:

- A protective earthing terminal bracket is required for connecting the PTX10003 to earth ground. This two-holed bracket attaches through the mounting bracket, providing a protective earthing terminal for the router. The accessory box shipped with the PTX10003 includes the cable lugs that attach to the terminal studs of each power supply module. The cable lugs are dual hole and sized to fit 1/4-20 UNC terminal studs at 15.86-mm (0.625-in.) spacing along center line.
- The grounding cable that you provide must be of the same size or heavier than the input wire of each power supply. The minimum recommendation is 4 AWG (8.4 mm^2) stranded wire, 90° C wire, or as permitted by local code. We provide a grounding lug for 4 AWG (8.4 mm^2), #10-32 screws, and 0.75 hole spacing.

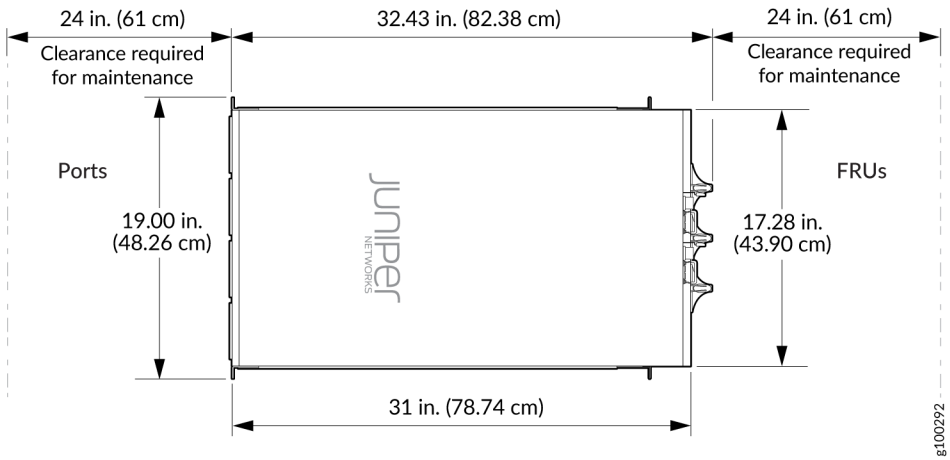
SEE ALSO

Connect the PTX10003 to Power | 104

PTX10003 Clearance Requirements for Airflow and Hardware Maintenance

When planning the site for a PTX10003 installation, you must allow sufficient clearance around the installed chassis (see Figure 25 on page 67).

Figure 25: Clearance Requirements for Airflow and Hardware Maintenance for the PTX10003



Follow these guidelines:

- For the cooling system to function properly, the airflow around the chassis must be unrestricted. See "PTX10003 Cooling System Description and Airflow" on page 29 for more information about the airflow through the chassis.
- If you are mounting a PTX10003 in a rack with other equipment, ensure that the exhaust from other equipment does not blow into the intake vents of the chassis.
- You must leave at least 24 in. (61 cm) both in front of and behind the PTX10003 for service personnel to remove and install hardware components.

PTX10003 Chassis Physical Specifications

Table 23 on page 68 lists the physical specifications for the PTX10003 chassis.

Table 23: Physical Specifications for the PTX10003

Hardware	PTX10003-160C	PTX10003-80C
Weight	110 lb (50 kg)	88 lb (40 kg)
Dimension (WxHxD)	17.4 x 5.25 x 31 in (44.2 x 13.3 x 78.7 cm)	17.4 x 5.25 x 31 in (44.2 x 13.3 x 78.7 cm)
Rack Units	3 U, fits in a 19” rack	3 U, fits in a 19” rack

PTX10003 Rack Requirements

The PTX10003 chassis is designed to be installed in a four-post 19-in rack.

Rack requirements consist of:

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

Table 24 on page 68 provides the rack requirements and specifications for the PTX10003.

Table 24: Rack Requirements for the PTX10003

Rack Requirement	Guidelines
Rack type: four-post	Use 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. A U is the standard rack unit defined in *Cabinets, Racks, Panels, and Associated Equipment* (document number EIA-310-D) published by the Electronics Components Industry Association (http://www.ecianow.org/).

Table 24: Rack Requirements for the PTX10003 *(Continued)*

Rack Requirement	Guidelines
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 PTX10003 can be mounted in any rack that provides holes spaced at that distance.
Rack size and strength	• Ensure that the rack complies with the standards for a 19-in. rack as defined in *Cabinets, Racks, Panels, and Associated Equipment* (document number EIA-310-D) published by the Electronics Components Industry Association (http://www.ecianow.org/). • Use a 600-mm rack as defined in the four-part *Equipment Engineering (EE); European telecommunications standard for equipment practice* (document numbers ETS 300 119-1 through 119-4) published by the European Telecommunications Standards Institute (http://www.etsi.org). The horizontal spacing between the rails in a rack that complies with this standard is usually wider than the router's mounting brackets, which measure 19 in. (48.26 cm) from outer edge to outer edge. Use approved wing devices to narrow the opening between the rails as required. • Ensure that the rack rails are spaced widely enough to accommodate the PTX10003 chassis' external dimensions. The outer edges of the front-mounting rails extend the width to 19 in. (48.26 cm). • Ensure that the front and rear rack rails are spaced between 26 in. (66 cm) and 36 in. (91.4 cm) front-to-back. • Ensure that the rack is strong enough to support the weight of the PTX10003. • Ensure that the spacing of rails and adjacent racks allows for proper clearance around the PTX10003 and rack.
Rack connection to building structure	• Secure the rack to the building structure. • If earthquakes are a possibility in your geographical area, secure the rack to the floor. • Secure the rack to the ceiling brackets as well as wall or floor brackets for maximum stability.

PTX10003 Network Cable and Transceiver Planning

IN THIS SECTION

- Determining Transceiver Support for the PTX10003 | 70
- Cable and Connector Specifications for MX and PTX Series Devices | 71
- Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion | 78
- Calculating Power Budget and Power Margin for Fiber-Optic Cables | 80

Determining Transceiver Support for the PTX10003

Each of the PTX10003 front panel interfaces support quad small-form factor pluggable (QSFP-DD) optical transceivers. The interfaces on a PTX10003 can be configured to support 10 Gbps, 40 Gbps, 100 Gbps, 200 Gbps, and 400 Gbps data rates.

You can find information about the optical transceivers supported on your Juniper device by using the Hardware Compatibility Tool. In addition to transceiver and connection type, the optical and cable characteristics—where applicable—are documented for each transceiver. The Hardware Compatibility Tool enables you to search by product, displaying all the transceivers supported on that device, or category, by interface speed or type. The list of supported transceivers for PTX10003 routers is located at https://apps.juniper.net/hct/product/#prd=PTX10003.



CAUTION: The Juniper Networks Technical Assistance Center (JTAC) provides complete support for Juniper-supplied optical modules and cables. However, JTAC does not provide support for third-party optical modules and cables that are not qualified or supplied by Juniper Networks. If you face a problem running a Juniper device that uses third-party optical modules or cables, JTAC may help you diagnose host-related issues if the observed issue is not, in the opinion of JTAC, related to the use of the third-party optical modules or cables. Your JTAC engineer will likely request that you check the third-party optical module or cable and, if required, replace it with an equivalent Juniper-qualified component.

Use of third-party optical modules with high-power consumption (for example, coherent ZR or ZR+) can potentially cause thermal damage to or reduce the lifespan of the host equipment. Any damage to the host equipment due to the use of third-party

optical modules or cables is the users' responsibility. Juniper Networks will accept no liability for any damage caused due to such use.

Cable and Connector Specifications for MX and PTX Series Devices

IN THIS SECTION

- 12-Fiber MPO Connectors | **71**
- 24-Fiber MPO Connectors | **77**
- LC Duplex Connectors | **78**

The transceivers that are supported on MX Series and PTX Series devices use fiber-optic cables and connectors. The type of connector and the type of fiber depends on the transceiver type.

You can determine the type of cable and connector required for your specific transceiver by using the Hardware Compatibility Tool.

CAUTION: To maintain agency approvals, use only a properly constructed, shielded cable.

NOTE: The terms multifiber push-on (MPO) and multifiber termination push-on (MTP) describe the same connector type. The rest of this topic uses MPO to mean MPO or MTP.

12-Fiber MPO Connectors

There are two types of cables used with 12-fiber MPO connectors on Juniper Networks devices—patch cables with MPO connectors on both ends, and breakout cables with an MPO connector on one end and four LC duplex connectors on the opposite end. Depending on the application, the cables might use single-mode fiber (SMF) or multimode fiber (MMF). Juniper Networks sells cables that meet the supported transceiver requirements, but it is not required to purchase cables from Juniper Networks.

Ensure that you order cables with the correct polarity. Vendors refer to these crossover cables as *key up to key up*, *latch up to latch up*, *Type B*, or *Method B*. If you are using patch panels between two transceivers, ensure that the proper polarity is maintained through the cable plant.

Also, ensure that the fiber end in the connector is finished correctly. Physical contact (PC) refers to fiber that has been polished flat. Angled physical contact (APC) refers to fiber that has been polished at an angle. Ultra physical contact (UPC) refers to fiber that has been polished flat, to a finer finish. The required fiber end is listed with the connector type in the Hardware Compatibility Tool.

12-Fiber Ribbon Patch Cables with MPO Connectors

You can use 12-fiber ribbon patch cables with socket MPO connectors to connect two transceivers of the same type—for example, 40GBASE-SR4-to-40GBASESR4 or 100GBASE-SR4-to-100GBASE-SR4. You can also connect 4x10GBASE-LR or 4x10GBASE-SR transceivers by using patch cables—for example, 4x10GBASE-LR-to-4x10GBASE-LR or 4x10GBASE-SR-to-4x10GBASE-SR—instead of breaking the signal out into four separate signals.

Table 25 on page 72 describes the signals on each fiber. Table 26 on page 73 shows the pin-to-pin connections for proper polarity.

Table 25: Cable Signals for 12-Fiber Ribbon Patch Cables

Fiber	Signal
1	Tx0 (Transmit)
2	Tx1 (Transmit)
3	Tx2 (Transmit)
4	Tx3 (Transmit)
5	Unused
6	Unused
7	Unused
8	Unused

Table 25: Cable Signals for 12-Fiber Ribbon Patch Cables *(Continued)*

Fiber	Signal
9	Rx3 (Receive)
10	Rx2 (Receive)
11	Rx1 (Receive)
12	Rx0 (Receive)

Table 26: Cable Pinouts for 12-Fiber Ribbon Patch Cables

MPO Pin	MPO Pin
1	12
2	11
3	10
4	9
5	8
6	7
7	6
8	5
9	4

Table 26: Cable Pinouts for 12-Fiber Ribbon Patch Cables *(Continued)*

MPO Pin	MPO Pin
10	3
11	2
12	1

12-Fiber Ribbon Breakout Cables with MPO-to-LC Duplex Connectors

You can use 12-ribbon breakout cables with MPO-to-LC duplex connectors to connect a QSFP+ transceiver to four separate SFP+ transceivers—for example, 4x10GBASE-LR-to-10GBASE-LR or 4x10GBASE-SR-to-10GBASE-SR SFP+ transceivers. The breakout cable is constructed out of a 12-fiber ribbon fiber-optic cable. The ribbon cable splits from a single cable with a socket MPO connector on one end, into four cable pairs with four LC duplex connectors on the opposite end.

Figure 26 on page 74 shows an example of a typical 12-ribbon breakout cable with MPO-to-LC duplex connectors (depending on the manufacture, your cable may look different).

Figure 26: 12-Ribbon Breakout Cable

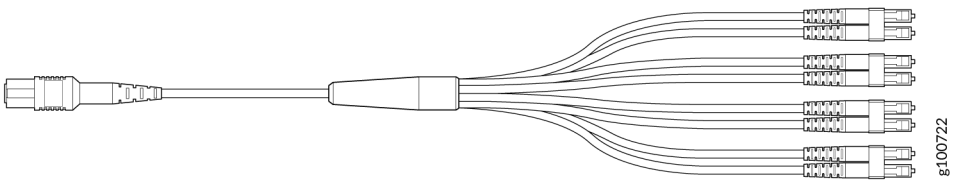


Table 27 on page 74 describes the way the fibers are connected between the MPO and LC duplex connectors. The cable signals are the same as those described in Table 25 on page 72.

Table 27: Cable Pinouts for 12-Fiber Ribbon Breakout Cables

MPO Connector Pin	LC Duplex Connector Pin
1	Tx on LC Duplex 1

Table 27: Cable Pinouts for 12-Fiber Ribbon Breakout Cables *(Continued)*

MPO Connector Pin	LC Duplex Connector Pin
2	Tx on LC Duplex 2
3	Tx on LC Duplex 3
4	Tx on LC Duplex 4
5	Unused
6	Unused
7	Unused
8	Unused
9	Rx on LC Duplex 4
10	Rx on LC Duplex 3
11	Rx on LC Duplex 2
12	Rx on LC Duplex 1

12-Ribbon Patch and Breakout Cables Available from Juniper Networks

Juniper Networks sells 12-ribbon patch and breakout cables with MPO connectors that meet the requirements described above. It is not required to purchase cables from Juniper Networks. Table 28 on page 76 describes the available cables.

Table 28: 12-Ribbon Patch and Breakout Cables Available from Juniper Networks

Cable Type	Connector Type	Fiber Type	Cable Length	Juniper Model Number
12-ribbon patch	Socket MPO/PC to socket MPO/PC, key up to key up	MMF (OM3)	1 m	MTP12-FF-M1M
			3 m	MTP12-FF-M3M
			5 m	MTP12-FF-M5M
			10 m	MTP12-FF-M10M
	Socket MPO/APC to socket MPO/APC, key up to key up	SMF	1 m	MTP12-FF-S1M
			3 m	MTP12-FF-S3M
			5 m	MTP12-FF-S5M
			10 m	MTP12-FF-S10M
12-ribbon breakout	Socket MPO/PC, key up, to four LC/UPC duplex	MMF (OM3)	1 m	MTP-4LC-M1M
			3 m	MTP-4LC-M3M
			5 m	MTP-4LC-M5M
			10 m	MTP-4LC-M10M
	Socket MPO/APC, key up, to four LC/UPC duplex	SMF	1 m	MTP-4LC-S1M
			3 m	MTP-4LC-S3M
			5 m	MTP-4LC-S5M

Table 28: 12-Ribbon Patch and Breakout Cables Available from Juniper Networks *(Continued)*

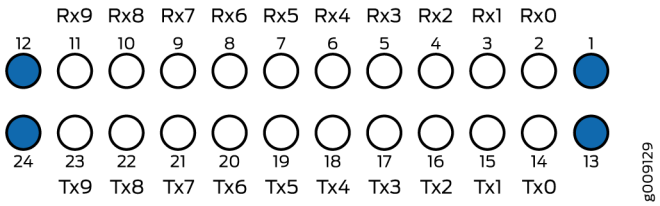
Cable Type	Connector Type	Fiber Type	Cable Length	Juniper Model Number
			10 m	MTP-4LC-S10M

24-Fiber MPO Connectors

You can use patch cables with 24-fiber MPO connectors to connect two supported transceivers of the same type—for example, 100GBASE-SR10-to-100GBASE-SR10.

Figure 27 on page 77 shows the 24-fiber MPO optical lane assignments.

Figure 27: 24-Fiber MPO Optical Lane Assignments



NOTE: Ensure that you order cables with the correct polarity. Vendors refer to these crossover cables as *key up to key up*, *latch up to latch up*, *Type B*, or *Method B*. If you are using patch panels between two transceivers, ensure that the proper polarity is maintained through the cable plant.

The MPO optical connector for the CFP2-100G-SR10-D3 is defined in *Section 5.6 of the CFP2 Hardware Specification and Section 88.10.3 of IEEE STD 802.3-2012*. These specifications include the following requirements:

- Recommended Option A in IEEE STD 802.3-2012.
- The transceiver receptacle is a plug. A patch cable with a socket connector is required to mate with the module.
- Ferrule finish shall be flat polished interface that is compliant with IEC 61754-7.
- Alignment key is key up.

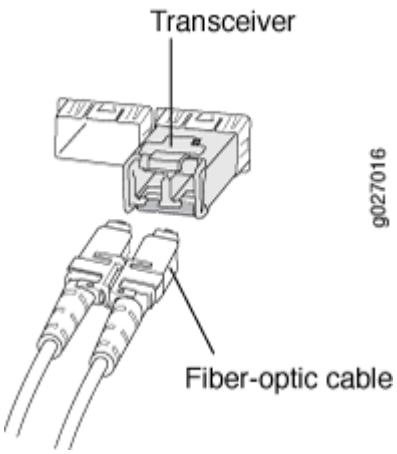
The optical interface must meet the requirement FT-1435-CORE in *Generic Requirements for Multi-Fiber Optical Connectors*. The module must pass the wiggle test defined by IEC 62150-3.

LC Duplex Connectors

You can use patch cables with LC duplex connectors to connect two supported transceivers of the same type—for example, 40GBASE-LR4-to-40GBASE-LR4 or 100GBASE-LR4-to100GBASE-LR4. The patch cable is one fiber pair with two LC duplex connectors at opposite ends. LC duplex connectors are also used with 12-fiber ribbon breakout cables, as described in "12-Fiber Ribbon Breakout Cables with MPO-to-LC Duplex Connectors" on page 74.

Figure 28 on page 78 shows an LC duplex connector being installed in a transceiver.

Figure 28: LC Duplex Connector



Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion

IN THIS SECTION

- Signal Loss in Multimode and Single-Mode Fiber-Optic Cable | **79**
- Attenuation and Dispersion in Fiber-Optic Cable | **79**

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 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, higher-order mode loss results. Together these factors limit the transmission distance of multimode fiber compared with single-mode fiber.

Single-mode fiber is so small in diameter that rays of light can 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 with multimode fiber, single-mode fiber has higher bandwidth and can carry signals for longer distances.

Exceeding the maximum transmission distances can result in significant signal loss, which causes unreliable transmission.

Attenuation and Dispersion in Fiber-Optic Cable

Correct functioning of an optical data link depends on modulated light reaching the receiver with enough power to be demodulated correctly. *Attenuation* is the reduction in power of the light signal as it is transmitted. Attenuation is caused by passive media components such as cables, cable splices, and connectors. 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 have enough light available to overcome attenuation.

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

- Chromatic dispersion—Spreading of the signal over time, resulting from the different speeds of light rays.
- Modal dispersion—Spreading of the signal over time, resulting from 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 rather than modal dispersion limits 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 less than 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.

Calculating Power Budget and Power Margin for Fiber-Optic Cables

IN THIS SECTION

- How to Calculate Power Budget for Fiber-Optic Cables | **80**
- How to Calculate Power Margin for Fiber-Optic Cables | **81**

Use the information in this topic and the specifications for your optical interface to calculate the power budget and power margin for fiber-optic cables.

TIP: You can use the Hardware Compatibility Tool to find information about the pluggable transceivers supported on your Juniper Networks device.

To calculate the power budget and power margin, perform the following tasks:

How to Calculate Power Budget for Fiber-Optic Cables

To ensure that fiber-optic connections have sufficient power for correct operation, you need to calculate the link's power budget, which is the maximum amount of power it 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 of power budget (P_B), you assume minimum transmitter power (P_T) and minimum receiver sensitivity (P_R):

$P_B = P_T - P_R$

The following hypothetical power budget equation uses values measured in decibels (dB) and decibels referred to one milliwatt (dBm):

$P_B = P_T - P_R$

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

$P_B = 13 \text{ dB}$

How to Calculate Power Margin for Fiber-Optic Cables

After calculating a link's power budget, you can calculate the power margin (P_M), which represents the amount of power available after subtracting attenuation or link loss (LL) from the power budget (P_B). A worst-case estimate of P_M assumes maximum LL:

$P_M = P_B - LL$

P_M greater than zero indicates that the power budget is sufficient to operate the receiver.

Factors that can cause link loss include higher-order mode losses, modal and chromatic dispersion, connectors, splices, and fiber attenuation. Table 29 on page 81 lists an estimated amount of loss for the factors used in the following sample calculations. For information about the actual amount of signal loss caused by equipment and other factors, refer to vendor documentation.

Table 29: Estimated Values for Factors Causing Link Loss

Link-Loss Factor	Estimated Link-Loss Value
Higher-order mode losses	Single mode—None Multimode—0.5 dB
Modal and chromatic dispersion	Single mode—None Multimode—None, if product of bandwidth and distance is less than 500 MHz-km
Faulty connector	0.5 dB
Splice	0.5 dB
Fiber attenuation	Single mode—0.5 dB/km Multimode—1 dB/km

The following sample calculation for a 2-km-long multimode link with a power budget (P_B) of 13 dB uses the estimated values from Table 29 on page 81. This example calculates link loss (LL) as the sum of fiber attenuation (2 km @ 1 dB/km, or 2 dB) and loss for five connectors (0.5 dB per connector, or 2.5 dB) and two splices (0.5 dB per splice, or 1 dB) as well as higher-order mode losses (0.5 dB). The power margin (P_M) is calculated as follows:

$P_M = P_B - LL$

P_M = 13 dB – 2 km (1 dB/km) – 5 (0.5 dB) – 2 (0.5 dB) – 0.5 dB

P_M = 13 dB – 2 dB – 2.5 dB – 1 dB – 0.5 dB

P_M = 7 dB

The following sample calculation for an 8-km-long single-mode link with a power budget (P_B) of 13 dB uses the estimated values from Table 29 on page 81. This example calculates link loss (LL) as the sum of fiber attenuation (8 km @ 0.5 dB/km, or 4 dB) and loss for seven connectors (0.5 dB per connector, or 3.5 dB). The power margin (P_M) is calculated as follows:

$P_M = P_B - LL$

P_M = 13 dB – 8 km (0.5 dB/km) – 7(0.5 dB)

P_M = 13 dB – 4 dB – 3.5 dB

P_M = 5.5 dB

In both examples, the calculated power margin is greater than zero, indicating that the link has sufficient power for transmission and does not exceed the maximum receiver input power.

PTX10003 Management Cable Specifications and Pinouts

IN THIS SECTION

- PTX10003 Cable Specifications for Console and Management Connections | **83**
- PTX10003 Management Port Connector Pinouts | **83**
- PTX10003 Console Port Connector Pinouts | **84**
- PTX10003 SFP Port Connector Pinouts | **85**
- PTX10003 SFP+ Port Connector Pinouts | **87**
- PTX10003 QSFP+ and QSFP28 Port Connector Pinouts | **88**
- PTX10003 USB Port Specifications | **91**

PTX10003 Cable Specifications for Console and Management Connections

Table 30 on page 83 lists the specifications for the cables that connect the PTX10003 to a management device.

> **NOTE**: The PTX10003 also has an SFP management port that supports transceivers that use fiber-optic cables. See "Determining Transceiver Support for the PTX10003" on page 70 for more information about supported transceivers.

Table 30: Cable Specifications for Console and Management Connections for the PTX10003

Port on PTX10003	Cable Specification	Cable Supplied	Maximum Length	Device Receptacle
Console (**CON**) port	RS-232 (EIA-232) serial cable	One 2.13-meter-long RJ-45 patch cable and RJ-45 to DB-9 adapter	2.13 meters	RJ-45
Management (**MGMT**) port	Category 5 cable or equivalent suitable for 1000 BASE-T operation	One 2.13-meter-long RJ-45 patch cable	100 meters	RJ-45

PTX10003 Management Port Connector Pinouts

The 10/100/1000BASE-T management port (labeled **MGMT**) uses an RJ-45 connector to connect to a management device for out-of-band management.

Table 31 on page 84 provides the pinout information of the RJ-45 management port connector. An RJ-45 cable is supplied with the PTX10003.

Table 31: RJ-45 Management Port Connector Pinouts for the PTX10003

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

PTX10003 Console Port Connector Pinouts

The console port (labeled **CON**) 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 32 on page 85 provides the pinout information for the RJ-45 console connector. An RJ-45 cable and an RJ-45 to DB-9 adapter are supplied with the PTX10003.

NOTE: If your laptop or PC does not have a DB-9 plug connector pin and you want to connect your laptop or PC directly to a PTX10003, use a combination of the RJ-45 cable and RJ-45 to DB-9 adapter supplied with the router and a USB to DB-9 plug adapter. You must provide the USB to DB-9 plug adapter.

Table 32: Console Port Connector Pinouts for the PTX10003

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
8	CTS Input	Clear to send

PTX10003 SFP Port Connector Pinouts

Table 33: SFP Network Port Connector Pinout Information

Pin	Signal	Description
1	VeeT	Module transmitter ground
2	TX_Fault	Module transmitter fault
3	TX_Disable	Transmitter disabled

Table 33: SFP Network Port Connector Pinout Information *(Continued)*

Pin	Signal	Description
4	SDA	2-wire serial interface data line
5	SCL-	2-wire serial interface clock
6	MOD_ABS	Module absent
7	RS	Rate select
8	RX_LOS	Receiver loss of signal indication
9	VeeR	Module receiver ground
10	VeeR	Module receiver ground
11	VeeR	Module receiver ground
12	RD-	Receiver inverted data output
13	RD+	Receiver noninverted data output
14	VeeR	Module receiver ground
15	VccR	Module receiver 3.3 V supply
16	VccT	Module transmitter 3.3 V supply
17	VeeT	Module transmitter ground
18	TD+	Transmitter noninverted data input

Table 33: SFP Network Port Connector Pinout Information *(Continued)*

Pin	Signal	Description
19	TD-	Transmitter inverted data input
20	VeeT	Module transmitter ground

PTX10003 SFP+ Port Connector Pinouts

Table 34: SFP+ Network Port Connector Pinout Information

Pin	Signal	Description
1	VeeT	Module transmitter ground
2	TX_Fault	Module transmitter fault
3	TX_Disable	Transmitter disabled
4	SDA	2-wire serial interface data line
5	SCL-	2-wire serial interface clock
6	MOD_ABS	Module absent
7	RS0	Rate select 0, optionally controls SFP+ module receiver
8	RX_LOS	Receiver loss of signal indication
9	RS1	Rate select 1, optionally controls SFP+ transmitter
10	VeeR	Module receiver ground

Table 34: SFP+ Network Port Connector Pinout Information *(Continued)*

Pin	Signal	Description
11	VeeR	Module receiver ground
12	RD-	Receiver inverted data output
13	RD+	Receiver noninverted data output
14	VeeR	Module receiver ground
15	VccR	Module receiver 3.3 V supply
16	VccT	Module transmitter 3.3 V supply
17	VeeT	Module transmitter ground
18	TD+	Transmitter noninverted data input
19	TD-	Transmitter inverted data input
20	VeeT	Module transmitter ground

PTX10003 QSFP+ and QSFP28 Port Connector Pinouts

Table 35: QSFP+ and QSFP28 Network Port Connector Pinout Information

Pin	Signal
1	GND
2	TX2n

Table 35: QSFP+ and QSFP28 Network Port Connector Pinout Information *(Continued)*

Pin	Signal
3	TX2p
4	GND
5	TX4n
6	TX4p
7	GND
8	ModSelL
9	LPMode_Reset
10	VccRx
11	SCL
12	SDA
13	GND
14	RX3p
15	RX3n
16	GND
17	RX1p

Table 35: QSFP+ and QSFP28 Network Port Connector Pinout Information *(Continued)*

Pin	Signal
18	RX1n
19	GND
20	GND
21	RX2n
22	RX2p
23	GND
24	RX4n
25	RX4p
26	GND
27	ModPrsL
28	IntL
29	VccTx
30	Vcc1
31	Reserved
32	GND

Table 35: QSFP+ and QSFP28 Network Port Connector Pinout Information *(Continued)*

Pin	Signal
33	TX3p
34	TX3n
35	GND
36	TX1p
37	TX1n
38	GND

PTX10003 USB Port Specifications

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

- RE-USB-1G-S: 1-gigabyte (GB) USB flash drive
- RE-USB-2G-S: 2-GB USB flash drive
- RE-USB-4G-S: 4-GB USB flash drive



CAUTION: Any USB memory product not listed as supported for the PTX Series 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 a PTX Series device. Failure to do so could expose your device to unpredictable behavior.

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

CHAPTER 3

Initial Installation and Configuration

PTX10003 Installation Overview | 94

Unpacking and Mounting the PTX10003 | 96

Connect the PTX10003 to Power | 104

Connecting the PTX10003-80C to External Devices | 117

Register Products—Mandatory to Validate SLAs | 119

Performing the Initial Software Configuration for the PTX10003 | 120

Powering Off the PTX10003 | 122

PTX10003 Installation Overview

IN THIS SECTION

- Overview of Installing the PTX10003 | 94
- PTX10003 Installation Safety Guidelines | 95

Overview of Installing the PTX10003

You can mount a PTX10003:

- Flush with the front of a 19-in. four-post rack. Use the mounting brackets attached to sides of the PTX10003.
- Recessed 2 in. (5 cm) from the front of a 19-in. four-post rack. Recessed mounting is primarily used in enclosed cabinets.

To install and connect a PTX10003:

1. Unpack the PTX10003 and verify the components received. See "Unpacking and Mounting the PTX10003" on page 96.
2. Mount the PTX10003 in a rack. See "Unpacking and Mounting the PTX10003" on page 96.
3. For installations that require a separate grounding conductor to the chassis, follow the instructions in "Connecting the PTX10003 to Ground" on page 104.
4. Connect the PTX10003 to power. Depending on your configuration, follow the instructions in "Connecting AC Power to the PTX10003" on page 107.
5. Connect the PTX10003 to a management console for initial configuration. See "Connecting the PTX10003-80C to External Devices" on page 117.
6. Initially configure the Junos OS Evolved software following the instructions in "Performing the Initial Software Configuration for the PTX10003" on page 120.

SEE ALSO

PTX10003 Site Preparation Checklist | 62

PTX10003 Installation Safety Guidelines

IN THIS SECTION

- General Installation Safety Guidelines | 95
- Chassis Lifting Guidelines | 95

Observe the following guidelines before and during PTX10003 installation:

General Installation Safety Guidelines

Before installing or moving the PTX10003, verify that the intended site meets the specified power, environmental, and clearance requirements. See the following documentation:

- "PTX10003 Site Preparation Checklist" on page 62
- "PTX10003 Environmental Requirements and Specifications" on page 64

Chassis Lifting Guidelines

The weight of a fully-loaded PTX10003-160C is approximately 110 lb (50 kg). The weight of a fully - loaded PTX10003-80C is approximately 88 lb (40 kg). Observe the following guidelines for lifting and moving a PTX10003:



CAUTION: If you are installing the PTX10003 above 60 in. (152.4 cm) from the floor, remove the power supplies and fan modules before attempting to install the device. Unless you are using a mechanical lift, at least three persons are required to perform the rack installation.

- Before lifting or moving the PTX10003, disconnect all external cables.
- When manually raising the PTX10003 into the rack, have two persons lift and align the PTX10003 with the rack while another person secures the device to the rack. 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.

Unpacking and Mounting the PTX10003

IN THIS SECTION

- Unpacking the PTX10003 | 96
- Mounting the PTX10003 in a Rack | 98

Unpacking the PTX10003

The PTX10003 chassis is a rigid sheet-metal structure that houses the hardware components. The PTX10003 is shipped in a cardboard carton, secured with foam packing material. The carton also contains an accessory kit.



CAUTION: PTX10003 routers are maximally protected inside the shipping carton. Do not unpack the PTX10003 until you are ready to begin installation.

To unpack a PTX10003:

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 point upward.
3. Open the top flaps on the shipping carton.
4. Remove the accessory kit.
5. Pull out the packing material holding the PTX10003 in place.
6. Verify the following components are in the box:

   For the PTX10003-160C:

   - Chassis with five fan modules and four power supplies installed
   - Two side-mounting blades attached to each side of the chassis
   - Two side-mounting rails attached to each side of the chassis
   - Four power cords with plugs for that are appropriate for your geographical location
   - RJ-45 cable and RJ-45 to DB-9 serial port adapter

- Accessory kit containing:
  - DC power cable lug (for DC installations)
  - Four M4 x 8 mm flat head screws
  - Four M5 x 10 mm pan head screws
  - End User License Agreement
  - One 2.1 m DB-9-RJ to RJ-45 serial port adapter, straight through cable
  - ESD wrist strap with cable
  - Cable management assembly
  - Road Map card

For the PTX10003-80C:

- Chassis with three fan modules and two power supplies installed
- Two side-mounting blades attached to each side of the chassis
- Two side-mounting rails attached to the side-mounting blades
- Two power cords with plugs for that are appropriate for your geographical location
- RJ-45 cable and RJ-45 to DB-9 serial port adapter
- Accessory kit containing:
  - DC power cable lug (for DC installations)
  - Four M4 x 8 mm flat head screws
  - Four M5 x 10 mm pan head screws
  - End User License Agreement
  - One DB-9-RJ to RJ-45 serial port adapter, straight through cable
  - ESD wrist strap with cable
  - Cable management assembly
  - Road Map card

7. Save the shipping carton and packing materials in case you need to move or ship the chassis later.

Mounting the PTX10003 in a Rack

IN THIS SECTION

- Before You Begin Mounting the PTX10003 | 98
- Mounting the PTX10003 | 99

The mounting rails and mounting blades are preattached to the PTX10003. To mount the chassis in a 19-in (48.26 cm) four-post rack, you simply remove one screw to release the sliding rail and then attach the mounting blades to the rack. The sliding mounting rails enable the PTX10003 to be mounted flush with the rack and still be adjustable for racks with different depths. The minimum distance the front and rear rack rails can be spaced apart is 26 in. (66.04 cm) front to back. The maximum distance the front and rear rack rails can be spaced apart is 36 in. (91.4 cm) front to back.

Before You Begin Mounting the PTX10003

1. Ensure that you understand how to prevent electrostatic discharge (ESD) damage. See "Prevention of Electrostatic Discharge Damage" on page 195.
2. Verify that the site meets the requirements described in "PTX10003 Site Preparation Checklist" on page 62.
3. Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure.
4. Read "General Safety Guidelines and Warnings" on page 170 and "PTX10003 Installation Safety Guidelines" on page 95.

   CAUTION: If you are mounting multiple units in the rack, mount the heaviest unit at the bottom and mount the others from bottom to top in order of decreasing weight. The PTX10003-160C weighs approximately 110 lb (50 kg) fully loaded and the PTX10003-80C weighs approximately 88 lb (40 kg) fully loaded. Installing the router in a rack requires either a mechanical lift or two people to lift the device and another person to secure it to the rack.

5. Decide whether to place the field-replaceable unit (FRU) end or the port end of the PTX10003 at the front of the rack. Position the device in such a manner that the **AIR OUT** labels on the handle are next to the hot aisle.
6. Remove the PTX10003 from the shipping carton (see "Unpacking the PTX10003" on page 96).
7. Ensure that you have the following parts and tools available to mount the PTX10003 in a rack.

NOTE: Either a mechanical lift or two persons to lift the PTX10003 into place. An additional person is needed for securing the router to the rack.

- ESD grounding strap (provided).
- Four power cords (PTX10003-160C) or two power cords (PTX10003-80C) with plugs appropriate to your geographical location (provided).
- RJ-45 cable and RJ-45 to DB-9 serial port adapter (provided).
- Management host, such as a PC laptop, with a serial port (not provided).
- Screwdriver appropriate for the rack-mounting screws (not provided).
- Grounding cable kit with bracket, lug, and three nuts with integrated washers.

WARNING: PTX10003 routers must be supported at all four corners.

CAUTION: PTX10003 routers require at least three people for installation, two people to lift the device into place and another person to attach the device to the rack. You can remove the power supplies and fan modules to minimize the weight before attempting to install the PTX10003. See "Remove the AC/HVDC Power Supply from the PTX10003" on page 131 and "Removing a Fan Module from the PTX10003" on page 127. For overhead installation—for example, if you are installing the PTX10003 above 60 in. (152.4 cm) from the floor—we recommend that you use a mechanical lift.

Mounting the PTX10003

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the device.
2. Decide whether to place the field-replaceable unit end or the port end of the PTX10003 at the front of the rack. Position the PTX10003 in such a manner that the **AIR OUT** label on the handle is next to the hot aisle.
3. Using a Phillips screwdriver, remove the screw on each side of the chassis that holds the mounting rails to the chassis. (see Figure 29 on page 100 and Figure 30 on page 100).

4. Slide the mounting rail out of the mounting blades.

Figure 29: Removing the Slide Rail Screw (PTX10003-160C)

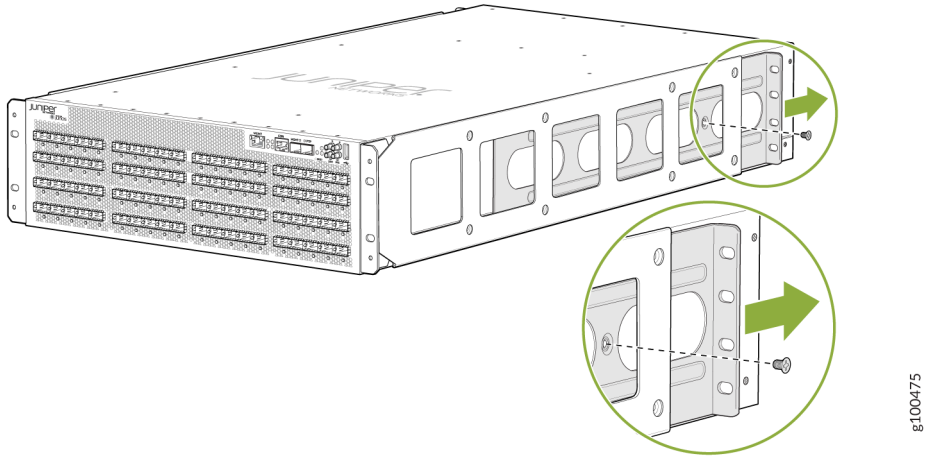
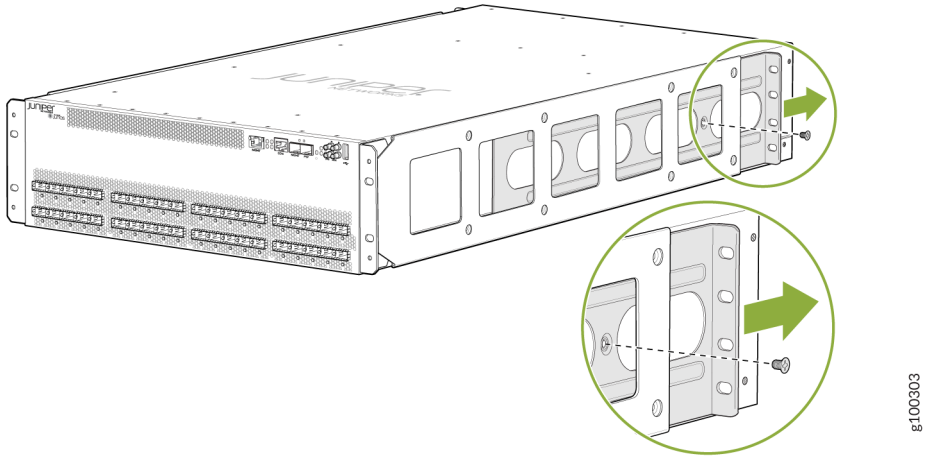


Figure 30: Removing the Slide Rail Screw (PTX10003-80C)



5. Perform one of the following steps:

   - Use a mechanical lift to position the PTX10003 in the rack so that the front brackets on the front mounting rails are aligned with the rack holes.
   - Have two people grasp both sides of the PTX10003, lift it, and position it in the rack so that the front brackets on the front-mounting rails are aligned with the rack holes.

6. Continue to support the PTX10003 while sliding the rear mounting blades into the channel of the side-mounting rails. See Figure 31 on page 101 and Figure 32 on page 101.

Figure 31: Securing the Side Rails to the PTX10003-160C

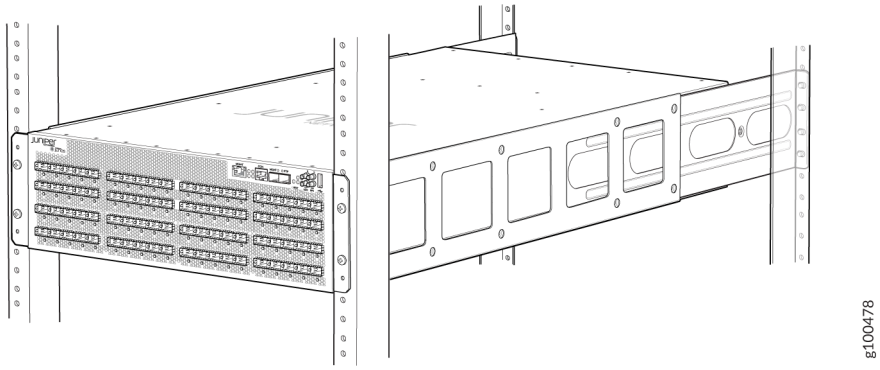
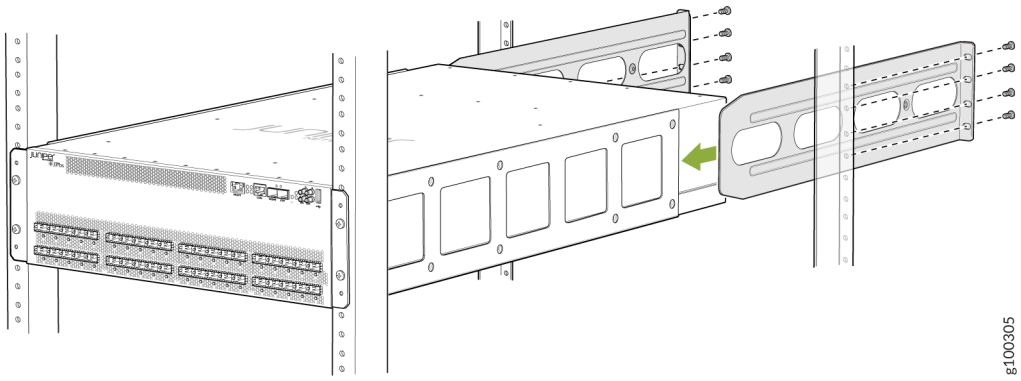


Figure 32: Securing the Side Rails to the PTX10003-80C Chassis



7. Ensure that the PTX10003 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 33 on page 102 and Figure 34 on page 102.

Figure 33: PTX10003 Secured in Rack (PTX10003-160C)

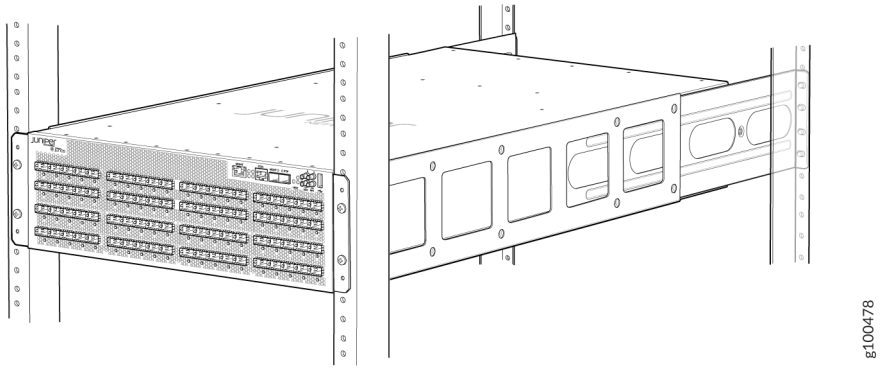
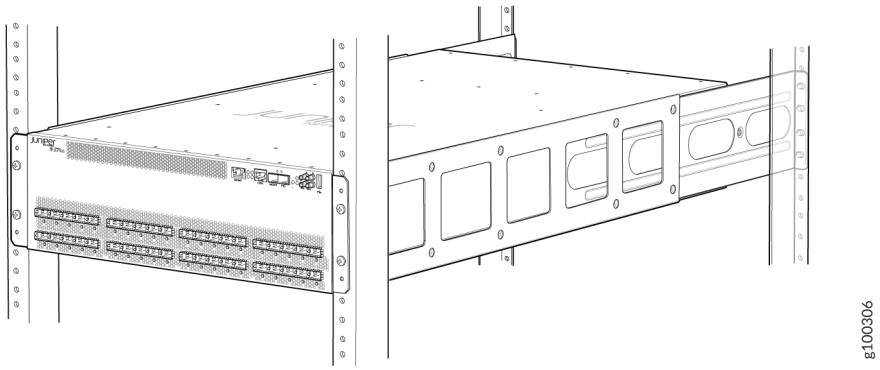


Figure 34: PTX10003 Secured in Rack (PTX10003-80C)



8. Attach one end of a grounding cable to earth ground and attach the other end to the chassis grounding point. Figure 35 on page 103 and Figure 36 on page 103 show the location of the chassis grounding point.

Figure 35: Chassis Grounding Point (PTX10003-160C)

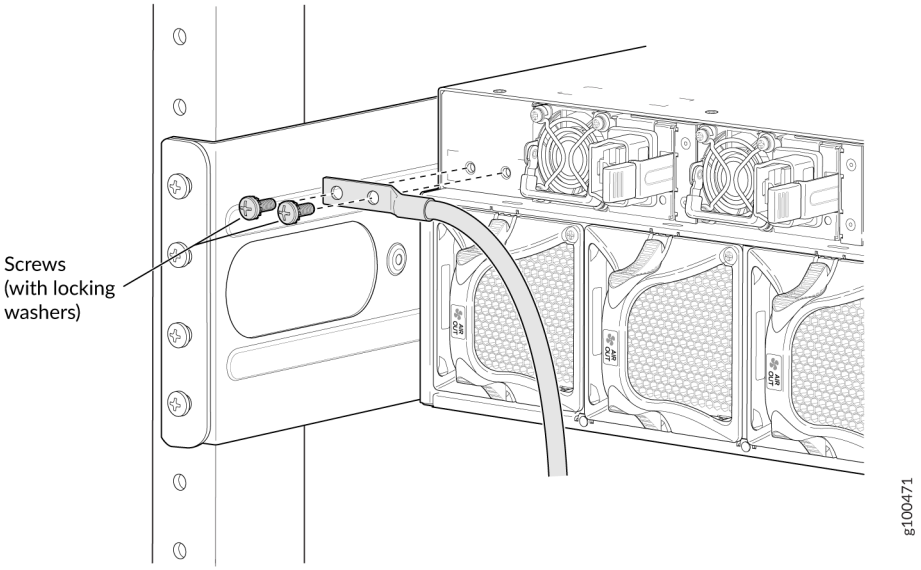
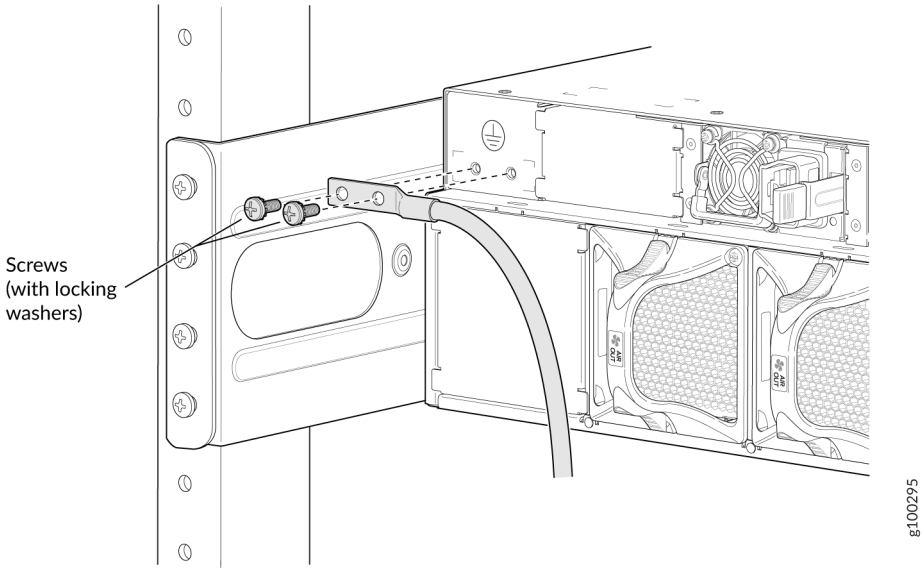


Figure 36: Chassis Grounding Point (PTX10003-80C)



9. If you removed the power supplies and fan modules from the chassis before installation, reinstall them. Refer to "Install the AC/HVDC Power Supply in the PTX10003" on page 133 and "Installing a Fan Module in the PTX10003" on page 128.

RELATED DOCUMENTATION

Rack-Mounting and Cabinet-Mounting Warnings | 178

Connect the PTX10003 to Power

IN THIS SECTION

- Connecting the PTX10003 to Ground | 104
- Connecting AC Power to the PTX10003 | 107
- Connecting DC Power to the PTX10003 | 110

Connecting the PTX10003 to Ground

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 PTX10003 chassis to connect to the earth ground.

NOTE: An AC-powered PTX10003 gains additional grounding when you plug the power supply into a grounded AC power outlet by using an AC power cord appropriate for your geographical location. See "PTX10003 Power System" on page 34.

NOTE: You must install the PTX10003-160C in a restricted-access location and ensure the chassis is properly grounded at all times. The PTX10003-160C has a two-hole protective grounding terminal provided on the chassis. See Figure 37 on page 106. Under all circumstances,

use this grounding connection to ground the chassis. For AC powered systems, you must also use the grounding wire in the AC power cord along with the two-hole lug ground connection. This tested system meets or exceeds all applicable EMC regulatory requirements with the two-hole protective grounding terminal.

NOTE: You must install the PTX10003-80C in a restricted-access location and ensure that the chassis is always properly grounded. The PTX10003-80C has a two-hole protective grounding terminal provided on the chassis. See Figure 38 on page 106. We recommend that you use this protective grounding terminal as the preferred method for grounding the chassis regardless of the power supply configuration. However, if additional grounding methods are available, you can also use those methods. For example, you can use the grounding wire in the AC power cord or use the grounding terminal or lug on a DC power supply. This tested system meets or exceeds all applicable EMC regulatory requirements with the two-hole protective grounding terminal.

⚠ **CAUTION**: Before you connect power to the PTX10003, a licensed electrician must attach a cable lug to the grounding cables and power cables that you supply. A cable with an incorrectly attached lug can damage the PTX10003 (for example, by causing a short circuit).

NOTE: Mount the PTX10003 in the rack before attaching the grounding lug to the PTX10003. See "Unpacking and Mounting the PTX10003" on page 96.

Ensure that you have the following parts and tools available:

- Grounding cable—The grounding cable must be 4 AWG (8.4 mm^2), minimum 90° C wire, or as permitted by the local code (not provided).
- Grounding lug for your grounding cable—The grounding lug required is a Panduit LCD6-14BH-L or equivalent (provided).
- Two #10-32 screws and washers (not provided).
- Screwdriver appropriate for the #10-32 screws (not provided).

To connect a grounding cable to the PTX10003:

1. Attach a grounding cable to earth ground (such as the rack in which the PTX10003 is mounted) and then attach it to the chassis grounding point. Figure 37 on page 106 and Figure 38 on page 106 show the location of the chassis grounding point.

Figure 37: Chassis Grounding Point (PTX10003-160C)

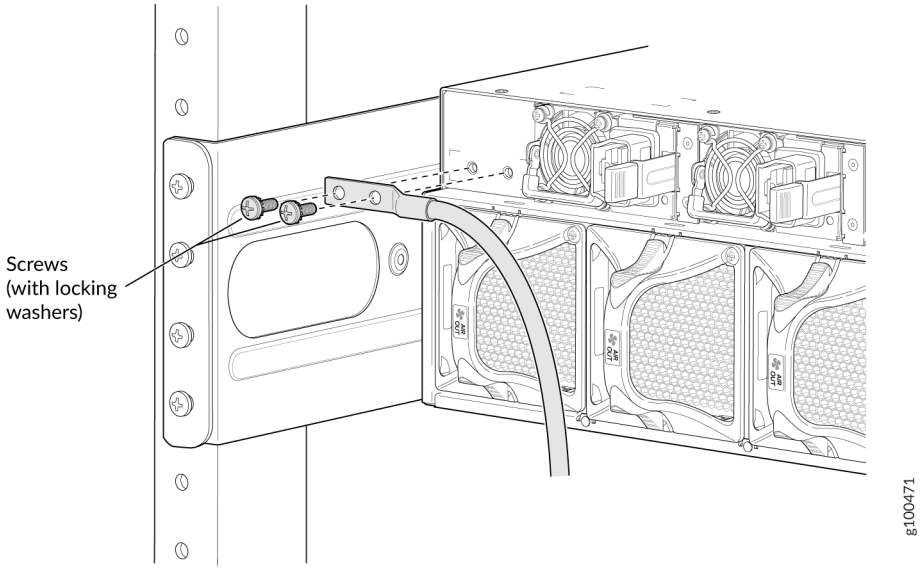
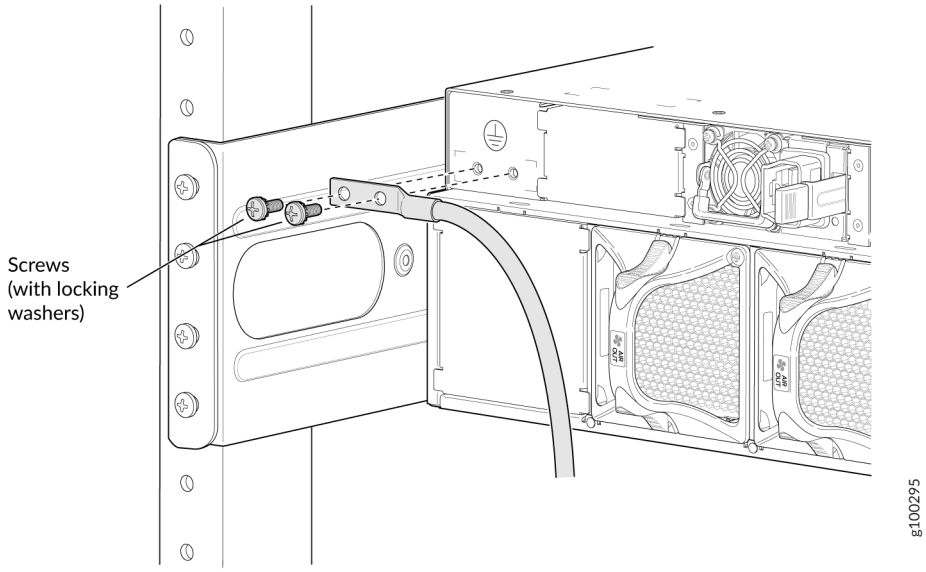


Figure 38: Chassis Grounding Point (PTX10003-80C)



2. Secure the grounding lug to the protective earthing terminal with the washers and screws.

3. 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.

Connecting AC Power to the PTX10003

- Ensure that you have a power cord appropriate for your geographical location available to connect AC or HVDC power to the router.

  Before you begin connecting AC or HVDC power to the PTX10003:

- Read *General Electrical Safety Guidelines and Warnings* and *Action to Take After an Electrical Accident*.

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).

- Ensure that you have connected the PTX10003 chassis to earth ground. See "Connecting the PTX10003 to Ground" on page 104.

- Ensure that you have an ESD grounding strap.

- If not already installed, install the power supplies in the router. See "Maintaining the PTX10003 Power Supplies" on page 130.

The power supplies automatically detect whether there is AC or HVDC input voltage and manage the power accordingly. Each 3000 W AC/HVDC power supply module has a single AC or HVDC input and provides 12 V power to the system. The power supply in a PTX10003 is a hot-removable and hot-insertable field-replaceable unit (FRU). After removing the power cord from an individual power supply, you can remove and replace it without powering off the router or disrupting router functions.



CAUTION: Do not mix AC/HVDC and DC power supplies in the same chassis.

NOTE: Each power supply must be connected to a dedicated power source outlet.

To connect AC power to a PTX10003:

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the device.
2. Ensure that the power supplies are fully inserted in the chassis and the latches are secure.

3. Locate the power cords shipped with the PTX10003; the cords have plugs appropriate for your geographical location. See "PTX10003 Power System" on page 34.

   WARNING: Ensure that the power cord does not block access to router components or drape where people could trip over it.

4. Connect each power supply to the power sources. Insert the coupler end of the power cord into the AC power cord inlet on the AC power supply faceplate (see Figure 39 on page 109 and Figure 40 on page 109).

NOTE: The coupler end of the power cord model is APP-400.

Figure 39: Connecting the AC Power Cord to the PTX10003-160C

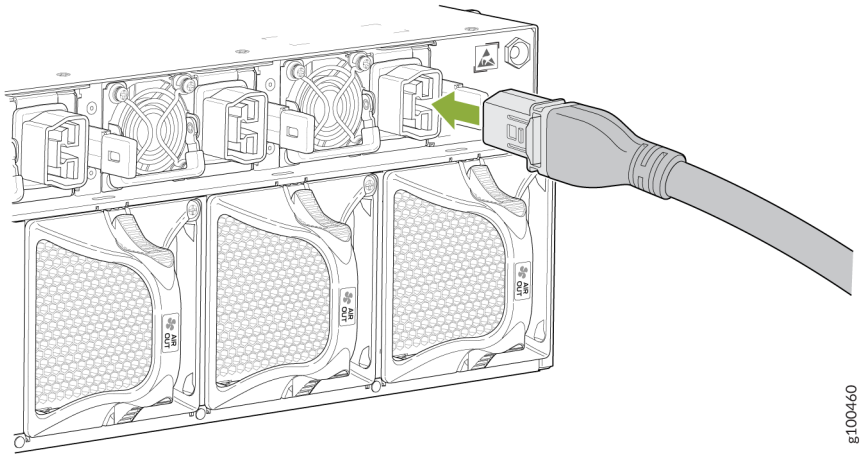
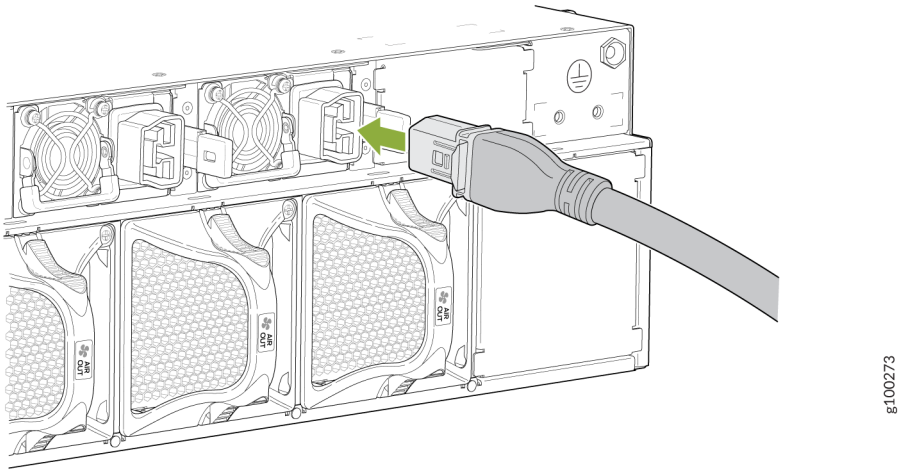


Figure 40: Connecting an AC Power Cord to the PTX10003-80C)



5. If the AC power source outlet has a power switch, set it to the off (**O**) position.

NOTE: The PTX10003 powers on as soon as power is provided to the power supply. There is no power switch on the router.

6. Insert the power cord plug into an AC power source outlet.

7. If the AC power source outlet has a power switch, set it to the on (|) position.
8. Verify that the status LEDs on each power supply are lit green.

   If the status LED is lit amber, remove power from the power supply, and replace the power supply (see "Maintaining the PTX10003 Power Supplies" on page 130). Do not remove the power supply until you have a replacement power supply ready.

SEE ALSO

PTX10003 Power System | 34

Connecting DC Power to the PTX10003

Before you begin connecting DC power to the PTX10003:

- Read *General Electrical Safety Guidelines and Warnings*, *Action to Take After an Electrical Accident*, and the following DC power warnings:
  - *DC Power Electrical Safety Guidelines*
  - *DC Power Copper Conductors Warning*
  - *DC Power Disconnection Warning*
  - *DC Power Grounding Requirements and Warning*
  - *DC Power Wiring Sequence Warning*
  - *DC Power Wiring Terminations Warning*
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).

CAUTION: Before you connect DC power to the PTX10003, 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 router (for example, by causing a short circuit). See "Connecting the PTX10003 to Ground" on page 104

NOTE: 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 PTX10003 chassis to connect to the earth ground (see "Connecting the PTX10003 to Ground" on page 104).

NOTE: Support for a 60 A power source was added in Junos OS Evolved Release 19.4. If you are using an earlier release, you'll need to use an 80 A power source. Be sure you set the DIP switch to 80 A when installing the PTX10003 DC power supply module.

- Install the DC power supply in the chassis. See "Maintaining the PTX10003 Power Supplies" on page 130. The battery returns of the DC power supply must be connected as an isolated DC return (DC-I).
- Ensure that you have the following parts and tools available:
  - ESD grounding strap (provided)
  - Phillips (+) screwdriver, 1/4-in., with a torque range between 6 lb-in. (0.68 Nm) and 7 lb-in. (0.79 Nm) (not provided)

    CAUTION: You must use an appropriate torque-controlled tool to tighten the hex-nuts on the DC power cable connector. Do not overtighten the hex-nuts. Applying excessive torque damages the terminal block and the wiring tray.

  - Power cable or cables appropriate for your geographical location to connect DC power to the PTX10003. We recommend you use a 4 AWG gauge DC power cable such as a Panduit/ LCDX4-14AH-L. The cable lugs are provided with the power supplies.

The DC power supply in a PTX10003 is a hot-removable and hot-insertable field-replaceable unit. You can remove and replace it without powering off the router or disrupting router functions. You do, however, need to remove power from the power supply before attempting to remove the unit.

This section does not apply to the AC/HVDC power supply.

WARNING: A DC-powered PTX10003 is intended for installation only in a restricted-access location.

CAUTION: Do not mix AC and DC power supplies in the same chassis.

NOTE: Each power supply must be connected to a dedicated power source outlet.

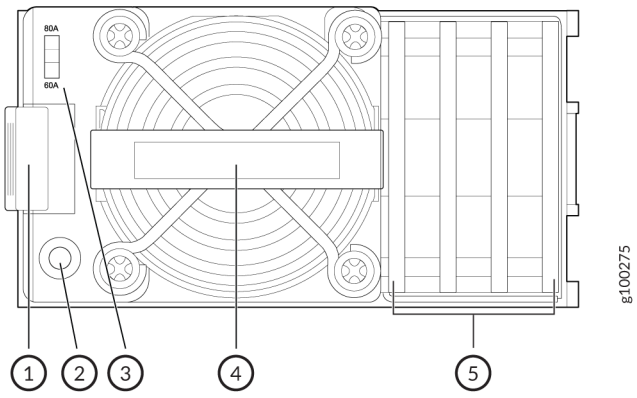
To connect DC power to a PTX10003:

1. Attach an ESD grounding strap to your bare wrist, and connect the strap to an approved site ESD grounding point.
2. Ensure that the power supplies are fully inserted in the chassis and the latches are secure.
3. Depending on the input power source, set the DC input current selector (DIP switch) to 80 A or 60 A.

NOTE: Support for a 60 A power source was added in Junos OS Evolved Release 19.4. If you are using an earlier release, you'll need to use an 80 A power source. Be sure you set the DIP switch to 80 A when installing the PTX10003 DC power supply module.

Figure 41 on page 112 shows the location of the DC input current selector (sometimes called the "DIP switch").

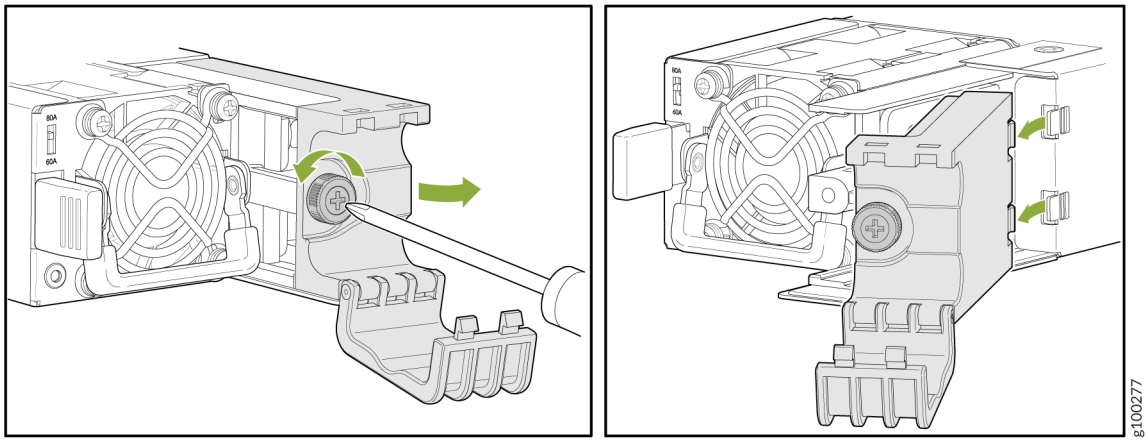
Figure 41: PTX10003 DC Power Supply



1– Ejector lever	4– Handle
2– Status LED	5– Terminal block cover
3– DC input current selector (DIP switch)	

4. Open the cable manager latch on the terminal block cover of a power supply.
5. Use a Phillips screwdriver to loosen the screw holding the cable manager latch to the power supply terminal block cover. See Figure 42 on page 113.

Figure 42: Loosening the Cable Manager Latch



6. Remove the cable manager bracket to expose the four terminal studs.
7. Install heat-shrink tubing insulation around the power cables.

   To install heat-shrink tubing:

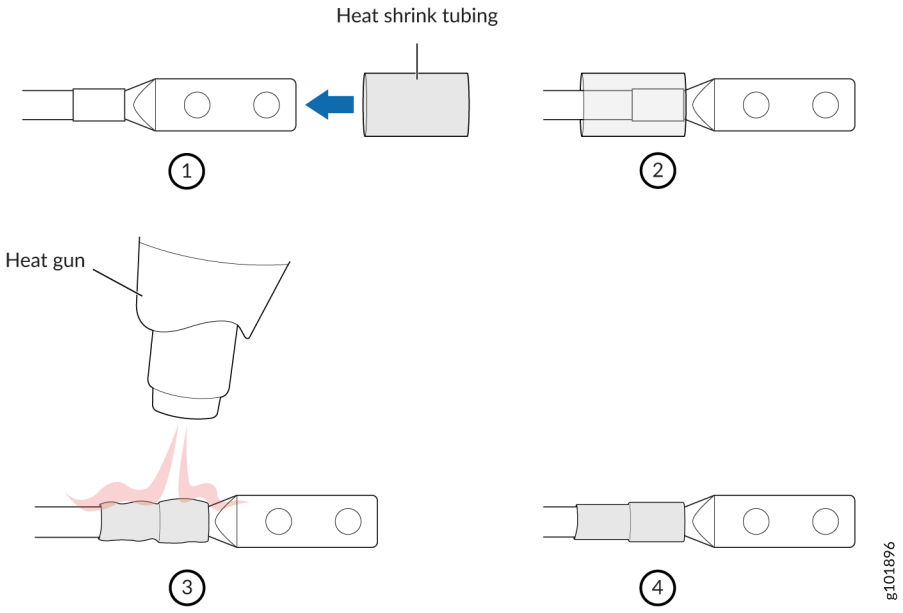
   a. Slide the tubing over the portion of the cable where it is attached to the lug barrel. Ensure that tubing covers the end of the wire and the barrel of the lug attached to it.

   b. Shrink the tubing with a heat gun. Ensure that you heat all sides of the tubing evenly so that it shrinks around the cable tightly.

   Figure 43 on page 114 shows the steps to install heat-shrink tubing.

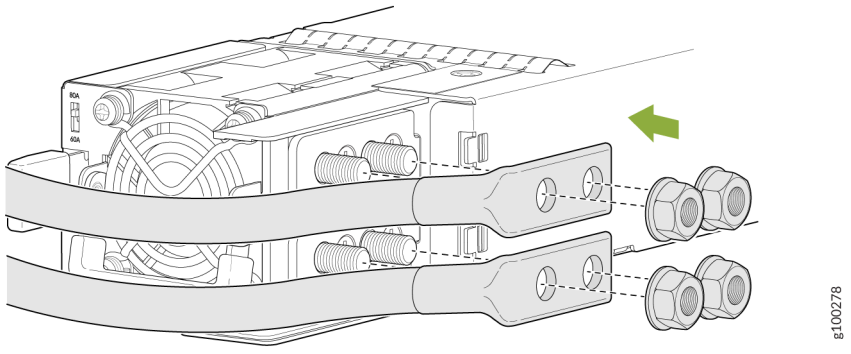
NOTE: Do not overheat the tubing.

Figure 43: How to Install Heat-Shrink Tubing



8. If you are using straight DC power cables, place the ends of the power cable connectors over the four terminal studs. See Figure 44 on page 114.

Figure 44: Connecting a Straight DC Power Cable to a DC Power Supply in a PTX10003



9. Connect the power supply to a 80 A or 60 A power source by securing the power cables to the four terminal studs with hex nuts.

10. Use a wrench to tighten the hex nuts by applying torque to between 6 lb-in. (0.68 Nm) and 7 lb-in. (0.79 Nm).

> **NOTE**: The PTX10003 powers on as soon as power is provided to the power supply. There is no power switch on the router.

> ⚠ **CAUTION**: You must use an appropriate torque-controlled tool to tighten the hexnuts on the DC power cable connector. Do not overtighten the screws. Applying excessive torque damages the terminal block and the wiring tray.

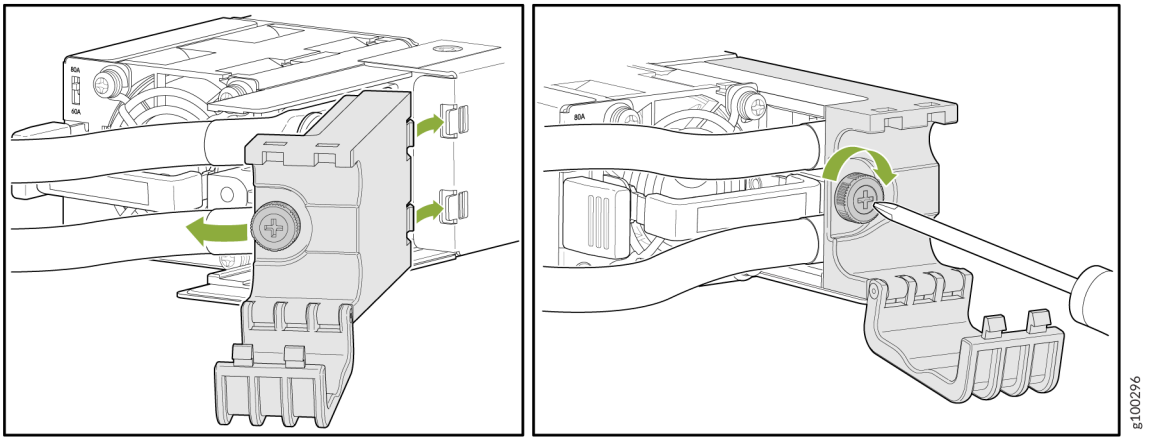
11. Repeat Step 3 through Step 8 to connect the other DC power supplies.
12. Verify that the status LEDs on each power supply are lit green and on steadily.

    If the status LED is lit amber, remove power from the power supply, and replace the power supply (see "Maintaining the PTX10003 Power Supplies" on page 130). Do not remove the power supply until you have a replacement power supply ready. The power supplies must be installed in the PTX10003 to ensure proper airflow.

> ⚠ **CAUTION**: Replace a failed power supply with a new power supply within 30 seconds of removal to prevent chassis overheating.

13. Reattach the cable manager bracket that you removed in Step6 and tighten the thumb screw. See Figure 45 on page 115.

Figure 45: Reattaching the Cable Manager Bracket



14. Close the cable manager latch to hold the power cables in place. See Figure 46 on page 116 and Figure 47 on page 116.

> **WARNING**: Ensure that the power cables do not block access to device components or drape where people could trip over them.

Figure 46: Closing the Cable Manager Latch (PTX10003-160C)

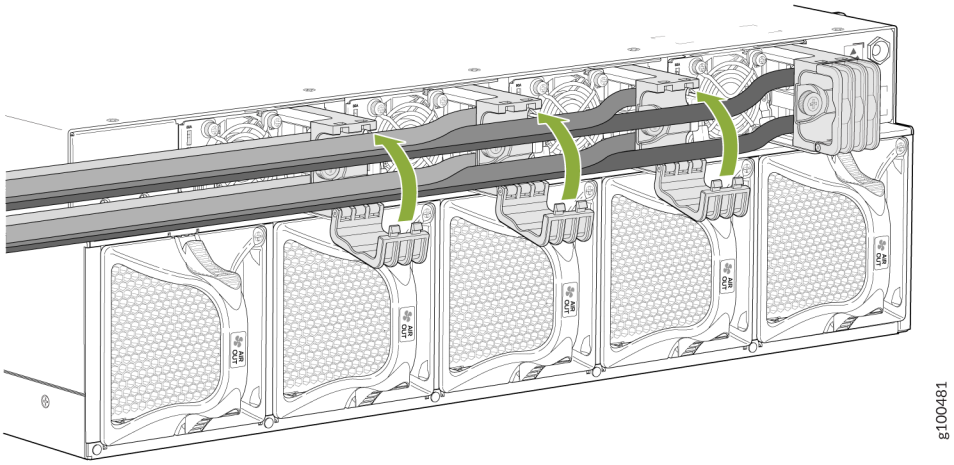
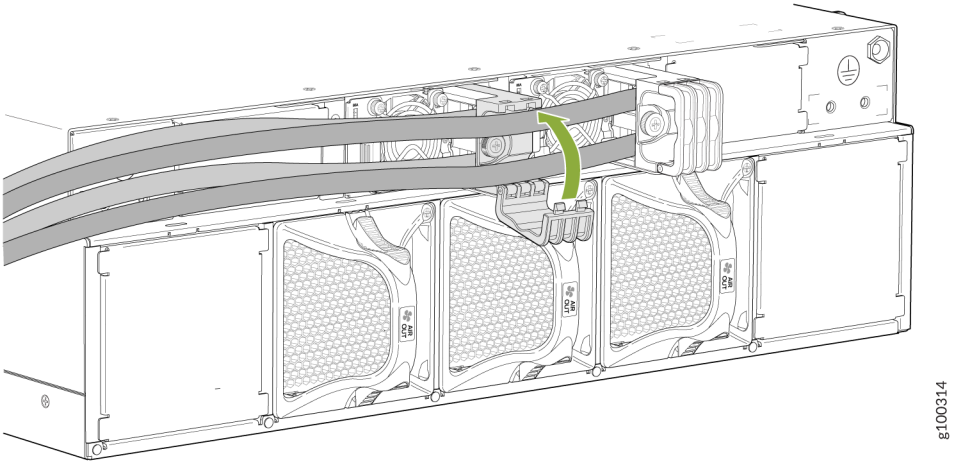


Figure 47: Closing the Cable Manager Latch (PTX10003-80C)



SEE ALSO

PTX10003 DC Power Supply Description | 49

PTX10003 Power System | 34

Connecting the PTX10003-80C to External Devices

IN THIS SECTION

- Connecting the PTX10003-80C to a Management Ethernet Device | 117
- Connecting the PTX10003-80C to a Management Console | 118

Connecting the PTX10003-80C to a Management Ethernet Device

Ensure that you have an appropriate cable available. See "PTX10003 Management Cable Specifications and Pinouts" on page 82.

You can monitor and manage the PTX10003-80C by using a dedicated management channel. The PTX10003-80C has two management ports—a 10/100/1000BASE-T RJ-45 port for copper connections and a Gigabit Ethernet SFP port for fiber-optic connections. Use the management ports to connect the PTX10003-80C to a network for out-of-band management.

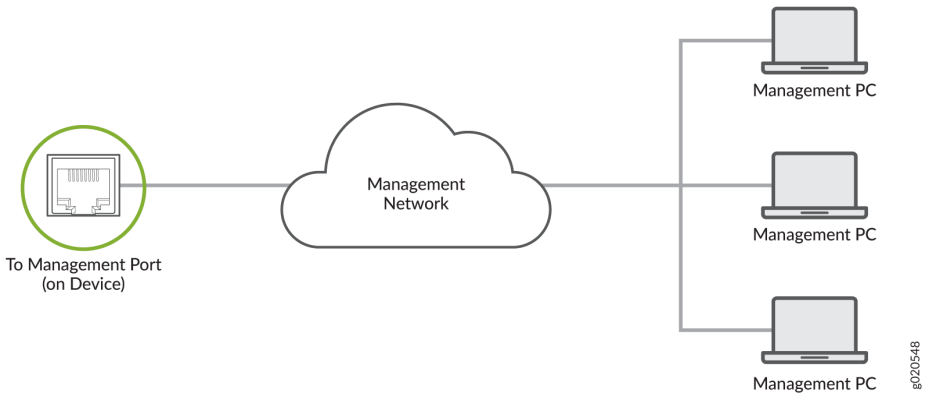
NOTE: You cannot use the management ports to perform the initial configuration of the PTX10003-80C. You must configure the management ports through the console connection before you can successfully connect to the PTX10003-80C by using these ports. See "Performing the Initial Software Configuration for the PTX10003" on page 120.

To connect a PTX10003-80C to a network for out-of-band management (see Figure 48 on page 118):

1. Connect one end of the cable to one of the two management ports—labeled **MGMT**—on the PTX10003-80C.

2. Connect the other end of the cable to the management network device.

Figure 48: Connecting a PTX10003-80C to a Network for Out-of-Band Management



Connecting the PTX10003-80C to a Management Console

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 PTX10003-80C.

NOTE: If your laptop or PC does not have a DB-9 plug connector pin and you want to connect your laptop or PC directly to the PTX10003-80C, use a combination of the RJ-45 cable and RJ-45 to DB-9 adapter (provided) and a USB to DB-9 plug adapter (not provided).

The PTX10003-80C has a console port with an RJ-45 connector. Use the console port to connect the router directly to a management console, such as a laptop, or to a console server.

To connect the PTX10003-80C to a management console (see Figure 49 on page 119 or Figure 50 on page 119):

1. Connect one end of the RJ-45 Ethernet cable to the console port (labeled **CON**) on the PTX10003.

2. Connect the other end of the Ethernet cable directly to a management console or console server.

Figure 49: Connecting the PTX10003-80C Directly to a Management Console



Figure 50: Connecting the PTX10003-80C to a Management Console Through a Console Server



RELATED DOCUMENTATION

PTX10003 Management Panel | 23

Register Products—Mandatory to Validate SLAs

Register all new Juniper Networks hardware products and changes to an existing installed product using the Juniper Networks website to activate your hardware replacement service-level agreements (SLAs).

CAUTION: Register product serial numbers on the Juniper Networks website. Update the installation base data if any addition or change to the installation base occurs or if the installation base is moved. Juniper Networks is not responsible for not meeting the hardware replacement service-level agreement for products that do not have registered serial numbers or accurate installation base data.

Register your product(s) at https://tools.juniper.net/svcreg/SRegSerialNum.jsp.
Update your installation base at https://www.juniper.net/customers/csc/management/updateinstallbase.jsp.

Performing the Initial Software Configuration for the PTX10003

Before you begin connecting and configuring a PTX10003, set the following parameter values on the management console or console server:

- Baud Rate—9600
- Flow Control—None
- Data—8
- Parity—None
- Stop Bits—1
- DCD State—Disregard

You'll need to perform the initial configuration of the PTX10003 through the console port using the CLI or through Zero Touch Provisioning (ZTP). To provision the PTX10003 using ZTP, you'll need access to a Dynamic Host Control Protocol (DHCP) server and a File Transfer Protocol (anonymous FTP), Hypertext Transfer Protocol (HTTP), or Trivial File Transfer Protocol (TFTP) server on which the software image and configuration files are stored.

To connect and configure the PTX10003 using the CLI:

1. Connect the console port to a laptop or PC by using the supplied RJ-45 cable and RJ-45 to DB-9 adapter. The console port (labeled **CON**) is located on the management panel of the PTX10003 (see "Connecting the PTX10003-80C to a Management Console" on page 118 for more information).
2. Log in as **root**. You do not need to enter a password. If the software boots before you connected to the console port, you might need to press the Enter key for the prompt to appear.

```
login: root
```

3. Start the CLI.

```
root@% cli
```

4. Enter configuration mode.

```
root> configure
```

5. Add a password to the root administration user account.

```
[edit]
root@# set system root-authentication plain-text-password
New password: password
Retype new password: password
```

6. (Optional) Configure the name of the PTX10003. If the name includes spaces, enclose the name in quotation marks (“ ”).

```
[edit]
root@# set system host-namehost-name
```

7. Configure the default gateway.

```
[edit]
root@# set routing-options static route default next-hop address
```

8. Configure the IP address and prefix length for the management interface.

```
[edit]
root@# set interfaces re0:mgmt-0 unit 0 family inet address address/prefix-length
```

NOTE: The RJ-45 management port is labeled **mgmt-0** and the SFP management port is labeled **mgmt-1**.

9. (Optional) Configure the static routes to remote prefixes with access to the management port.

```
[edit]
root@# set routing-instances mgmt_junos routing-options static route remote-prefix next-hop
destination-ip retain no-readvertise
```

10. Enable the Telnet service.

```
[edit]
root@# set system services telnet
```

NOTE: When Telnet is enabled, you cannot log in to a PTX10003 through Telnet by using root credentials. Root login is allowed only for SSH access.

11. Commit the configuration to activate it on the PTX10003.

```
[edit]
root@# commit
```

Powering Off the PTX10003

IN THIS SECTION

- Powering Off the AC-Powered PTX10003 | **123**
- Powering Off the DC-Powered PTX10003 | **124**

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See "Prevention of Electrostatic Discharge Damage" on page 195.
- Ensure you do not need to route traffic through the PTX10003.
- Ensure you have the following parts and tools available to power off the PTX10003:

- 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

Powering Off the AC-Powered PTX10003

1. Connect to the router by using one of the following methods:
   - Connect a management device to the console (**CON**) port on a PTX10003 by following the instructions in "Connecting the PTX10003-80C to a Management Console" on page 118.
   - Connect a management device to one of the two management (**MGMT**) ports by following the instructions in "Connecting the PTX10003-80C to a Management Ethernet Device" on page 117.
2. Shut down Junos OS Evolved from the external management device by issuing the `request system halt` operational mode CLI command. This command shuts down Junos OS Evolved gracefully and preserves system state information. A message appears on the console, confirming that the operating system has halted.

```
user@host> request system halt
Halt the system ? [yes,no] (no) yes
```

You see the following output (or something similar) after entering the command:

```
System going down IMMEDIATELY

*** System shutdown message from user@host***

halt the system at Thu Jun 20 04:57:23 2019

user@host> Connection to host closed by remote host.
Connection to host closed.
```

CAUTION: The final output of any version of the `request system halt` command is the "The operating system has halted." Although traffic and the operating system have

stopped, the PTX10003 power supply LEDs remain lit and a fan module continues to run. Wait at least 60 seconds after first seeing this message before continuing with this procedure.

3.

4. Disconnect power to the PTX10003. 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 plug end of the power cord connected to the power source outlet.

5. Remove the power source cable from the power supply by pushing in the latch on the side of the power connector and gently pulling out the power plug from the power supply.

6. Uncable the device before removing it from the rack.

Powering Off the DC-Powered PTX10003

1. Connect to the router by using one of the following methods:

   - Connect a management device to the console (**CON**) port on a PTX10003 by following the instructions in "Connecting the PTX10003-80C to a Management Console" on page 118.
   - Connect a management device to one of the two management (**MGMT**) ports by following the instructions in "Connecting the PTX10003-80C to a Management Ethernet Device" on page 117.

2. Shut down Junos OS from the external management device by issuing the `request system halt` operational mode CLI command. This command shuts down Junos OS gracefully and preserves system state information. A message appears on the console, confirming that the operating system has halted.

```
user@host> request system halt
Halt the system ? [yes,no] (no) yes
```

You see the following output (or something similar) after entering the command:

```
Initiating  halt... ok
Initiating Junos shutdown...  shutdown: [pid 14318]
Shutdown NOW!
ok
Junos shutdown is in progress...
*** FINAL System shutdown message  ***
```

```
System going down IMMEDIATELY

...
...
Operating system  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." Although traffic and the operating system have stopped, the PTX10003 power supply LEDs remain lit and a fan module continues to run. Wait at least 60 seconds after first seeing this message before following continuing with this procedure.

3.

4. Turn off the circuit breaker for the DC power source.

CAUTION: Turn off the circuit breaker for the HVDC power source before disconnecting the power cord from the power supply. Unplugging an HVDC connection while the power supply is powered up may damage the electrical connectors.

5. Loosen the thumb screws for the power cable.

6. Disconnect a connector for the power cables or release each of three cables from the power supply (requires a standard screw driver).

7. Gently pull out the socket end of the power cable connected to the power supply.

8. Uncable the device before removing it from the rack.

CHAPTER 4

Maintaining Components

Maintaining the PTX10003 Fan Modules | 127

Maintaining the PTX10003 Power Supplies | 130

Maintaining Transceivers and Fiber-Optic Cables on the PTX10003-80C | 140

Uninstalling the PTX10003 | 147

Maintaining the PTX10003 Fan Modules

IN THIS SECTION

- Removing a Fan Module from the PTX10003 | 127
- Installing a Fan Module in the PTX10003 | 128

Removing a Fan Module from the PTX10003

Before you remove a fan module from a PTX10003, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 195).

Ensure that you have the following parts and tools available:

- ESD grounding strap
- Antistatic bag or an antistatic mat
- Phillips (+) screwdriver, number 1

The fan modules in a PTX10003 are hot-removable and hot-insertable field-replaceable units (FRUs); you can remove and replace them without powering off the PTX10003 or disrupting routing functions.



CAUTION: Before removing the fan module, ensure you have a replacement fan module at hand. After removing a failed fan module, you must install a new fan module as quickly as possible to prevent chassis overheating. The PTX10003 cooling system shuts down if a single fan tray is out of the chassis for more than 240 seconds. The cooling system shuts down immediately if you remove more than one fan tray from the chassis.

To remove a fan module from a PTX10003:

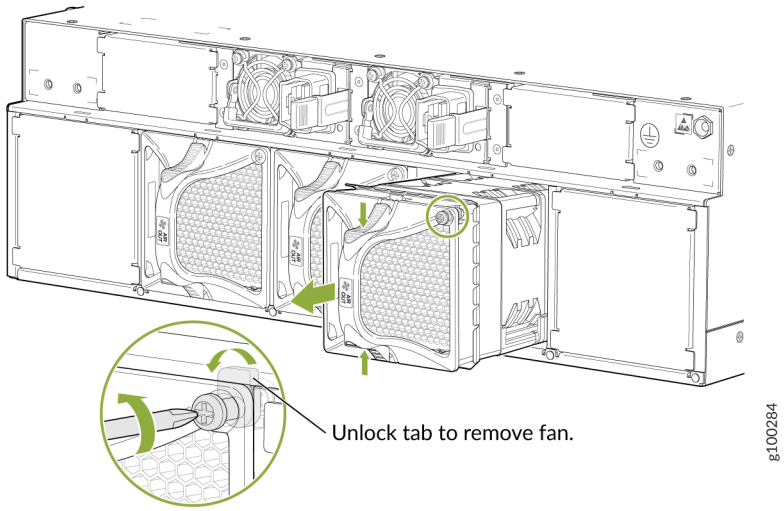
1. Place the antistatic bag or the antistatic mat on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the device.
3. Using the Phillips screwdriver, loosen the locking screw (3 or 4 turns).

4. Grasp the handle on the fan module and squeeze the outside of the handle to release the module.

> **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 spinning.

5. Pull firmly to slide the fan module halfway out of the chassis.
6. When the fan stops spinning, slide the fan module completely out of the chassis.
7. Place the fan module in the antistatic bag or on the antistatic mat placed on a flat, stable surface. Refer to Figure 51 on page 128.

Figure 51: Removing a PTX10003 Fan Module



> **NOTE**: When a fan module is removed, the CLI message `Fan/Blower is Absent` is logged in the system log, and the system raises a major alarm.

Installing a Fan Module in the PTX10003

Before you install a fan module in a PTX10003, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 195).

Ensure that you have the following parts and tools available:

- ESD grounding strap
- Phillips (+) screwdriver, number 1

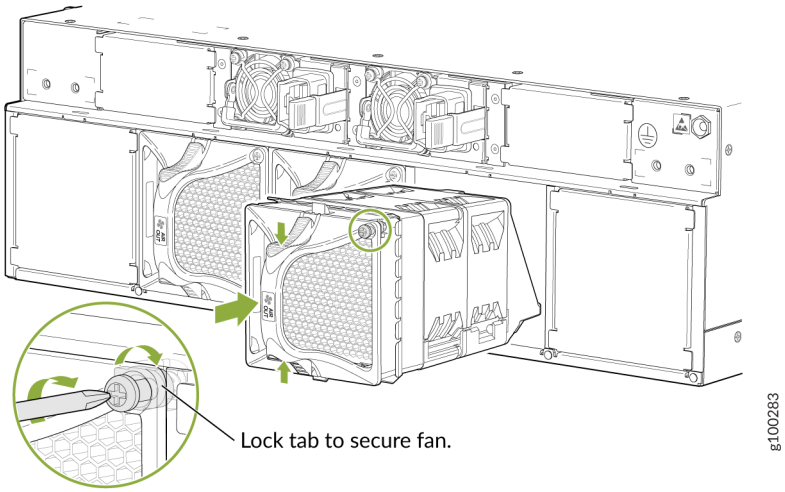
The fan modules in a PTX10003 are hot-removable and hot-insertable field-replaceable units (FRUs); you can remove and replace them without powering off the PTX10003 or disrupting routing functions.

> ⚠ **CAUTION**: Before removing the fan module, ensure you have a replacement fan module at hand. After removing a failed fan module, you must install a new fan module as quickly as possible to prevent chassis overheating. The PTX10003 cooling system shuts down if a single fan tray is out of the chassis for more than 240 seconds. The cooling system shuts down immediately if you remove more than one fan tray from the chassis.

To install a fan module in a PTX10003 (see Figure 52 on page 129):

1. To prevent damage to the equipment caused by static discharge, 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. Taking care not to touch the connectors, remove the fan module from its bag.
3. Align the module with the open slot on the FRU end of the PTX10003 and slide it in until it is fully seated.
4. Using the Phillips screwdriver, tighten the locking screw (3 or 4 turns). See Figure 52 on page 129.

Figure 52: Installing a PTX10003 Fan Module



Maintaining the PTX10003 Power Supplies

IN THIS SECTION

- Replacing an AC/HVDC Power Supply in the PTX10003 | 130
- Replacing an DC Power Supply in the PTX10003 | 135

The power supplies in a PTX10003 are hot-removable and hot-insertable field-replaceable units; You can remove and replace them without powering off the PTX10003 or disrupting routing functions.

CAUTION: Do not mix AC/HVDC and DC power supplies in the same chassis.

Replacing an AC/HVDC Power Supply in the PTX10003

IN THIS SECTION

- Remove the AC/HVDC Power Supply from the PTX10003 | 131
- Install the AC/HVDC Power Supply in the PTX10003 | 133

WARNING: Turn off the power source before disconnecting the power cord to prevent damage to the power connector contact.

WARNING: If you need to replace all the power supplies installed in your PTX10003, you must power off the PTX10003 before removing the power supplies. See "Powering Off the PTX10003" on page 122.

CAUTION: Replace the power supply within one minute of removal to prevent chassis overheating. Before removing the power supply, ensure you have a replacement power supply available.

CAUTION: The AC/HVDC power supply you are installing must use the same airflow direction as the fan trays installed in the router. Labels on the power supply handle indicate the direction of airflow. See "PTX10003 Cooling System Description and Airflow" on page 29.

CAUTION: Before you replace a power supply in a PTX10003, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 195).

Here's the parts and tools you'll need to replace a power supply:

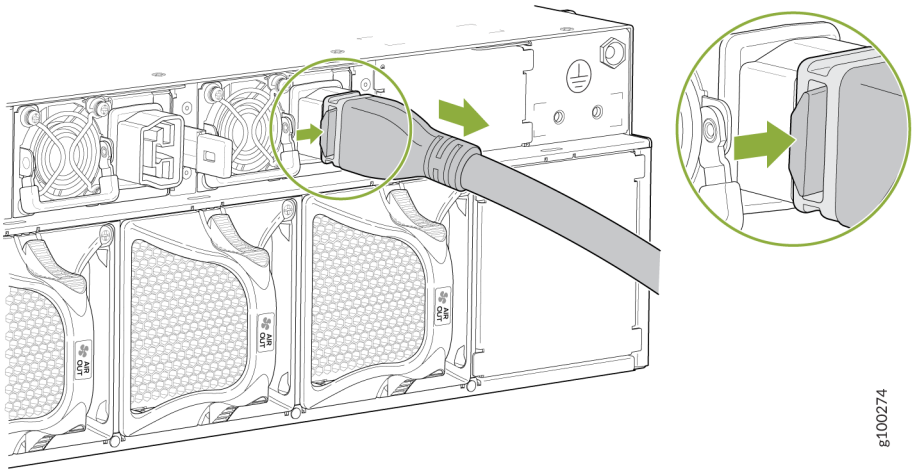
- ESD grounding strap (provided)
- Antistatic bag or an antistatic mat (not provided)
- (For a DC power supply) Phillips (+) screwdriver, number 2 (not provided)

Remove the AC/HVDC Power Supply from the PTX10003

1. Place the antistatic bag or the antistatic mat on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the device.
3. Disconnect power to the PTX10003 power supply you are going to replace. If the AC input power source outlet has a power switch, set it to the off (**O**) position. If the AC input power source outlet does not have a power switch, gently pull out the plug end of the power cord connected to the power source outlet.

4. Remove the power cord from the power supply by pressing in the locking button on the side of the power connector and gently pulling the connector out of the power supply faceplate. Refer to Figure 53 on page 132.

Figure 53: Removing the Power Cord from the Power Supply



5. Slide the ejector lever on the power supply toward the orange handle until it stops.

6. 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. See Figure 54 on page 133 and Figure 55 on page 133.

Figure 54: Removing an AC/HVDC Power Supply from the PTX10003-160C

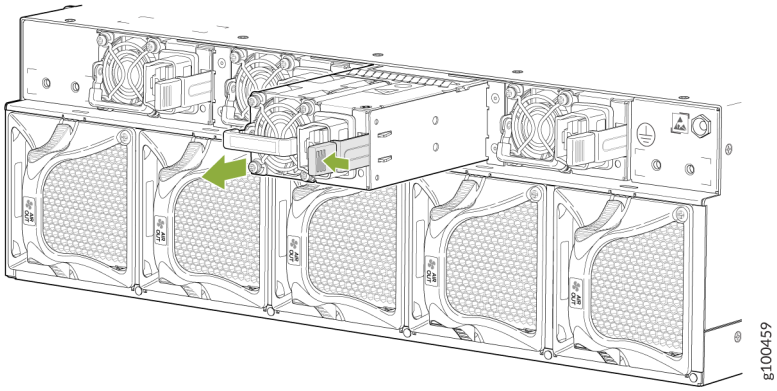
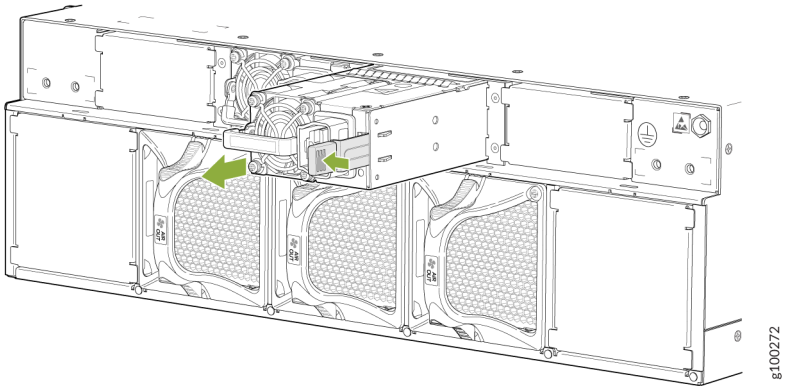


Figure 55: Removing an AC/HDVC Power Supply from the PTX10003-80C



7. Place the power supply in the antistatic bag or on the antistatic mat placed on a flat, stable surface.
8. Install a new power supply within one minute of removing the old one.

Install the AC/HVDC Power Supply in the PTX10003

CAUTION: Install the power supply within one minute of removal to prevent chassis overheating. Before removing the power supply, ensure you have a replacement power supply available.

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the device.
2. If the power supply has protective plastic wrap, peel and remove the plastic wrap from all four sides of the power supply.
3. Taking care not to touch power supply components, pins, leads, or solder connections, remove the power supply from its bag.
4. Using both hands, place the power supply in the power supply slot on the field replaceable units (FRU) panel of the PTX10003 and slide it in until it is fully seated and the ejector lever slides into place. See Figure 56 on page 134 and Figure 57 on page 134.

Figure 56: Installing a PTX10003-160C AC/HVDC Power Supply

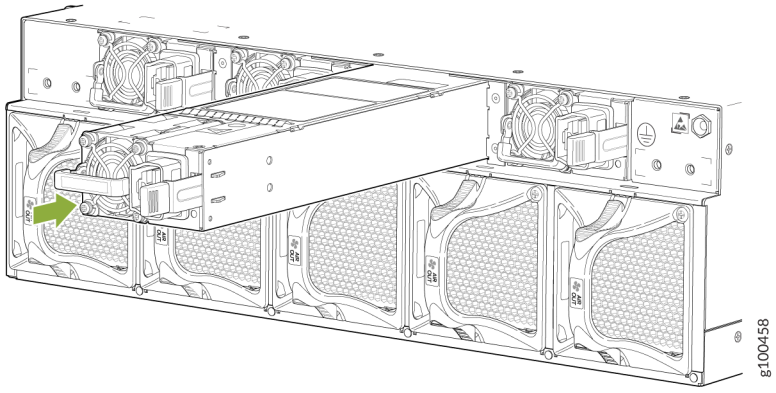
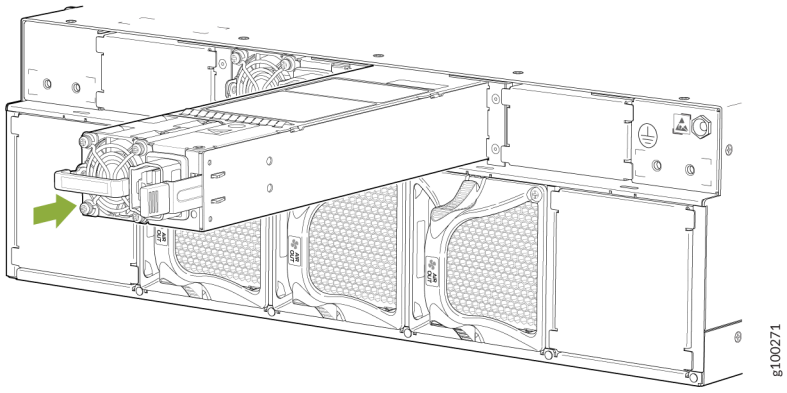


Figure 57: Installing a PTX10003-80C AC/HVDC Power Supply



NOTE: Each power supply must be connected to a dedicated power source outlet.

NOTE: If you have a Juniper Care service contract, register any addition, change, or upgrade of hardware components at https://www.juniper.net/customers/support/tools/updateinstallbase/ . 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.

Replacing an DC Power Supply in the PTX10003

IN THIS SECTION

- Remove the DC Power Supply from the PTX10003 | **136**
- Install the DC Power Supply in the PTX10003 | **137**

WARNING: Turn off the circuit breaker for the DC power source before disconnecting the power cord from the power supply. Unplugging an DC connection while the power supply is powered up may damage the electrical connectors.

WARNING: If you need to replace all the power supplies installed in your PTX10003, you must power off the PTX10003 before removing the power supplies. See "Powering Off the PTX10003" on page 122.

CAUTION: Replace the power supply within one minute of removal to prevent chassis overheating. Before removing the power supply, ensure you have a replacement power supply available.

CAUTION: The DC power supply you are installing must use the same airflow direction as the fan trays installed in the router. Labels on the power supply handle indicate the direction of airflow. See "PTX10003 Cooling System Description and Airflow" on page 29.

CAUTION: Before you replace a power supply in a PTX10003, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see "Prevention of Electrostatic Discharge Damage" on page 195).

Remove the DC Power Supply from the PTX10003

1. Place the antistatic bag or the antistatic mat on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the device.
3. Turn off the circuit breaker for the power feed to the power supply that you are replacing. Be sure the LEDs turn off on the power supply that you are removing.
4. Loosen the thumb screws for the power cable. Gently pull out the socket end of the power plug connected to the power supply faceplate.
5. Disconnect a connector for the power cables or release each of three cables from the power supply (requires a standard screw driver).
6. Grasp the power supply handle while pressing the release latch towards the power supply handle.

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. See Figure 58 on page 137and Figure 59 on page 137.

Figure 58: Removing a DC Power Supply from the PTX10003-160C

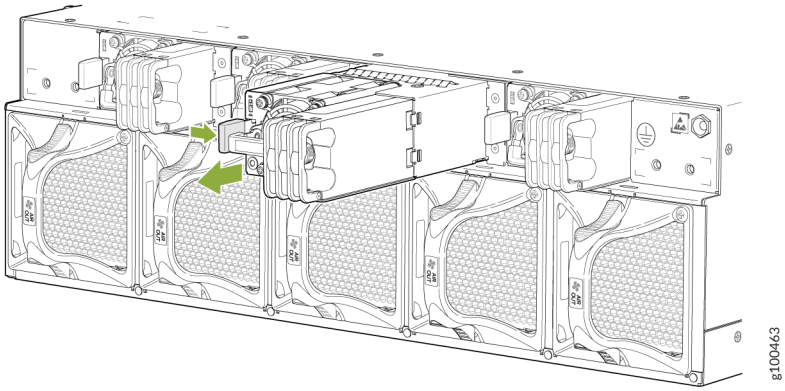
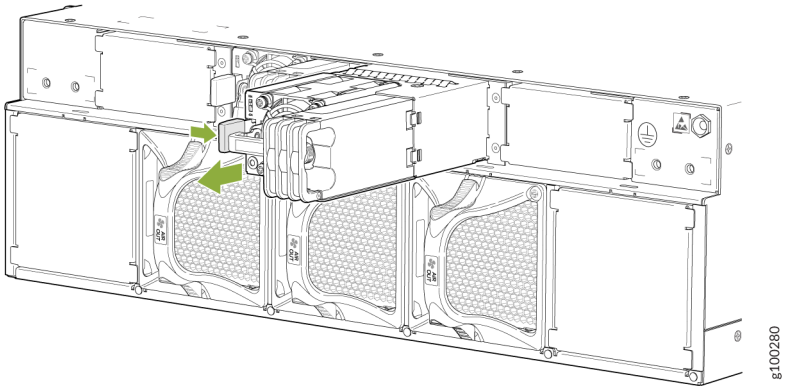


Figure 59: Removing a DC Power Supply from the PTX10003-80C



8. Place the power supply in the antistatic bag or on the antistatic mat placed on a flat, stable surface.
9. Install a new power supply within one minute of removing the old one.

Install the DC Power Supply in the PTX10003

CAUTION: Install the power supply within one minute of removal to prevent chassis overheating. Before removing the power supply, ensure you have a replacement power supply available.

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the device.
2. If the power supply has protective plastic wrap, peel and remove the plastic wrap from all four sides of the power supply.
3. Taking care not to touch power supply components, pins, leads, or solder connections, remove the power supply from its bag.
4. To prevent damage to the equipment caused by static discharge, attach an ESD grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
5. Taking care not to touch power supply components, pins, leads, or solder connections, remove the power supply from its bag.

6. Using both hands, place the power supply in the power supply slot on the field replaceable units (FRU) panel of the PTX10003 and slide it in until it is fully seated and the locking lever slides into place. See Figure 60 on page 139 and Figure 61 on page 139.

Figure 60: Installing a DC Power Supply (PTX10003-160C)

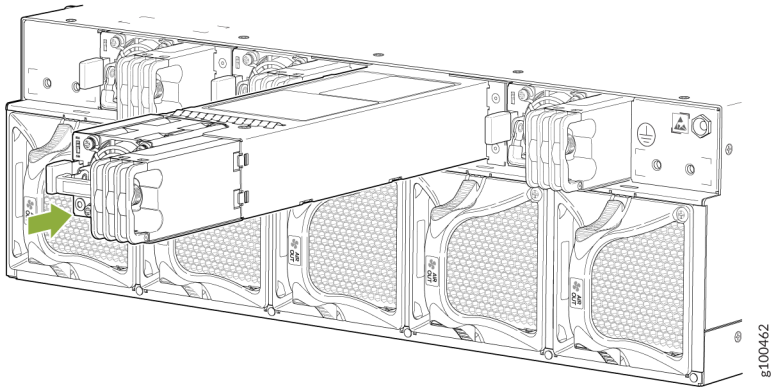
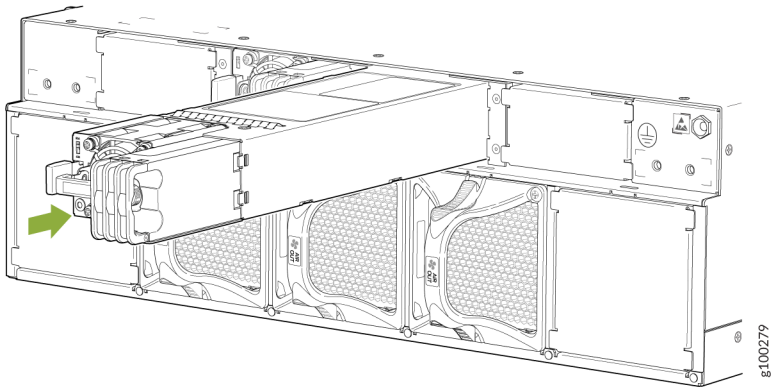


Figure 61: Installing a DC Power Supply (PTX10003-80C)



NOTE: Each power supply must be connected to a dedicated power source outlet.

NOTE: If you have a Juniper Care service contract, register any addition, change, or upgrade of hardware components at https://www.juniper.net/customers/support/tools/updateinstallbase/ .

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.

Maintaining Transceivers and Fiber-Optic Cables on the PTX10003-80C

IN THIS SECTION

- Removing a Transceiver from the PTX10003-80C | **140**
- Installing a Transceiver in the PTX10003-80C | **142**
- Disconnecting a Fiber-Optic Cable from a PTX10003-80C | **145**
- Connecting a Fiber-Optic Cable to a PTX10003-80C | **146**
- Maintaining Fiber-Optic Cables | **147**

Removing a Transceiver from the PTX10003-80C

Before you begin removing a transceiver from a device, ensure that you have taken the necessary precautions for safe handling of lasers (see "Laser and LED Safety Guidelines and Warnings" on page 183).

Ensure that you have the following parts and tools available:

- An antistatic bag or an antistatic mat
- Rubber safety caps to cover the transceiver and fiber-optic cable connector
- A dust cover to cover the port

The transceivers for Juniper Networks 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.

NOTE: After you remove a transceiver or when you change the media-type configuration, wait for 6 seconds for the interface to display the operational commands.

Figure 62 on page 142 shows a QSFP+ transceiver.

To remove a transceiver from a device:

1. Place the antistatic bag or antistatic mat on a flat, stable surface.
2. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the device.
3. Label the cable connected to the transceiver so that you can reconnect it correctly.

LASER 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.

LASER 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. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

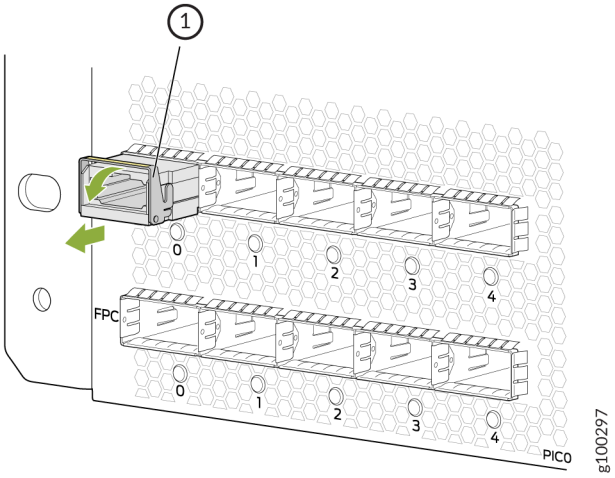
4. Remove the cable connected to the transceiver (see "Disconnecting a Fiber-Optic Cable from a PTX10003-80C" on page 145). Cover the transceiver and the end of each fiber-optic cable connector with a rubber safety cap immediately after disconnecting the fiber-optic cables.
5. To remove a transceiver:
   a. By using your fingers, pull open the ejector lever on the transceiver to unlock the transceiver.

CAUTION: Before removing the transceiver, make sure that you open the ejector lever completely until you hear it click. This prevents damage to the transceiver.

b. Grasp the transceiver ejector lever and gently slide the transceiver approximately 0.5 in. (1.3 cm) straight out of the port.

> **CAUTION**: To prevent electrostatic discharge (ESD) damage to the transceiver, do not touch the connector pins at the end of the transceiver.

Figure 62: Removing a Transceiver



1– Ejector lever

6. By using your fingers, grasp the body of the transceiver and pull it straight out of the port.
7. Place the transceiver in the antistatic bag or on the antistatic mat placed on a flat, stable surface.
8. Place the dust cover over the empty port.

Installing a Transceiver in the PTX10003-80C

Before you begin installing a transceiver in a device, ensure that you have taken the necessary precautions for safe handling of lasers (see "Laser and LED Safety Guidelines and Warnings" on page 183).

Ensure that you have a rubber safety cap available to cover the transceiver.

The transceivers for Juniper Networks devices are hot-removable and hot-insertable field-replaceable units (FRUs). You can remove and replace them without powering off the device or disrupting the device functions.

NOTE: After you insert a transceiver or after you change the media-type configuration, wait for 6 seconds for the interface to display operational commands.

NOTE: We recommend that you use only optical transceivers and optical connectors purchased from Juniper Networks with your Juniper Networks device.

CAUTION: The Juniper Networks Technical Assistance Center (JTAC) provides complete support for Juniper-supplied optical modules and cables. However, JTAC does not provide support for third-party optical modules and cables that are not qualified or supplied by Juniper Networks. If you face a problem running a Juniper device that uses third-party optical modules or cables, JTAC may help you diagnose host-related issues if the observed issue is not, in the opinion of JTAC, related to the use of the third-party optical modules or cables. Your JTAC engineer will likely request that you check the third-party optical module or cable and, if required, replace it with an equivalent Juniper-qualified component.

Use of third-party optical modules with high-power consumption (for example, coherent ZR or ZR+) can potentially cause thermal damage to or reduce the lifespan of the host equipment. Any damage to the host equipment due to the use of third-party optical modules or cables is the users' responsibility. Juniper Networks will accept no liability for any damage caused due to such use.

Figure 63 on page 144 shows a QSFP+ transceiver.

To install a transceiver:

CAUTION: To prevent electrostatic discharge (ESD) damage to the transceiver, do not touch the connector pins at the end of the transceiver.

1. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the device.
2. Remove the transceiver from its bag.
3. Check to see whether the transceiver is covered with a rubber safety cap. If it is not, cover the transceiver with a rubber safety cap.

LASER 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.

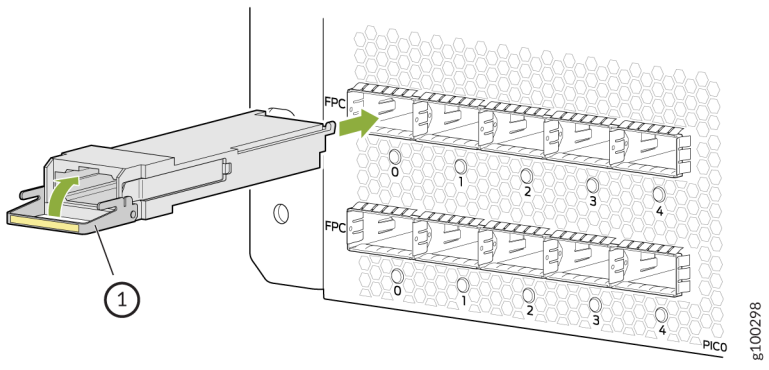
4. If the port in which you want to install the transceiver is covered with a dust cover, remove the dust cover and save it in case you need to cover the port later. If you are hot-swapping a transceiver, wait for at least 10 seconds after removing the transceiver from the port before installing a new transceiver.
5. Using both hands, carefully place the transceiver in the empty port. The connectors must face the 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.

6. Slide the transceiver in gently until it is fully seated. If you are installing a CFP transceiver, tighten the captive screws on the transceiver by using your fingers.
7. Remove the rubber safety cap when you are ready to connect the cable to the transceiver.

LASER 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 63: Installing a Transceiver



1– Ejector lever

Disconnecting a Fiber-Optic Cable from a PTX10003-80C

Before you begin disconnecting a fiber-optic cable from an optical transceiver, ensure that you have taken the necessary precautions for safe handling of lasers. See "Laser and LED Safety Guidelines and Warnings" on page 183.

Ensure that you have the following parts and tools available:

- A rubber safety cap to cover the transceiver
- A rubber safety cap to cover the fiber-optic cable connector

Juniper Networks devices have field-replaceable unit (FRU) optical transceivers to which you can connect fiber-optic cables.

To disconnect a fiber-optic cable from an optical transceiver installed in the device:

1. Disable the port in which the transceiver is installed by issuing the following command:

```
[edit interfaces]
user@device# set interface-name disable
```



LASER 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.

2. Carefully unplug the fiber-optic cable connector from the transceiver.
3. Cover the transceiver with a rubber safety cap.



LASER 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.

Connecting a Fiber-Optic Cable to a PTX10003-80C

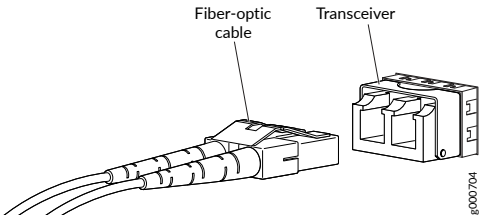
Before you begin connecting a fiber-optic cable to an optical transceiver installed in a device, ensure that you have taken the necessary precautions for safe handling of lasers (see "Laser and LED Safety Guidelines and Warnings" on page 183).

To connect a fiber-optic cable to an optical transceiver installed in a device:

> **LASER 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. Wrap and fasten one end of the ESD wrist strap around your bare wrist, and connect the other end of the strap to the ESD point on the device.
2. If the fiber-optic cable connector is covered with a rubber safety cap, remove the cap. Save the cap.
3. Remove the rubber safety cap from the optical transceiver. Save the cap.
4. Insert the cable connector into the optical transceiver (see Figure 64 on page 146).

Figure 64: Connecting a Fiber-Optic Cable to an Optical Transceiver Installed in a Device



5. Secure the cables so that they do not support 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.

Maintaining Fiber-Optic Cables

Fiber-optic cables connect to optical transceivers that are installed in Juniper Networks devices.

To maintain fiber-optic cables:

- 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 cables to prevent stress on the connectors. When attaching a fiber-optic cable to a transceiver, be sure to secure the fiber-optic cable so that it does not support its own weight as it hangs to the floor. Never let a fiber-optic cable hang free from the connector.
- Avoid bending fiber-optic cables beyond their minimum bend radius. Bending fiber-optic cables into arcs smaller than a few inches in diameter 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 Opptex Cletop-S®Fiber Cleaner. Follow the directions in the cleaning kit you use.

Uninstalling the PTX10003

Before removing a PTX10003 from a rack:

Here's the parts and tools you'll need to relocate the PTX10003:

- Either a mechanical lift or two persons to support the weight of the PTX10003. An additional person is needed to remove the screws securing the router to the rack.

- Screwdriver appropriate for your rack-mounting screws.

If you need to relocate an installed PTX10003, perform the following procedure.

> **NOTE**: When you remove multiple devices from a rack, remove the device at the top of the rack first and proceed to remove the rest of the devices from top to bottom to avoid toppling the rack.

- Ensure that the rack is stable and secured to the building.
- Ensure that there is enough space to place the removed PTX10003 in its new location and along the path to the new location.
- Read "General Safety Guidelines and Warnings" on page 170 and "PTX10003 Installation Safety Guidelines" on page 95.
- Power off the device (see "Powering Off the PTX10003" on page 122).
- Disconnect the power cords.
- Ensure that you have disconnected any cables or wires attached to the PTX10003 (see "Disconnecting a Fiber-Optic Cable from a PTX10003-80C" on page 145).

To remove a PTX10003 from a rack:

1. Perform one of the following steps:
   - Position a mechanical lift under the PTX10003. Use the screwdriver to remove the front-mounting screws that attach the router to the rack.
   - Have two persons support the weight of the PTX10003 while another person uses the screwdriver to remove the front-mounting screws that attach the router to the rack.
2. Remove the PTX10003 from the rack.
3. Use the screwdriver to remove the mounting screws that attach the rear-mounting blades to the rear of the rack.
4. Place the removed screws and rear-mounting blades in a labeled bag. You will need them when you reinstall the chassis.
5. Transport the PTX10003 to the new location.

RELATED DOCUMENTATION

Mounting the PTX10003 in a Rack | 98

5

CHAPTER

Troubleshooting Hardware

Troubleshooting the PTX10003 | 150

Troubleshooting the PTX10003

IN THIS SECTION

- PTX10003 Troubleshooting Resources Overview | 150
- PTX10003 Alarm Messages Overview | 151
- PTX10003 System Alarm Messages and Recommended Actions | 151

PTX10003 Troubleshooting Resources Overview

To troubleshoot a PTX10003, you use the Junos OS Evolved CLI, alarms, and LEDs on the network ports, management panel, and components.

- LEDs—When the Routing Engine detects an alarm condition, it lights the red or yellow alarm LED on the management panel as appropriate. In addition, you can also use component LEDs and network port LEDs to troubleshoot the PTX10003. For more information, see the following topics:
  - "PTX10003 Management Panel LEDs" on page 25
  - "PTX10003 Port LEDs" on page 16
  - "Fan Module Status and LED Description" on page 31
- CLI—The CLI is the primary tool for controlling and troubleshooting hardware, Junos OS Evolved, routing protocols, and network connectivity. CLI commands display information from routing tables, information specific to routing protocols, and information about network connectivity derived from the ping and traceroute utilities. For information about using the CLI to troubleshoot Junos OS Evolved, see the appropriate Junos OS Evolved configuration guide.
- JTAC—If you need assistance during troubleshooting, you can contact the Juniper Networks Technical Assistance Center (JTAC) by using the Web or by telephone. If you encounter software problems, or problems with hardware components not discussed here, contact JTAC.

SEE ALSO

Contact Customer Support | 156

PTX10003 Alarm Messages Overview

When the Routing Engine detects an alarm condition, it lights the red or yellow alarm LED on the management panel as appropriate. To view a more detailed description of the alarm cause, issue the `show system alarms` CLI command:

```
user@host> show system alarms
6 alarms currently active
Alarm time               Class  Description
2018-02-07 12:12:18 PST  Major  FPC Management1 Ethernet Link Down
2018-02-07 12:11:54 PST  Minor  FPC0: LED 3:Alarm LED Read Error
2018-02-07 12:11:54 PST  Minor  FPC0: LED 3:Alarm LED Write Error
2018-02-07 12:11:54 PST  Major  FPC0: PEM 1 Not Supported
2018-02-07 12:11:54 PST  Major  FPC0: PEM 0 Not Supported
2018-02-07 12:11:54 PST  Major  FPC0: PEM 0 Not Powered
```

SEE ALSO

Definitions of Safety Warning Levels | 171

PTX10003 System Alarm Messages and Recommended Actions

System alarms indicate a failure on the device or one of its components. System alarms are preset and cannot be modified.

System alarms on PTX10003 routers have two severity levels:

- Major (red)—Indicates a critical situation on the device that has resulted from one of the conditions described in Table 36 on page 152. 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 36 on page 152 describes the system alarm messages on the PTX10003.

Table 36: PTX10003 System Alarm Messages

Component	Alarm Type	CLI Message	Recommended Action
Fans	Major (red)	`Fan Failure`	Replace the fan module 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: • `CM ENV Monitor: Get fan speed failed.` • *`fan-number`* `is NOT spinning @ correct speed`, where *`fan-number`* can be 1, 2, or 3.
		`Fan` *`fan-number`* `Not Spinning`	Remove and check the fan module for obstructions, and then reinsert the fan module. If the problem persists, replace the fan module.
	Minor (yellow)	`Fan/Blower Absent`	Check the system log for the message *`fan-number`* `Absent`, where *`fan-number`* can be 1, 2, or 3. Install the fan module.
Power supplies	Major (red)	`PSMx Fan Failure`	Replace PSM and RMA
		`PSMx Input Failure`	Check input power feeds
	Minor (yellow)	`Zone 0 N+2 Power redundancy missing`	Install a redundant PSM and check the input power feeds

Table 36: PTX10003 System Alarm Messages *(Continued)*

Component	Alarm Type	CLI Message	Recommended Action
Temperature sensors	Major (red)	*sensor-location* Temp Sensor Fail	Check the system log for the following message and report it to customer support: Temp sensor *sensor-number* failed, where *sensor-number* ranges from 1 through 10.
		sensor-location Temp Sensor Too Hot	Check environmental conditions and alarms on other devices. Ensure that environmental factors (such as hot air blowing around the equipment) do not affect the temperature sensor. If the condition persists, the device might shut down.
	Minor (yellow)	*sensor-location* 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) do not affect the temperature sensor.
Routing Engine	Minor (yellow)	RE *RE number* /var partition usage is high	Clean up the system file storage space on the device.
	Major (red)	RE *RE number* /var partition is full	Clean up the system file storage space on the device.
	Minor (yellow)	Rescue configuration is not set	Use the **request system configuration rescue save** command to set the rescue configuration.

Table 36: PTX10003 System Alarm Messages *(Continued)*

Component	Alarm Type	CLI Message	Recommended Action
		Feature `usage requires a license` or `License for` *feature* `expired`	Install the required license for the feature specified in the alarm.
Management Ethernet interface	Major (red)	`Management Ethernet 1 Link Down`	Check whether a cable is connected to the management Ethernet interface, or whether the cable is defective. Replace the cable, if required. If the problem cannot be resolved, open a support case by using the Case Manager link at https://www.juniper.net/support/ or call 1-888-314-5822 (toll free, US and Canada)or 1-408-745-9500 (from outside the United States).

SEE ALSO

> *Configuring Junos OS to Determine Conditions That Trigger Alarms on Different Interface Types*
>
> *alarm*

CHAPTER 6

Contacting Customer Support and Returning the Chassis or Components

Contact Customer Support | 156

Returning the PTX10003 Chassis or Components | 157

Contact Customer Support

You can contact Juniper Networks Technical Assistance Center (JTAC) 24 hours a day, 7 days a week in one of the following ways:

- On the Web, using the Service Request Manager link at:

  https://support.juniper.net/support/

- By telephone:
  - From the US and Canada: 1-888-314-JTAC
  - From all other locations: 1-408-745-9500

> **NOTE**: If contacting JTAC by telephone, enter your 12-digit service request number followed by the pound (#) key if this is an existing case, or press the star (*) key to be routed to the next available support engineer.

When requesting support from JTAC by telephone, be prepared to provide the following information:

- Your existing service request number, if you have one
- 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
- Your name, organization name, telephone number, fax number, and shipping address

The support representative validates your request and issues an RMA number for return of the component.

Returning the PTX10003 Chassis or Components

IN THIS SECTION

- Locating the Serial Number on a PTX10003 Chassis or Component | 157
- Returning a PTX10003 or Component for Repair or Replacement | 164
- Contact Customer Support to Obtain a Return Material Authorization | 164
- Packing a PTX10003 Chassis or Component for Shipping | 165

Locating the Serial Number on a PTX10003 Chassis or Component

IN THIS SECTION

- Listing the PTX10003 Chassis and Component Details by Using the CLI | 158
- Locating the PTX10003 Chassis Serial Number ID Label | 160
- Locating the Serial Number ID Labels on PTX10003 Components | 160

If you are returning a PTX10003 or a PTX10003 field-replaceable unit to Juniper Networks for repair or replacement, you must locate the serial number of the router or field-replaceable unit. 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 "Contact Customer Support to Obtain a Return Material Authorization" on page 164.

If the PTX10003 is operational and you can access the command-line interface (CLI), you can list serial numbers for the router and some components with a CLI command. If you do not have access to the CLI or if the serial number for the field-replaceable unit does not appear in the command output, you can locate the serial number ID label on the router or field-replaceable unit.

NOTE: If you want to find the serial number ID label on a component, you need to remove the component from the chassis, for which you must have the required parts and tools available.

NOTE: You must remove the fan module to read the fan serial number from the serial number ID label. The fan module serial number cannot be viewed through the CLI. **Fan Tray 2** refers to the third module from the left, counting from 0.

Listing the PTX10003 Chassis and Component Details by Using the CLI

To list the PTX10003 and components and their serial numbers, use the `show chassis hardware` CLI operational mode command.

Here is a sample of the CLI output for the PTX10003-160C:

```
user@host> show chassis hardware

Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                JN1269142AJD      JNP10003-160C [PTX10003-160C]
FPM 0            REV 04   711-078358   BCAD0775          FPM-JNP10003
PDU 0            REV 03   711-081294   BCAD0815          PDU-JNP10003
PSM 2            REV 01   740-073765   1GE27460006       AC AFO 3000W PSU
PSM 3            REV 01   740-073765   1GE27500072       AC AFO 3000W PSU
Routing Engine 0 REV 05   750-080696   BCAG7004          RE-JNP10003-160C
CB 0             REV 06   750-077001   BCAG8104          Control Board
FPC 0            REV 07   750-077005   BCAG8283          FPC-JNP10003-MEZZ-C
  PIC 0                   BUILTIN      BUILTIN           4x400G/10x200G/20x100G
  PIC 1                   BUILTIN      BUILTIN           4x400G/10x200G/20x100G
FPC 1                     BUILTIN      BUILTIN           FPC-JNP10003-LOGICAL
  PIC 0                   BUILTIN      BUILTIN           4x400G/10x200G/20x100G
  PIC 1                   BUILTIN      BUILTIN           4x400G/10x200G/20x100G
FPC 2            REV 04   750-077004   BCAG7036          FPC-JNP10003-MEZZ-B
  PIC 0                   BUILTIN      BUILTIN           4x400G/10x200G/20x100G
  PIC 1                   BUILTIN      BUILTIN           4x400G/10x200G/20x100G
    Xcvr 5       REV 01   740-084673   SS1TY2A349003     QSFP28-DD-2X100GBASE-SR4
    Xcvr 6       REV 01   740-084673   2E1CY2A34901L     QSFP28-DD-2X100GBASE-SR4
    Xcvr 8       REV 01   740-084673   2E1CY2A34900C     QSFP28-DD-2X100GBASE-SR4
    Xcvr 9       REV 01   740-084673   SS1TY2A349002     QSFP28-DD-2X100GBASE-SR4
FPC 3            REV 04   750-077003   BCAG8098          FPC-JNP10003-MEZZ-A
  PIC 0                   BUILTIN      BUILTIN           4x400G/10x200G/20x100G
  PIC 1                   BUILTIN      BUILTIN           4x400G/10x200G/20x100G
SIB 0                     BUILTIN      BUILTIN           SIB-JNP10003
SIB 1                     BUILTIN      BUILTIN           SIB-JNP10003
```

```
Fan Tray 0       REV 03   750-077190   BCAD1337          JNP10003 Fan Tray, Front to Back
Airflow - AFO
Fan Tray 1       REV 05   750-077190   BCAD1433          JNP10003 Fan Tray, Front to Back
Airflow - AFO
Fan Tray 2       REV 05   750-077190   BCAD1359          JNP10003 Fan Tray, Front to Back
Airflow - AFO
Fan Tray 3       REV 05   750-077190   BCAD1340          JNP10003 Fan Tray, Front to Back
Airflow - AFO
Fan Tray 4       REV 03   750-077190   BCAD1435          JNP10003 Fan Tray, Front to Back
Airflow - AFO
```

Here is an example of the CLI output for the PTX10003-80C:

```
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                JN1268FE3AJD      JNP10003-80C [PTX10003-80C]
FPM 0            REV 08   711-078358   BCAJ8781          FPM-JNP10003
PDU 0            REV 06   711-081294   BCAH7428          PDU-JNP10003
PSM 1            REV 03   740-073765   1GE28340085       AC AFO 3000W PSU
PSM 2            REV 03   740-073765   1GE28340094       AC AFO 3000W PSU
Routing Engine 0 REV 57   750-080695   S                 RE-JNP10003-80C
CB 0             REV 18   750-077001   BCAP2631          Control Board
FPC 0            REV 14   750-077005   BCAP2645          FPC-JNP10003-MEZZ-C
  PIC 0                   BUILTIN      BUILTIN           4x400G/10x200G/20x100G
    Xcvr 0       REV 01   740-038625   APF18250052JTN    QSFP+-40G-CU5M
    Xcvr 1       REV 01   740-038625   APF18250052JTN    QSFP+-40G-CU5M
    Xcvr 2       REV 01   740-038625   APF18250052R7W    QSFP+-40G-CU5M
    Xcvr 3       REV 01   740-038625   APF18250052R7W    QSFP+-40G-CU5M
    Xcvr 4       REV 01   740-067442   1ACP13290K6       QSFP+-40G-SR4
    Xcvr 5       REV 01   740-052009   U03A7UM           QSFP+-40G-LR4
    Xcvr 6       REV 01   740-052009   U03A7RJ           QSFP+-40G-LR4
    Xcvr 7       REV 01   740-052009   U02ABHV           QSFP+-40G-LR4
    Xcvr 8       REV 01   740-052009   U03A1YC           QSFP+-40G-LR4
    Xcvr 9       REV 01   740-052009   U03A1WR           QSFP+-40G-LR4
  PIC 1                   BUILTIN      BUILTIN           4x400G/10x200G/20x100G
    Xcvr 0       REV 02   740-056706   1FCP8320016       QSFP+4x10G-IR (PSM4)
    Xcvr 1       REV 02   740-056706   1FCP831001V       QSFP+4x10G-IR (PSM4)
    Xcvr 2       REV 02   740-056706   1FCP832400D       QSFP+4x10G-IR (PSM4)
    Xcvr 3       REV 02   740-056706   1FCP832003C       QSFP+4x10G-IR (PSM4)
    Xcvr 4       REV 02   740-056706   1FCP832401B       QSFP+4x10G-IR (PSM4)
    Xcvr 5       REV 01   740-061408   1F2CQ5A3330S9     QSFP-100G-CWDM4
    Xcvr 6       REV 01   740-061408   1F2CQ5A3330W8     QSFP-100G-CWDM4
```

```
    Xcvr 7       REV 01   740-061408   1F2CQ5A3330R5     QSFP-100G-CWDM4
    Xcvr 8       REV 01   740-061408   1F2CQ5A3330R8     QSFP-100G-CWDM4
    Xcvr 9       REV 01   740-061408   1F2CQ5A33302Q     QSFP-100G-CWDM4
FPC 1                     BUILTIN      BUILTIN           FPC-JNP10003-LOGICAL
  PIC 0                   BUILTIN      BUILTIN           4x400G/10x200G/20x100G
    Xcvr 0       REV 01   740-038625   APF18250052R2P    QSFP+-40G-CU5M
    Xcvr 1       REV 01   740-038625   APF18250052R2P    QSFP+-40G-CU5M
    Xcvr 2       REV 01   740-038625   APF18250052R5V    QSFP+-40G-CU5M
    Xcvr 3       REV 01   740-038625   APF18250052R5V    QSFP+-40G-CU5M
    Xcvr 4       REV 01   740-067442   1ACP13290HX       QSFP+-40G-SR4
    Xcvr 5       REV 01   740-054053   XZS0AGM           QSFP+-4X10G-SR
    Xcvr 6       REV 01   740-054053   XZS0KT2           QSFP+-4X10G-SR
    Xcvr 7       REV 01   740-054053   XZS0AE9           QSFP+-4X10G-SR
    Xcvr 8       REV 01   740-054053   XZS0KT4           QSFP+-4X10G-SR
    Xcvr 9       REV 01   740-054053   XZS0AFY           QSFP+-4X10G-SR
  PIC 1                   BUILTIN      BUILTIN           4x400G/10x200G/20x100G
    Xcvr 0       REV 02   740-056705   1AMP23290CQ       QSFP+40GE-LX4
    Xcvr 1       REV 02   740-056705   1AMP23290C0       QSFP+40GE-LX4
    Xcvr 2       REV 02   740-056705   1AMP23290CE       QSFP+40GE-LX4
    Xcvr 3       REV 02   740-056705   1AMP232909A       QSFP+40GE-LX4
    Xcvr 4       REV 02   740-056705   1AMP23290AW       QSFP+40GE-LX4
    Xcvr 5       REV 02   740-054050   1FCPB322029       QSFP+-4X10G-LR
    Xcvr 6       REV 02   740-054050   1FCPB32106E       QSFP+-4X10G-LR
    Xcvr 7       REV 02   740-054050   1FCPB32201Y       QSFP+-4X10G-LR
    Xcvr 8       REV 02   740-054050   1FCPB32208S       QSFP+-4X10G-LR
    Xcvr 9       REV 02   740-054050   1FCPB321072       QSFP+-4X10G-LR
SIB 0                     BUILTIN      BUILTIN           SIB-JNP10003
SIB 1                     BUILTIN      BUILTIN           SIB-JNP10003
Fan Tray 1       REV 07   750-077190   BCAH7469          JNP10003 Fan Tray, Front to Back
Airflow - AFO
Fan Tray 2       REV 07   750-077190   BCAH7525          JNP10003 Fan Tray, Front to Back
Airflow - AFO
Fan Tray 3       REV 07   750-077190   BCAH7622          JNP10003 Fan Tray, Front to Back
Airflow - AFO
```

Locating the PTX10003 Chassis Serial Number ID Label

The serial number ID label is located on a label on the top cover.

Locating the Serial Number ID Labels on PTX10003 Components

For each field-replaceable unit, you must remove the it from the chassis to see the serial number ID label. See Figure 65 on page 162.

- AC power supply—The serial number ID label is on the top of the AC power supply. See Figure 67 on page 163.
- DC power supply—The serial number ID label is on the top of the DC power supply. See Figure 68 on page 163.

- Fan module—The serial number ID label is on the top of the fan module. See Figure 69 on page 163.

Figure 65: Locating the PTX10003-160C Chassis Serial Number

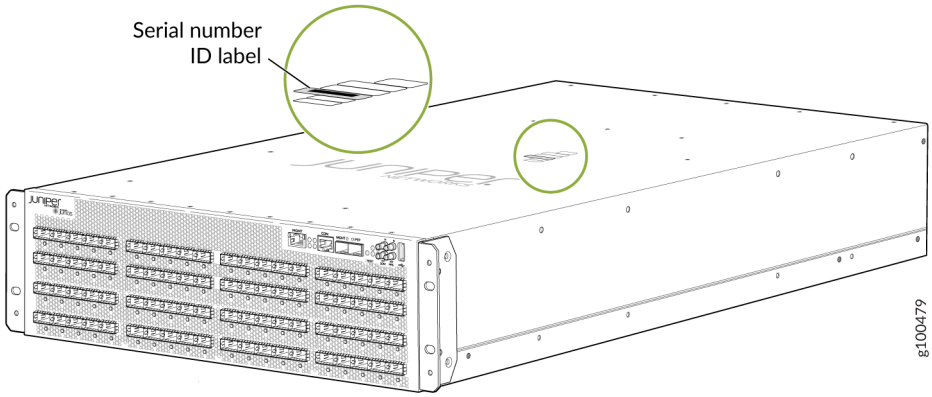


Figure 66: Locating the PTX10003-80C Chassis Serial Number

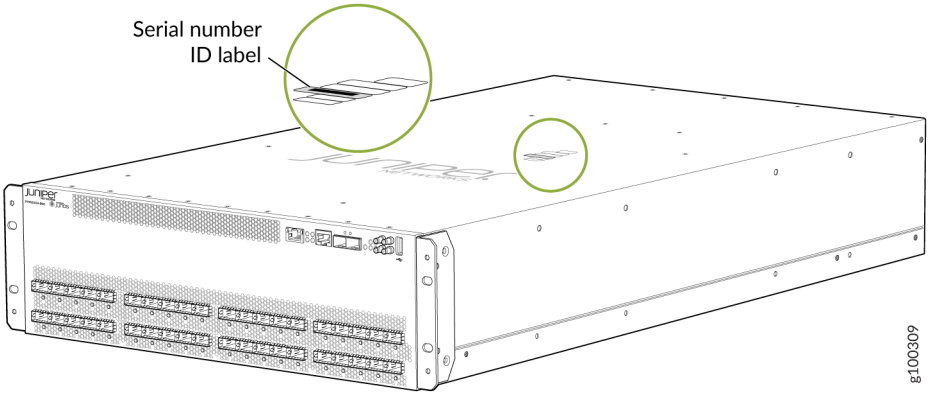


Figure 67: Locating the PTX10003 AC Power Supply Serial Number Label

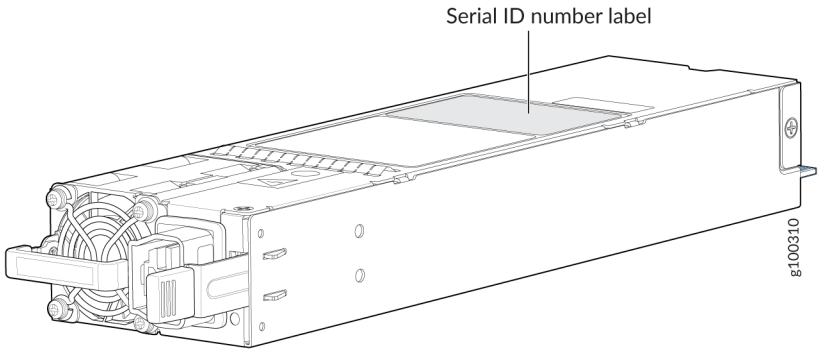


Figure 68: Locating the PTX10003 DC Power Supply Serial Number Label

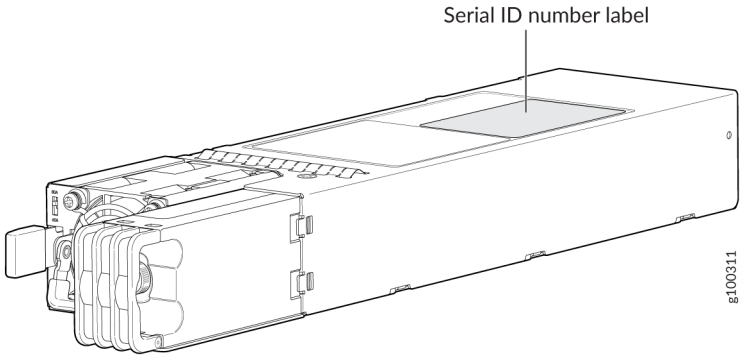
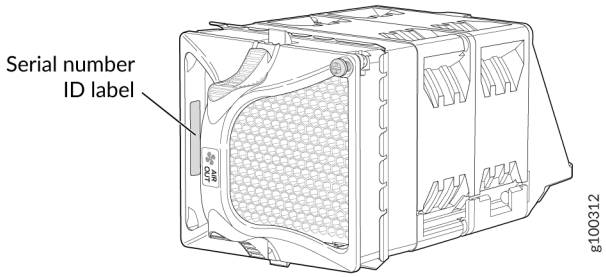


Figure 69: Locating the PTX10003 Fan Module Serial Number Label



Returning a PTX10003 or Component for Repair or Replacement

If you need to return a PTX10003 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 PTX10003 Chassis or Component" on page 157.
2. Obtain a Return Material Authorization (RMA) number from the Juniper Technical Assistance Center (JTAC) as described in "Contact Customer Support to Obtain a Return Material Authorization" on page 164.

   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 router or component for shipping as described in "Packing a PTX10003 Chassis or Component for Shipping" on page 165.

For more information about return and repair policies, see the customer support page at https://www.juniper.net/support/guidelines.html .

Contact Customer Support to Obtain a Return Material Authorization

If you need to return a device or hardware component to Juniper Networks for repair or replacement, obtain a Return Material Authorization (RMA) number from Juniper Networks Technical Assistance Center (JTAC). You must obtain an RMA number before you attempt to return the component.

After locating the serial number of the device or hardware component you want to return, open a service request with the Juniper Networks Technical Assistance Center (JTAC) on the Web or by telephone.

Before you request an RMA number from JTAC, be prepared to provide the following information:

- Your existing service request 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:

- Service Request Manager: https://support.juniper.net/support
- Telephone: +1-888-314-JTAC (+1-888-314-5822), toll free in U.S., Canada, and Mexico

> **NOTE**: For international or direct-dial options in countries without toll free numbers, see https://support.juniper.net/support.

If you are contacting JTAC by telephone, enter your 12-digit service request 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.

Packing a PTX10003 Chassis or Component for Shipping

IN THIS SECTION

- Packing a PTX10003 Chassis for Shipping | **166**
- Packing a PTX10003 Component for Shipping | **166**

If you are returning a PTX10003 chassis or component to Juniper Networks for repair or replacement, pack the item as described in this topic.

Before you pack the chassis or component:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See "Prevention of Electrostatic Discharge Damage" on page 195.
- 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 "Contact Customer Support" on page 156).

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.

Packing a PTX10003 Chassis for Shipping

Here's how to pack a PTX10003 for shipping:

1. Power off the PTX10003 and remove the AC power cords or DC power cables. See "Powering Off the PTX10003" on page 122.
2. Remove the cables that connect the PTX10003 to all external devices.
3. Remove all field-replaceable units from the router. See:
   - "Maintaining the PTX10003 Fan Modules" on page 127
   - "Maintaining the PTX10003 Power Supplies" on page 130
4. Remove the PTX10003 from the rack. See "Uninstalling the PTX10003" on page 147.
5. Place the PTX10003 in an antistatic bag.
6. Place the PTX10003 in the shipping carton.
7. Place the packing foam on top of and around the PTX10003.
8. If you are returning accessories or field-replaceable units with the PTX10003, pack them as instructed in "Packing a PTX10003 Chassis or Component for Shipping" on page 165.
9. Close the top of the cardboard shipping box and seal it with packing tape.
10. Write the return materials authorization (RMA) number on the exterior of the box to ensure proper tracking. See "Contact Customer Support to Obtain a Return Material Authorization" on page 164 for instructions on obtaining an RMA number.

Packing a PTX10003 Component for Shipping

CAUTION: Do not stack PTX10003 components. Return individual components in separate boxes if they do not fit together on one level in the shipping box.

Here's how to pack a PTX10003 component for shipping:

1. Place individual field-replaceable units in antistatic bags.
2. Ensure that the components are adequately protected with packing materials and packed so that the pieces are prevented from moving around inside the carton.
3. Close the top of the cardboard shipping box and seal it with packing tape.

4. Write the RMA number on the exterior of the box to ensure proper tracking. See "Contact Customer Support to Obtain a Return Material Authorization" on page 164 for instructions on obtaining an RMA number.

CHAPTER 7

Safety and Compliance Information

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General Safety Guidelines and Warnings

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.
- Follow the instructions in this guide to properly ground the device 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.

- Some parts of the chassis, including AC and DC power supply surfaces, power supply unit handles, SFB card handles, and fan tray handles might become hot. The following label provides the warning for hot surfaces on the chassis:



- Always ensure that all modules, power supplies, and cover panels are fully inserted and that the installation screws are fully tightened.

Definitions of Safety Warning Levels

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 prevent minor injury or discomfort to you or severe damage to the device.

Attention Veillez à respecter les consignes indiquées pour éviter toute incommodité ou blessure légère, voire des dégâts graves pour l'appareil.

LASER WARNING: This symbol alerts you to the risk of personal injury from a laser.

Avertissement Ce symbole signale un risque de blessure provoquée par rayon 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 familiarize yourself 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.

Avertissement 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 vare 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 eléctricos, 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.

Qualified Personnel Warning



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.

Avertissement 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.

Warning Statement for Norway and Sweden



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.

Fire Safety Requirements

IN THIS SECTION

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- Fire Suppression Equipment | 174

In the event of a fire emergency, 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 device. 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.

Installation Instructions Warning



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.

Avertissement 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.

Chassis and Component Lifting Guidelines

- Before moving the device to a site, ensure that the site meets the power, environmental, and clearance requirements.
- Before lifting or moving the device, disconnect all external cables and wires.
- As when lifting any heavy object, ensure that your legs bear most of the weight rather than your back. Keep your knees bent and your back relatively straight. Do not twist your body as you lift. Balance the load evenly and be sure that your footing is firm.
- Use the following lifting guidelines to lift devices and components:
  - Up to 39.7 lb (18 kg): One person.
  - From 39.7 lb (18 kg) to 70.5 lb (32 kg): Two or more people.
  - From 70.5 lb (32 kg) to 121.2 lb (55 kg): Three or more people.
  - Above 121.2 lb (55 kg): Use material handling systems (such as levers, slings, lifts, and so on). When this is not practical, engage specially trained persons or systems (such as riggers or movers).

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.

Avertissement 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 tillträdas av servicepersonal med ett speciellt verktyg, lås och nyckel, eller annan säkerhetsanordning, och kontrolleras av den auktoritet som ansvarar för området.

Ramp Warning



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.

Avertissement 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.

Rack-Mounting and Cabinet-Mounting Warnings

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:

- Install the device in a rack that is secured to the building structure.
- Mount the device 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 vältytään 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.

Avertissement 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 edificio.
- 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, oeriormente 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.

Grounded Equipment Warning



WARNING: This device must be properly grounded at all times. Follow the instructions in this guide to properly ground the device to earth.

Waarschuwing Dit apparaat moet altijd goed geaard zijn. Volg de instructies in deze gids om het apparaat goed te aarden.

Varoitus Laitteen on oltava pysyvästi maadoitettu. Maadoita laite asianmukaisesti noudattamalla tämän oppaan ohjeita.

Avertissement L'appareil doit être correctement mis à la terre à tout moment. Suivez les instructions de ce guide pour correctement mettre l'appareil à la terre.

Warnung Das Gerät muss immer ordnungsgemäß geerdet sein. Befolgen Sie die Anweisungen in dieser Anleitung, um das Gerät ordnungsgemäß zu erden.

Avvertenza Questo dispositivo deve sempre disporre di una connessione a massa. Seguire le istruzioni indicate in questa guida per connettere correttamente il dispositivo a massa.

Advarsel Denne enheten på jordes skikkelig hele tiden. Følg instruksjonene i denne veiledningen for å jorde enheten.

Aviso Este equipamento deverá estar ligado à terra. Siga las instrucciones en esta guía para conectar correctamente este dispositivo a tierra.

¡Atención! Este dispositivo debe estar correctamente conectado a tierra en todo momento. Siga las instrucciones en esta guía para conectar correctamente este dispositivo a tierra.

Varning! Den här enheten måste vara ordentligt jordad. Följ instruktionerna i den här guiden för att jorda enheten ordentligt.

Laser and LED Safety Guidelines and Warnings

IN THIS SECTION

- General Laser Safety Guidelines | **184**
- Class 1 Laser Product Warning | **184**
- Class 1 LED Product Warning | **185**
- Laser Beam Warning | **185**

Juniper Networks devices are equipped with laser transmitters, which are considered a Class 1 Laser Product by the U.S. Food and Drug Administration and are evaluated as a Class 1 Laser Product per IEC/EN 60825-1 requirements.

Observe the following guidelines and warnings:

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.



LASER 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.

Avertissement Les connecteurs à fibre optique sans terminaison peuvent émettre un rayonnement laser invisible. Le cristallin de l'œil humain faisant converger toute la puissance du laser sur la rétine, toute focalisation directe de l'œil sur une source laser, —même de faible puissance—, peut entraîner des lésions oculaires irréversibles.

Class 1 Laser Product Warning



LASER WARNING: Class 1 laser product.
Waarschuwing Klasse-1 laser produkt.

Varoitus Luokan 1 lasertuote.

Avertissement 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.

Class 1 LED Product Warning



LASER WARNING: Class 1 LED product.
Waarschuwing Klasse 1 LED-product.

Varoitus Luokan 1 valodiodituote.

Avertissement 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.

Laser Beam Warning



LASER 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.

Avertissement 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.

¡Atención! 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.

Radiation from Open Port Apertures Warning



LASER 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.

Avertissement 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 emiteres 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 an

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.

Maintenance and Operational Safety Guidelines and Warnings

IN THIS SECTION

- Battery Handling Warning | **187**
- Jewelry Removal Warning | **189**
- Lightning Activity Warning | **190**
- Operating Temperature Warning | **191**
- Product Disposal Warning | **192**

While performing the maintenance activities for devices, observe the following guidelines and warnings:

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.

Avertissement 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 baterían 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.

Avertissement 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.

Lightning Activity Warning



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.

Avertissement 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 lyner.

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. 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.

Avertissement 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.

Product Disposal Warning



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.

Avertissement 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.

General Electrical Safety Guidelines and Warnings



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*) and require isolation from the exposed outside plant (OSP) cabling. To comply with NEBS (Network Equipment-Building System) 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.

Avertissement Certains ports de l'appareil sont destinés à un usage en intérieur uniquement (ports Type 2 ou Type 4 tels que décrits dans le document *GR-1089-CORE*) et doivent être isolés du câblage de l'installation extérieure exposée. Pour respecter les exigences NEBS et assurer une protection contre la foudre et les perturbations de tension secteur, les ports pour intérieur *ne doivent pas* être raccordés physiquement aux interfaces prévues pour la connexion à l'installation extérieure ou à son câblage. Les ports pour intérieur de l'appareil sont réservés au raccordement de câbles pour intérieur ou non exposés uniquement. L'ajout de protections ne constitue pas une précaution suffisante pour raccorder physiquement ces interfaces au câblage de l'installation extérieure.



CAUTION: Before removing or installing components of a device, connect an electrostatic discharge (ESD) grounding strap to an ESD point and wrap and fasten the other end of the strap around your bare wrist. Failure to use an ESD grounding strap could result in damage to the device.

Attention Avant de retirer ou d'installer des composants d'un appareil, raccordez un bracelet antistatique à un point de décharge électrostatique et fixez le bracelet à votre poignet nu. L'absence de port d'un bracelet antistatique pourrait provoquer des dégâts sur l'appareil.

- 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.
  - Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75.

    Peut être installé dans des salles de matériel de traitement de l'information conformément à l'article 645 du National Electrical Code et à la NFPA 75.

- 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 you clean grounding surface and give them a bright finish before making grounding connections.
- 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 that appears to be damaged.

Action to Take After an Electrical Accident

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, and then call for help.

Prevention of Electrostatic Discharge Damage

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 wrist 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 70 on page 196) 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 grounding strap. The measurement must be in the range 1 through 10 Mohms.
  >
  > **Avertissement** Par mesure de sécurité, vérifiez régulièrement la résistance du bracelet antistatique. Cette valeur doit être comprise entre 1 et 10 mégohms (Mohms).

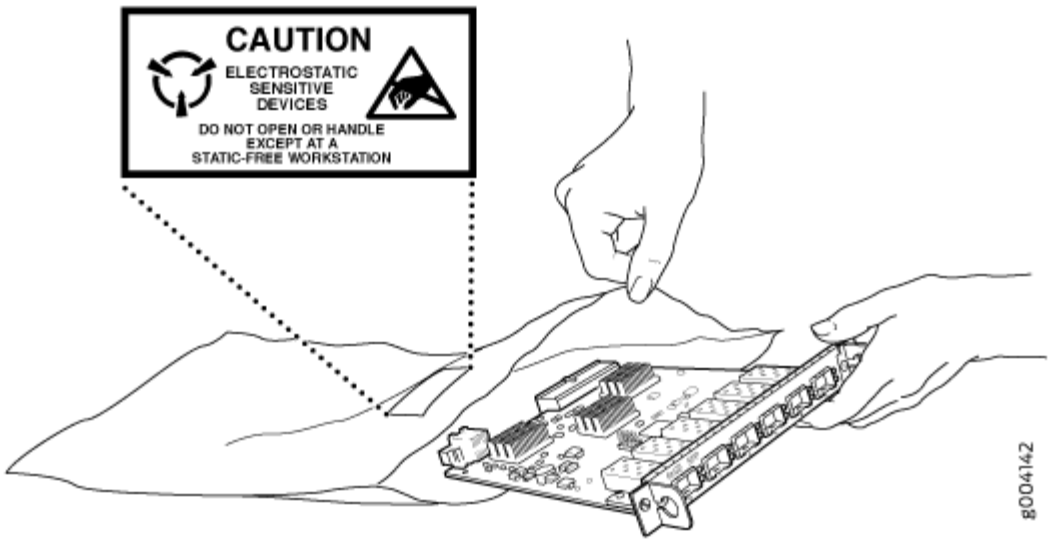
- When handling any component that is subject to ESD damage and that is removed from the device, make sure the equipment end of your ESD wrist strap is attached to the ESD point on the chassis.

  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 70 on page 196). If you are returning a component, place it in an antistatic bag before packing it.

Figure 70: Placing 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.

Attention Les câbles ANSI/TIA/EIA-568, par exemple Cat 5e et Cat 6, peuvent emmagasiner des charges électrostatiques. Pour évacuer ces charges, reliez toujours les câbles à une prise de terre adaptée avant de les raccorder au système.

AC Power Electrical Safety Guidelines

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 (2-pole circuit breaker or 4-pole circuit breaker based on your device) 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 prevent 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。

AC Power Disconnection Warning

WARNING: Before working on the device or near power supplies, unplug all the power cords from an AC-powered device.

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.

Avertissement 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.

DC Power Electrical Safety Guidelines

- A DC-powered device is equipped with a DC terminal block that is rated for the power requirements of a maximally configured device.
- For permanently connected equipment, a readily accessible disconnect device shall be incorporated external to the equipment.
- For pluggable equipment, the socket-outlet shall be installed near the equipment and shall be easily accessible.
- Be sure to connect the ground wire or conduit to a solid central 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.
- 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.

DC Power Copper Conductors Warning



WARNING: Use copper conductors only.
Waarschuwing Gebruik alleen koperen geleiders.

Varoitus Käytä vain kuparijohtimia.

Attention Utilisez uniquement des conducteurs en cuivre.

Warnung Verwenden Sie ausschließlich Kupferleiter.

Avvertenza Usate unicamente dei conduttori di rame.

Advarsel Bruk bare kobberledninger.

Aviso Utilize apenas fios condutores de cobre.

¡Atención! Emplee sólo conductores de cobre.

Varning! Använd endast ledare av koppar.

DC Power Disconnection Warning



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.

Avertissement Avant de pratiquer l'une quelconque des procédures ci-dessous, vérifier 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.

DC Power Grounding Requirements and Warning

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.

Avertissement 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.

DC Power Wiring Sequence Warning



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 V to –48 V. When disconnecting power, the proper wiring sequence is –48 V to –48 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 V naar – 48 V. De juiste bedradingsvolgorde losgemaakt is en –48 naar –48 V, +RTN naar +RTN, aarde naar aarde.

Varoitus Oikea yhdistettava kytkentajarjestys on maajohto maajohtoon, +RTN varten +RTN, –48 V varten – 48 V. Oikea irrotettava kytkentajarjestys on –48 V varten – 48 V, +RTN varten +RTN, maajohto maajohtoon.

Avertissement Câblez l'approvisionnement d'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 V à –48 V. En débranchant la puissance, l'ordre approprié de câblage est –48 V à –48 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 -48V zu -48V. Die richtige Sequenz zum Abtrennen der

Stromversorgung ist -48V zu -48V, +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.

¡Atención! Wire a fonte de alimentação de DC Usando os talões apropriados nan 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.

DC Power Wiring Terminations Warning

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 käännetyt kiinnityskorvat. Tällaisten liitäntöjen tulee olla kooltaan johtimiin sopivia ja niiden tulee puristaa yhteen sekä eristeen että johdinosan.

Avertissement 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 occhiello o a forcella 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 eléctrica 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 sluten eller öppen typ med uppåtvänd tapp. Storleken på dessa kontakter måste vara avpassad till ledningarna och måste kunna hålla både isoleringen och ledaren fastklämda.

Multiple Power Supplies Disconnection Warning



WARNING: The network device has more than one power supply connection. All connections must be removed completely to remove power from the unit completely.

Waarschuwing Deze eenheid heeft meer dan één stroomtoevoerverbinding; alle verbindingen moeten volledig worden verwijderd om de stroom van deze eenheid volledig te verwijderen.

Varoitus Tässä laitteessa on useampia virtalähdekytkentöjä. Kaikki kytkennät on irrotettava kokonaan, jotta virta poistettaisiin täysin laitteesta.

Avertissement Cette unité est équipée de plusieurs raccordements d'alimentation. Pour supprimer tout courant électrique de l'unité, tous les cordons d'alimentation doivent être débranchés.

Warnung Diese Einheit verfügt über mehr als einen Stromanschluß; um Strom gänzlich von der Einheit fernzuhalten, müssen alle Stromzufuhren abgetrennt sein.

Avvertenza Questa unità ha più di una connessione per alimentatore elettrico; tutte le connessioni devono essere completamente rimosse per togliere l'elettricità dall'unità.

Advarsel Denne enheten har mer enn én strømtilkobling. Alle tilkoblinger må kobles helt fra for å eliminere strøm fra enheten.

Aviso Este dispositivo possui mais do que uma conexão de fonte de alimentação de energia; para poder remover a fonte de alimentação de energia, deverão ser desconectadas todas as conexões existentes.

¡Atención! Esta unidad tiene más de una conexión de suministros de alimentación; para eliminar la alimentación por completo, deben desconectarse completamente todas las conexiones.

Varning! Denna enhet har mer än en strömförsörjningsanslutning; alla anslutningar måste vara helt avlägsnade innan strömtillförseln till enheten är fullständigt bruten.

TN Power Warning



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.

Avertissement 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.

PTX10003 Regulatory Standard Compliances

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PTX10003 Agency Approvals

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The PTX10003 complies with the following standards:

- Safety
  - CAN/CSA-C22.2 No. 60950-1, Safety of Information Technology Equipment
  - UL 60950-1 Information Technology Equipment - Safety - Part 1: General Requirements
  - EN 60950-1: 2006/ A2: 2013- Safety of Information Technology Equipment
  - IEC 60950-1: 2005/ A2: 2013- Information Technology Equipment - Safety - Part 1: General Requirements (with country deviations)
  - EN 60825-1 Safety of Laser Products - Part 1: Equipment Classification, Requirements and User's Guide
- EMC
  - EN 300 386 V1.6.1 (2012-09) Electromagnetic compatibility and Radio spectrum Matters (ERM); Telecommunication network equipment; Electro Magnetic Compatibility (EMC) requirements
  - EN 300 386 V2.1.1 (2016-07) Telecommunication network equipment; Electro Magnetic Compatibility (EMC) requirements; Harmonized Standard covering the essential requirements of the Directive 2014/30/EU
  - EN 55032:2015 (CISPR 32:2015) Electromagnetic compatibility of multimedia equipment - Emission requirements
  - EN 55024:2010 (CISPR 24:2010) Information technology equipment - Immunity characteristics - Limits and methods of measurement
  - EN 55035:2017 (CISPR 35:2016) Electromagnetic compatibility of multimedia equipment - Immunity requirements
  - IEC/EN 61000 Immunity Test
  - AS/NZS CISPR 32:2015 Australia/New Zealand Radiated and Conducted Emissions

- FCC 47 CFR Part 15 USA Radiated and Conducted Emissions
- IC ICES-003 Canada Radiated and Conducted Emissions
- VCCI-CISPR 32:2016 Japanese Radiated and Conducted Emissions
- BSMI CNS 13438 Taiwan Radiated and Conducted Emissions (at 10 Meter)
- KN 32 and KN 35 Korea Radiated Emission and Immunity Characteristics (at 10 Meter)
- KN 61000 Korea Immunity Test
- IEC/EN 61000 Immunity Test
- TEC/SD/DD/EMC-221/05/OCT-16 (Supersedes No. TEC/EMI/TEL-001/01/FEB-09) India EMC standard
- Juniper Inductive GND (JIG)

- NEBS (Level 3)
  - GR-1089-CORE, Issue 6: EMC and Electrical Safety—Generic Criteria for Network Telecommunications Equipment
    - The equipment is suitable for installation as part of the Common Bonding Network (CBN).
    - 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
  - Acoustic Noise

    Maschinenlärminformations-Verordnung - 3. GPSGV, der höchste Schalldruckpegel beträgt 70dB(A) oder weniger gemäss EN ISO 7779

    Translation:

    The emitted sound pressure is below 70 dB(A) per EN ISO 7779.

- Immunity
  - 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

- Acoustic Noise

  Maschinenlärminformations-Verordnung - 3. GPSGV, der höchste Schalldruckpegel beträgt 70dB(A) oder weniger gemäss EN ISO 7779

  Translation:

  The emitted sound pressure is below 70 dB(A) per EN ISO 7779.

Compliance Statement for Argentina

EQUIPO DE USO IDÓNEO.

Compliance Statements for the PTX10003 Routers

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This topic describes the compliance statements for the PTX10003 routers.

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.

Israel

אזהרה

מוצר זה הוא מוצר Class A.
בסביבה ביתית,מוצר זה עלול לגרום הפרעות בתדר רדיו,ובמקרה זה ,המשתמש עשוי להידרש לנקוט אמצעים מתאימים.

Translation from Hebrew–Warning: This product is Class A. In residential environments, the product may cause radio interference, and in such a situation, 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 g040913

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.

Taiwan

警告使用者：
這是甲類的資訊產品, 在居住的環境中使用 時, 可能會造成射頻干擾, 在這種情況下, 使用者會被要求采取某些適當的對策。

Chinese Class A warning g100090

The preceding translates as follows:

This is 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.

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.