



TCX1000 Inline Amplifier Hardware Guide



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TCX1000 Inline Amplifier Hardware Guide

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- Documentation Feedback on page ix
- Requesting Technical Support on page x

Documentation and Release Notes

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

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

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Documentation Conventions

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

Table 1: Notice Icons







| Icon | Meaning | Description |
|--|--------------------|---|
|  | Informational note | Indicates important features or instructions. |
|  | Caution | Indicates a situation that might result in loss of data or hardware damage. |
|  | Warning | Alerts you to the risk of personal injury or death. |
|  | Laser warning | Alerts you to the risk of personal injury from a laser. |
|  | Tip | Indicates helpful information. |
|  | Best practice | Alerts you to a recommended use or implementation. |

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

Table 2: Text and Syntax Conventions

| Convention | Description | Examples |
|------------------------------|---|--|
| Bold text like this | Represents text that you type. | To enter configuration mode, type the configure command: user@host> configure |
| Fixed-width text like this | Represents output that appears on the terminal screen. | user@host> show chassis alarms No alarms currently active |
| <i>Italic text like this</i> | <ul style="list-style-type: none"> Introduces or emphasizes important new terms. Identifies guide names. Identifies RFC and Internet draft titles. | <ul style="list-style-type: none"> A policy <i>term</i> is a named structure that defines match conditions and actions. <i>Junos OS CLI User Guide</i> RFC 1997, <i>BGP Communities Attribute</i> |
| <i>Italic text like this</i> | Represents variables (options for which you substitute a value) in commands or configuration statements. | Configure the machine's domain name: [edit] root@# set system domain-name <i>domain-name</i> |

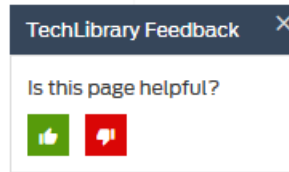
Table 2: Text and Syntax Conventions (continued)

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

Documentation Feedback

We encourage you to provide feedback so that we can improve our documentation. You can use either of the following methods:

- Online feedback system—Click TechLibrary Feedback, on the lower right of any page on the [Juniper Networks TechLibrary](#) site, and do one of the following:



- Click the thumbs-up icon if the information on the page was helpful to you.
- Click the thumbs-down icon if the information on the page was not helpful to you or if you have suggestions for improvement, and use the pop-up form to provide feedback.
- E-mail—Send your comments to techpubs-comments@juniper.net. Include the document or topic name, URL or page number, and software version (if applicable).

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or Partner Support Service support contract, or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

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

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

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- Search for known bugs: <https://prsearch.juniper.net/>
- Find product documentation: <https://www.juniper.net/documentation/>
- Find solutions and answer questions using our Knowledge Base: <https://kb.juniper.net/>
- Download the latest versions of software and review release notes: <https://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <https://kb.juniper.net/InfoCenter/>

- Join and participate in the Juniper Networks Community Forum:
<https://www.juniper.net/company/communities/>
- Create a service request online: <https://myjuniper.juniper.net>

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

Creating a Service Request with JTAC

You can create a service request with JTAC on the Web or by telephone.

- Visit <https://myjuniper.juniper.net>.
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

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

CHAPTER 1

Overview

- [TCX1000-ILA System Overview on page 13](#)
- [TCX1000-ILA Chassis on page 16](#)
- [TCX1000-ILA Cooling System Description on page 22](#)
- [TCX1000-ILA Power System on page 24](#)

TCX1000-ILA System Overview

- [TCX1000 Inline Amplifier Description on page 13](#)
- [TCX1000-ILA Hardware Component Overview on page 15](#)
- [TCX1000-ILA Component Redundancy on page 15](#)
- [TCX1000-ILA Field-Replaceable Units on page 15](#)

TCX1000 Inline Amplifier Description

The Juniper Networks TCX1000 Inline Amplifier is a standalone erbium-doped fiber amplifier (EDFA) with dual AC or DC power supplies. The TCX1000-ILA supports dual optical inline amplification—two functionally separate amplifiers. The TCX1000-ILA provides amplification of a dense wavelength-division multiplexing (DWDM) signal to enable long-distance transmission over fiber-optic cable. The TCX1000-ILA is used in conjunction with the TCX1000-RDM20.

The TCX1000-ILA operates with redundant hot-swappable pluggable power supplies that are either AC or DC.

For more information on the TCX Series operation, features, and deployment examples, see the *TCX Series Optical Transport System Feature Guide* at <https://www.juniper.net/documentation/>.

The proNX Optical Director is required for the proper operation of the TCX1000-ILA. For more information about configuring the TCX1000-ILA, see the *proNX Optical Director User Guide* and the *proNX Optical Director Installation Guide* at https://www.juniper.net/documentation/product/en_US/pronx-optical-director.



NOTE: The TCX1000-ILA does not run the Juniper Networks Junos operating system (OS).

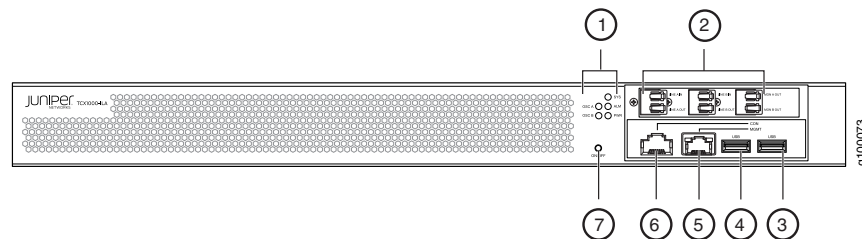
- [Front Panel on page 14](#)
- [FRU Panel on page 14](#)

Front Panel

The front panel of the TCX1000-ILA contains six LC port connectors, the **ON/OFF** button, the console and management ports, the system status LEDs, and the USB ports.

[Figure 1 on page 14](#) shows the front panel of the TCX1000-ILA.

Figure 1: TCX1000-ILA Front Panel

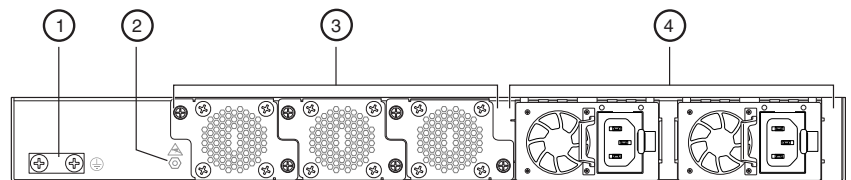


| | |
|---------------------------|--|
| 1—Status LEDs | 5—Management (MGMT) Ethernet port |
| 2—LC port connectors | 6—Console (CON) port |
| 3—USB (USB) port | 7—On/off button (ON/OFF) |
| 4—USB (USB) port | |

FRU Panel

The field-replaceable unit (FRU) panel of the TCX1000-ILA contains the fan modules and power supplies for the TCX1000-ILA. [Figure 2 on page 14](#) shows the FRU panel on the TCX1000-ILA.

Figure 2: TCX1000-ILA FRU Panel



| | |
|--------------------|------------------|
| 1—Grounding points | 3—Fan modules |
| 2—ESD point | 4—Power supplies |

The cooling system in the TCX1000-ILA consists of three 12.4-W fan modules. These fan modules can be hot-swapped—you do not need to power off the TCX1000-ILA or disrupt the functioning of the TCX1000-ILA to replace a fan module. The TCX1000-ILA has two 150-W power supplies, either AC or DC depending on your configuration. The power

supplies need to be both AC or both DC. Only one power supply is required to power the device, while the second power supply provides redundancy.

TCX1000-ILA Hardware Component Overview

Table 3 on page 15 describes the models.

Table 3: TCX1000-ILA Hardware Models

| Model Number | Description |
|----------------|--|
| TCX1000-ILA-DC | This system includes the chassis, three fan modules, and two DC power supplies |
| TCX1000-ILA-AC | This system includes the chassis, three fan modules, and two AC power supplies |

Table 4 on page 15 describes the hardware components of the TCX1000-ILA.

Table 4: TCX1000-ILA Hardware Components

| Component | Spare Model Number | Description |
|----------------|--------------------|--|
| Chassis | TCX1000-ILA-CHAS | The TCX1000-ILA is standalone EDFA with dual AC or DC power supplies. <i>NOTE:</i> This spare model does not include the fan modules or the power supplies. |
| Fan module | FAN-ILA-S | "TCX1000-ILA Cooling System Description" on page 22 |
| Power supplies | JPSU-150-AC-AFO | "TCX1000-ILA Power System" on page 24 |
| | JPSU-150-DC-AFO | "TCX1000-ILA Power System" on page 24 |

TCX1000-ILA Component Redundancy

The following hardware components provide redundancy on the TCX1000-ILA models:

- Cooling system—The TCX1000-ILA has three fan modules. Each fan module is a redundant unit containing one fan. If a fan module fails and the remaining fan modules are unable to keep the TCX1000-ILA within the desired temperature thresholds, chassis alarms are raised and the TCX1000 ILA can shut down.
- The TCX1000-ILA ships with two power supplies that provide 1+1 redundancy. If one power supply fails or is removed, the second power supply balances the electrical load without interruption and still provides 1+1 redundancy while the failing power supply is replaced.

TCX1000-ILA Field-Replaceable Units

Field-replaceable units (FRUs) are components that you can replace at your site. The TCX1000-ILA FRUs are hot-removable and hot-insertable—you can remove and replace them without powering off the TCX1000-ILA or disrupting the TCX1000-ILA function.



CAUTION: Replace a failed fan module with a new fan module within 30 seconds of removal to prevent chassis overheating.

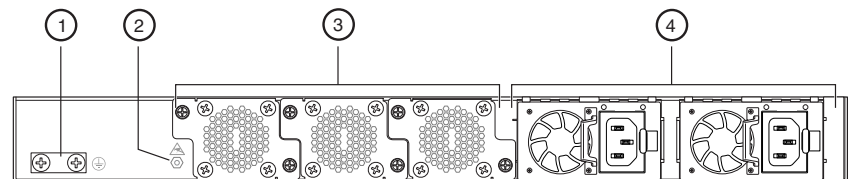
Table 5 on page 16 lists the FRUs for the TCX1000-ILA and actions to take before removing them.

Table 5: Required Actions Before Removing a FRU from the TCX1000 ILA

| FRU | Required Actions Before Removal |
|--------------------|---|
| Power supplies (2) | Disconnect the AC power and remove the AC power cord or cable for the power supply unit. Disconnect the DC power and remove the power connector. |
| Fan modules (3) | None. |

Figure 3 on page 16 shows the FRU panel on the TCX1000-ILA.

Figure 3: TCX1000 ILA FRU Panel



| | |
|-------------|------------------|
| 1—Grounding | 3—Fan modules |
| 2—ESD point | 4—Power supplies |



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.

Related Documentation

- [Maintaining the TCX1000-ILA Power System on page 63](#)
- [TCX1000-ILA Cooling System Description on page 22](#)
- [TCX1000-ILA Power System on page 24](#)

TCX1000-ILA Chassis

- [TCX1000-ILA Chassis Description on page 17](#)
- [TCX1000-ILA Front Panel and FRU Panel on page 17](#)

- [TCX1000-ILA Chassis Status LEDs on page 19](#)
- [TCX1000-ILA Management Panel on page 21](#)
- [TCX1000-ILA Management Port LEDs on page 22](#)

TCX1000-ILA Chassis Description

The TCX1000-ILA chassis is a rigid sheet metal structure that houses all the other hardware components. The chassis measures 1.72 in. (4.36 cm) high, 9.6 in. (24.4 cm) deep, and 17.24 in. (43.8 cm) wide. The chassis can be installed in racks or cabinets.

TCX1000-ILA Front Panel and FRU Panel

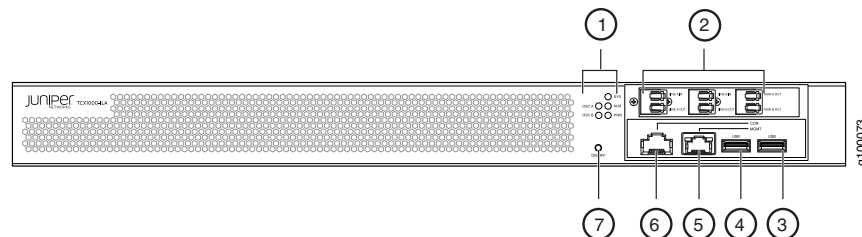
The front panel of the TCX1000-ILA contains six LC port connectors, the **ON/OFF** button, the console and management ports, the system status LEDs, and the USB ports. The field-replaceable unit (FRU) panel of the TCX1000-ILA contains the fan modules and power supplies for the TCX1000-ILA.

- [Front Panel on page 17](#)
- [FRU Panel on page 18](#)

Front Panel

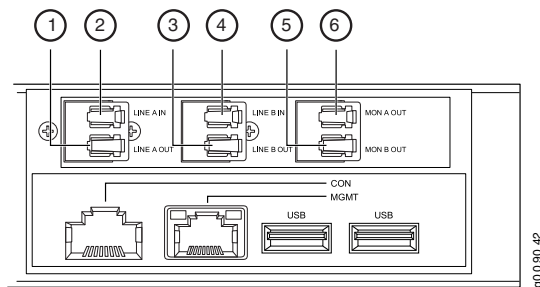
Figure 4 on page 17 shows the front panel of the TCX1000-ILA.

Figure 4: TCX1000-ILA Front Panel



| | |
|---------------------------|-----------------------------------|
| 1—Status LEDs | 5—Management (MGMT) port |
| 2—LC port connectors | 6—Console (CON) port |
| 3—USB (USB) port | 7—ON/OFF button (ON/OFF) |
| 4—USB (USB) port | |

You can use the ON/OFF push button on the front panel to turn on and off the device. Push and hold the button for a minimum of five seconds to power off the unit. If the unit is off, push and hold the button for five seconds to turn on the unit.

Figure 5: LC Ports

| | |
|---------------------------------------|--|
| 1—Output line A (LINE A OUT) | 4—Input line B (LINE B IN) |
| 2—Input line A (LINE A IN) | 5—Monitor output line B (MON B OUT) |
| 3—Output line B (LINE B OUT) | 6—Monitor output line A (MON A OUT) |

There are two optical ports per direction (two **LINE IN** ports, two **LINE OUT** ports, and two (**MON**) ports for monitoring). See [Figure 5 on page 18](#).

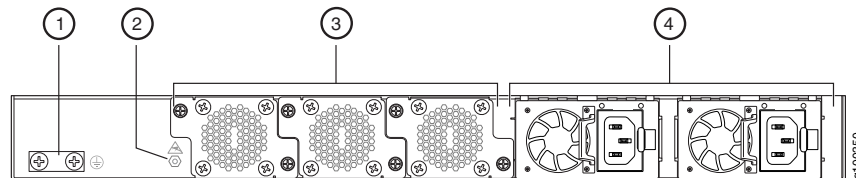
The TCX1000-ILA accepts two line connections (LC): Line A and Line B and is bidirectional. It provides optical gain for the optical signal traversing the amplifier in the A-B direction, and the signal traversing the amplifier in the opposite B-A direction. Thus, it can be viewed as two amplifiers in one box. Functionally, the two amplifiers are totally separate (with the exception of the implementation of the OSC).

To connect the two optical lines to the TCX1000 ILA you can make the following connections:

- Connect one line to the **LINE A IN** and **LINE A OUT** ports
- Connect the other line to the **LINE B IN** and **LINE B OUT** ports

FRU Panel

[Figure 6 on page 18](#) shows the FRU panel on the TCX1000-ILA.

Figure 6: TCX1000-ILA FRU Panel

| | |
|--------------------|------------------|
| 1—Grounding points | 3—Fan modules |
| 2—ESD point | 4—Power supplies |

The cooling system in an TCX1000-ILA consists of three 12.4-W fan modules. The fan modules can be hot-swapped—you do not need to power off the TCX1000-ILA or disrupt the TCX1000-ILA function to replace a fan module.

The TCX1000-ILA has two 150-W power supplies, either AC or DC depending on your configuration. The power supplies need to be both AC or both DC—you cannot mix AC and DC power supplies in the same chassis. Only one power supply is required to power the device, while the second power supply provides redundancy. When the TCX1000-ILA has both power supplies installed and connected to power, the device has full power redundancy. If a power supply fails or is removed, another power supply balances the electrical load without interruption. Each power supply provides 12 VDC output with a standby voltage of 12 VDC. The power supplies can be hot-swapped—you do not need to power off the TCX1000-ILA or disrupt the TCX1000-ILA function to replace a power supply.

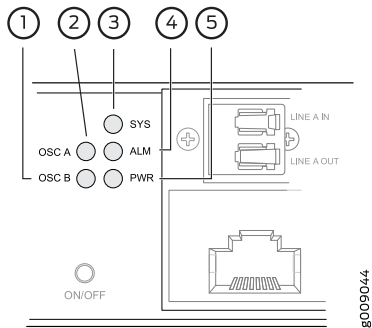
For more information about the components on the FRU panel, see , “TCX1000-ILA Power System” on page 24, and .

See Also

TCX1000-ILA Chassis Status LEDs

The TCX1000-ILA has five status LEDs on the front panel of the chassis (see Figure 7 on page 19)—two optical supervisory channel (OSC) status LEDs (**OSC A** and **OSC B**), a system status LED (**SYS**), an alarm LED (**ALM**), and a power LED (**PWR**). The OSC is a separate channel that carries overhead information for network management purposes. The OSC, which is an important section in every DWDM system, is a separate channel that carries overhead information for network purposes. For instance, it carries data between sites for monitoring and controlling specifications in the system.

Figure 7: Chassis Status LEDs on an TCX1000-ILA



| | |
|-------------------------------------|----------------------------|
| 1—OSC B status (OSC B) LED | 4—Alarm (ALM) LED |
| 2—OSC A status (OSC A) LED | 5—Power (PWR) LED |
| 3—System status (SYS) LED | |

Table 6 on page 20 describes the chassis status LEDs on an TCX1000-ILA.

Table 6: TCX1000-ILA Chassis Status LEDs

| Name | Color | State | Description |
|--------------------------|-------|-------------|--|
| OSC A status (OSC A) LED | Unlit | Off | The power is off. |
| | Red | On steadily | No OSC signal is received from the downstream device. |
| | Amber | On steadily | OSC signal received from the upstream device indicates a fault. |
| | Green | On steadily | OSC signal is communicating normally. |
| OSC B status (OSC B) LED | Unlit | Off | The power is off. |
| | Red | On steadily | No OSC signal is received from the downstream device. |
| | Amber | On steadily | OSC signal received from the upstream device indicates a fault. |
| | Green | On steadily | OSC signal is communicating normally. |
| System status (SYS) LED | Unlit | Off | The power is off, or the TCX1000-ILA is not connected to any power source. |
| | Green | On steadily | The TCX1000-ILA software has booted. |
| | Green | Blinking | The TCX1000-ILA is active and is communicating with upstream and downstream network elements. |
| Alarm (ALM) LED | Unlit | Off | The TCX1000-ILA is off, or there is no alarm. |
| | Red | On steadily | A major hardware fault has occurred, such as a temperature alarm or a power or pump failure, and the unit has halted. The CLI is still accessible. |
| | Amber | On steadily | A minor alarm has occurred, such as a software error. |
| | Green | Solid | The TCX1000-ILA is operating properly. |

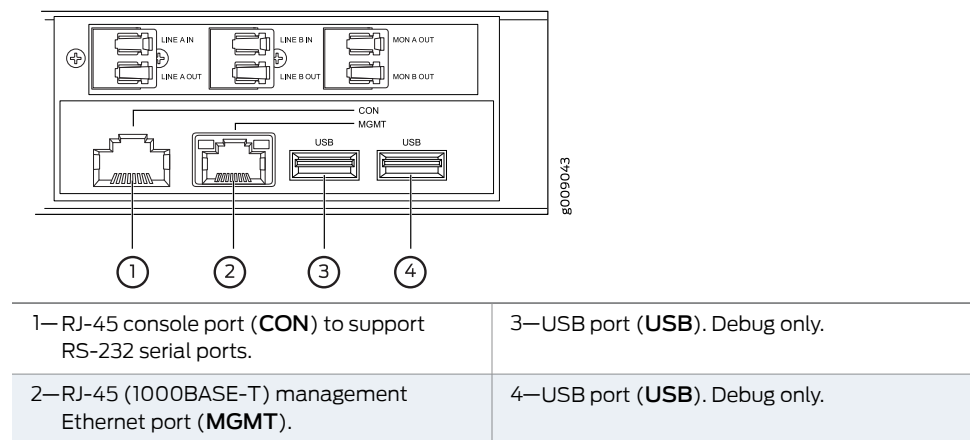
Table 6: TCX1000-ILA Chassis Status LEDs (continued)

| Name | Color | State | Description |
|-------------|-------|-------------|--|
| Power (PWR) | Unlit | Off | The TCX1000-ILA is powered off or there is no power to the device. |
| | Amber | On steadily | The TCX1000-ILA is powered by a single power supply. The second power supply is either missing or not connected to a power source. |
| | Green | On steadily | The TCX1000-ILA is powered with two redundant power supplies. |

TCX1000-ILA Management Panel

The TCX1000-ILA management panel is found on the front panel (see [Figure 8 on page 21](#)).

Figure 8: TCX1000-ILA Management Panel Components



The front panel has system status LEDs (see [Table 6 on page 20](#)) that alert you to minor or major alarms or other issues with the amplifier. [Figure 8 on page 21](#) shows the management panel in detail.

The TCX1000-ILA is managed by proNX Optical Director. The proNX Optical Director, is a distributed software platform that provides optical control and management of all products in the TCX Series Optical Transport System. The proNX Optical Director also provides fault, configuration, accounting, performance and security (FCAPS) functionality and optical service activation on supported transceivers in Juniper Networks routers and switches.



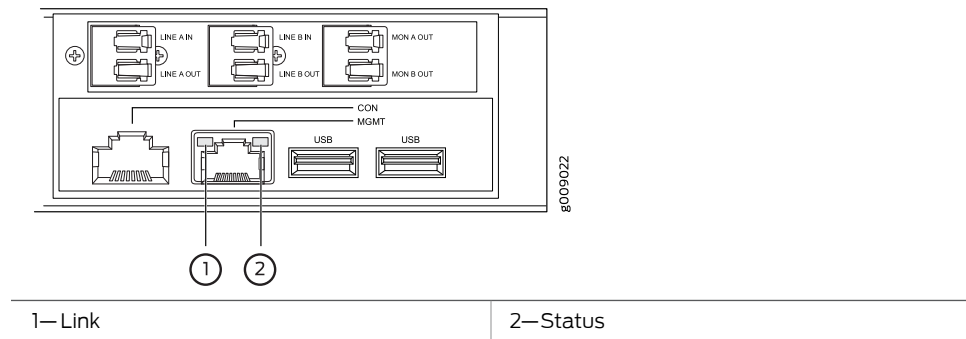
NOTE: See the *proNX Optical Director User Guide* for more information.

TCX1000-ILA Management Port LEDs

The management port—labeled **MGMT**—on the TCX1000-ILA is located on the management panel.

The management port is an Ethernet port that supports an RJ-45 connector and has separate LEDs for status and activity. [Figure 9 on page 22](#) shows the location of the LEDs.

Figure 9: Management Port LEDs on the TCX1000-ILA



[Table 7 on page 22](#) describes the RJ-45 management port LEDs.

Table 7: TCX1000-ILA RJ-45 Management Port LEDs

| LED | Color | State | Description |
|--------|--------|-------------|--|
| Link | Unlit | Off | No link is established, there is a fault, or the link is down. |
| | Yellow | Blinking | A link is established, and there is link activity. |
| Status | Unlit | Off | Link is down. |
| | Green | On steadily | Link is up. |
| | | Blinking | There is data activity. |

- See Also**
- [TCX1000-ILA Cooling System Description on page 22](#)
 - [TCX1000-ILA Power System on page 24](#)
 - [TCX1000-ILA System Overview on page 13](#)

TCX1000-ILA Cooling System Description

The cooling system in a TCX1000-ILA consists of three 12.4-W fan modules installed in the field-replaceable unit (FRU) panel and two counter-rotating fans housed in each of the power supplies.

In the TCX1000-ILA's cooling system, cool air enters through the vents in the front panel and hot air exhausts through the fans in the FRU panel. This type of airflow is known as *airflow out* or *front-to-back* airflow. When installed, the chassis must be positioned so that the FRUs are next to the hot air exhaust.



NOTE: 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.

- [Fan Modules on page 23](#)

Fan Modules

The fan modules in an TCX1000-ILA are hot-removable and hot-insertable FRUs. These fan modules can be hot-swapped—you do not need to power off the TCX1000-ILA or disrupt the TCX1000-ILA function to replace a fan module. The fan module slots are numbered **0** through **2** from left to right when viewing chassis from the FRU panel side (see [Figure 10 on page 23](#) and [Figure 11 on page 23](#)) shows the fan module for the TCX1000-ILA. The numbers are located on the top of the chassis.

Figure 10: Fan Numbering

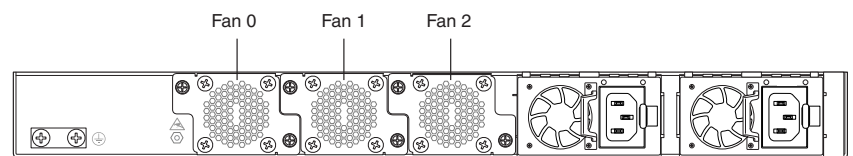
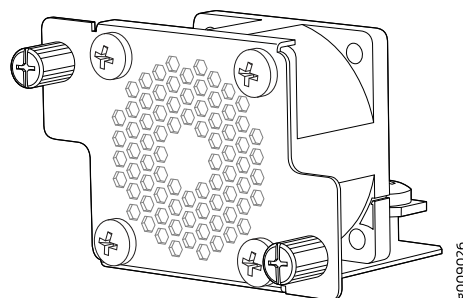


Figure 11: Fan Module





NOTE: All three fan modules must be installed for optimal operation of the TCX1000-ILA. The TCX1000-ILA can continue to function indefinitely (with appropriate alarms) when one or two of the three fans are missing. If all fans are missing, or in case of all-fan failure, the ILA raises an alarm for each fan failure, but continues operating without regard to whether the device/pump temperature exceed the alarming threshold. In all cases, when the device/pump temperature exceeds the alarming threshold, temperature alarms are raised, but ILA continues operating. This implementation is to safeguard traffic (so there is no accidental shutdown of traffic), however there is a risk of potential device damage due to overheat.

- Related Documentation**
- [Prevention of Electrostatic Discharge Damage on page 103](#)
 - [Maintaining the TCX1000-ILA Cooling System on page 61](#)

TCX1000-ILA Power System

- [TCX1000-ILA AC Power Supply Description on page 24](#)
- [TCX1000-ILA DC Power Supply Description on page 25](#)
- [TCX1000-ILA Power Supply LEDs on page 26](#)
- [TCX1000-ILA Power Consumption Specifications on page 28](#)
- [TCX1000-ILA AC Power Supply Specifications on page 28](#)
- [TCX1000-ILA AC Power Cord Specifications on page 29](#)
- [TCX1000-ILA DC Power Specifications on page 30](#)
- [TCX1000-ILA DC Power Cable and Lugs Specifications on page 30](#)
- [TCX1000-ILA Chassis Grounding Cable and Lug Specifications on page 31](#)

TCX1000-ILA AC Power Supply Description

The AC power supplies in the TCX1000-ILA (see [Figure 13 on page 25](#)) are hot-removable and hot-insertable field-replaceable units (FRUs) that you can install without powering off the TCX1000-ILA or disrupting the functioning of the TCX1000-ILA. The TCX1000-ILA has two AC power supplies. Both the power supplies are initially installed at the factory. See [Figure 12 on page 24](#) for the power numbering scheme, the power supply number (0 or 1) is located on the top of the chassis.

Figure 12: Power Supply Numbering

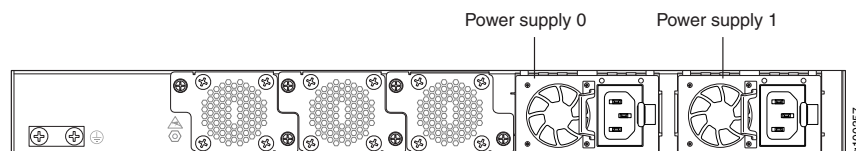
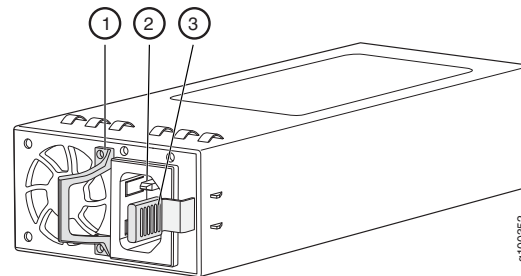


Figure 13: AC Power Supply in an TCX1000-ILA



| | |
|-------------------------|------------------|
| 1— Handle | 3— Ejector lever |
| 2— Male power connector | |

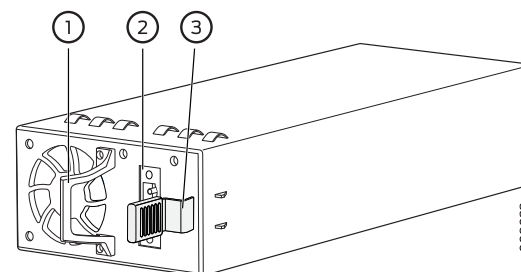
Each of the 150-W power supplies has a single AC input. The power supply provides 12-VDC output with a standby voltage of 12 VDC. An TCX1000-ILA has twice the number of power supplies needed to power all of the components in the device, which is known as *1+1 redundancy*. When the TCX1000-ILA has both power supplies installed and connected to power, the device has full power redundancy. If a power supply fails or is removed, another power supply balances the electrical load without interruption.

The fans in the power supply provide front-to-back airflow, which is also known as *airflow out (AFO)*.

TCX1000-ILA DC Power Supply Description

The DC power supplies in the TCX1000-ILA (see [Figure 14 on page 25](#)) are hot-removable and hot-insertable field-replaceable units (FRUs) that you can install without powering off the TCX1000-ILA or disrupting the functioning of the TCX1000-ILA. The DC version of the TCX1000-ILA has two DC power supplies. Both the power supplies are initially installed at the factory.

Figure 14: DC Power Supply in an TCX1000-ILA



| | |
|----------------|------------------|
| 1— Handle | 3— Ejector lever |
| 2— DC terminal | |

Each of the two 150-W power supplies has a single DC input. The power supply provides 12 VDC output with a standby voltage of 12 VDC. An TCX1000-ILA has twice the number of power supplies needed to power all of the components in the device, which is known as *1+1 redundancy*. When the TCX1000-ILA has both power supplies installed and connected to power, the device has full power redundancy. If a power supply fails or is

removed, the other or second power supply balances the electrical load without interruption.

The fans in the power supply provide front-to-back airflow, which is also known as *airflow out (AFO)*.



CAUTION: To avoid electrical injury, carefully follow instructions in [Figure 24 on page 55](#), “Installing a Power Supply in an TCX1000-ILA” on [page 65](#), and “Removing a Power Supply from an TCX1000-ILA” on [page 64](#).



NOTE: We recommend that the 48-VDC facility DC source be equipped with a circuit protector rated as required by local code.



NOTE: We recommend that the 60-VDC facility DC source be equipped with a circuit protector rated as required by local code.

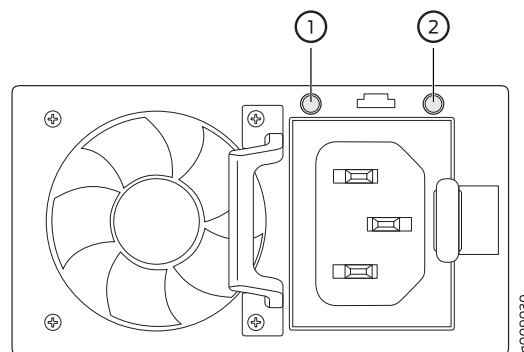


NOTE: For more information about power system redundancy, see “[TCX1000-ILA Component Redundancy](#)” on [page 15](#).

TCX1000-ILA Power Supply LEDs

Each TCX1000-ILA power supply has two LEDs on the power supply faceplate. [Figure 15 on page 26](#) shows the location of the LEDs on an TCX1000-ILA AC power supply. [Figure 16 on page 27](#) shows the location of the LEDs on an TCX1000-ILA DC power supply.

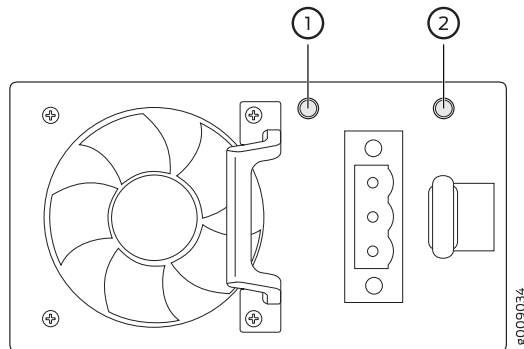
Figure 15: AC Power Supply LEDs



1—DC OK

2—AC OK

Figure 16: DC Power Supply LEDs



1—DC OUT OK

2—DC IN OK

Use [Table 8 on page 27](#) and [Table 9 on page 28](#) to interpret the state of the power supply LEDs.

Table 8: TCX1000-ILA AC Power Supply LED

| Name | Color | State | Description |
|-------|-------|-------------|--|
| DC OK | Unlit | Off | There is no power to any of the power supplies. |
| | Green | On steadily | The power supply is on and operating correctly. |
| | | Blinking | The power supply is on standby mode (AC IN present). |
| | Red | On steadily | There is a power supply failure. |
| | | Blinking | No AC power to this power supply only. |
| AC OK | Unlit | Off | There is no power to any of the power supplies. |
| | Green | On steadily | The power supply output is on and operating correctly. |
| | | On steadily | The power supply is on standby mode (AC IN present). |
| | Red | On steadily | There is a power supply failure. |
| | | Blinking | No AC power to this power supply only. |

Table 9: TCX1000-ILA DC Power Supply LED

| Name | Color | State | Description |
|-----------|-------|-------------|--|
| DC OUT OK | Unlit | Off | There is no power to the power supplies. |
| | Green | On steadily | The power supply is on and operating correctly. |
| | | Blinking | The power supply is on standby mode (DC IN present). |
| | Red | On steadily | There is a power supply failure. |
| | | Blinking | There is no DC power to this power supply only. |
| DC IN OK | Unlit | Off | There is no power to the power supplies. |
| | Green | On steadily | The power supply is on and operating correctly. |
| | | On steadily | The power supply is on standby mode (DC IN present). |
| | Red | On steadily | There is a power supply failure. |
| | | Blinking | There is no DC power to this power supply only. |

TCX1000-ILA Power Consumption Specifications

Table 10 on page 28 describes the power consumption specifications for the TCX1000-ILA.

Table 10: TCX1000-ILA Power Consumptions Specifications

| Item | Minimum | Typical | Maximum |
|--|---------|---------|---------|
| TCX1000-ILA AC | – | 75 W | 115.5 W |
| TCX1000-ILA AC input voltage range | 100 VAC | – | 240 VAC |
| TCX1000-ILA AC input voltage frequency | 50 Hz | – | 60 Hz |
| TCX1000-ILA AC input current range | 1.5 A | | 3 A |
| TCX1000-ILA DC | – | 75 W | 115.5 W |
| TCX1000-ILA DC input voltage range | –60 | –48 | –44 |
| TCX1000-ILA DC input current range | 2.8 A | – | 4.7 A |

TCX1000-ILA AC Power Supply Specifications

Table 11 on page 29 describes the AC power supply specifications for an TCX1000-ILA.

Table 11: AC Power Specifications for the TCX1000-ILA

| Item | Minimum |
|-------------------------|---|
| AC supply voltage | 100 VAC Operating range: 100-240 VAC |
| AC input line frequency | 50 Hz-60 Hz |
| AC input current rating | 1.5 (230 VAC) 3.0 (115 VAC) |
| Typical power rating | 75 W |
| Maximum power rating | 115.5 |

- See Also**
- [General Safety Guidelines and Warnings on page 82](#)
 - [General Electrical Safety Guidelines and Warnings on page 101](#)

TCX1000-ILA AC Power Cord Specifications

Detachable AC power cords are shipped with the chassis if you include them as part of your order. The coupler is type C13 as described by International Electrotechnical Commission (IEC) standard 60320. The plug at the male end of the power cord fits into the power source outlet that is standard for your geographical location.



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 TCX1000-ILA are in compliance.

[Table 12 on page 29](#) lists AC power cord specifications provided for each country or region.

Table 12: AC Power Cord Specifications for the TCX1000-ILA

| Country | Model Number | Electrical Specification | Plug Type |
|--|------------------|--------------------------|---|
| Australia | CBL-GP-JX-PWR-AU | 250 VAC, 10 A, 50 Hz | AS/NZ 3112-1993 |
| China | CBL-GP-JX-PWR-CH | 250 VAC, 10 A, 50 Hz | GB2099.1 1996 and GB1002 1996 (CH1-10P) |
| Europe (except Italy and United Kingdom) | CBL-GP-JX-PWR-EU | 250 VAC, 10 A, 50 Hz | CEE (7) VII |
| Italy | CBL-GP-JX-PWR-IT | 250 VAC, 10 A, 50 Hz | IEC60884-1 |

Table 12: AC Power Cord Specifications for the TCX1000-ILA (continued)

| Country | Model Number | Electrical Specification | Plug Type |
|----------------|------------------|-------------------------------|-------------------|
| Japan | CBL-GP-JX-PWR-JP | 125 VAC, 12 A, 50 Hz or 60 Hz | JIS 8303 and 8306 |
| North America | CBL-GP-JX-PWR-US | 125 VAC, 10 A, 60 Hz | NEMA 5-15P |
| United Kingdom | CBL-GP-JX-PWR-UK | 250 VAC, 10 A, 50 Hz | BS1363 |

See Also • [Connecting AC Power to an TCX1000-ILA on page 51](#)

TCX1000-ILA DC Power Specifications

Table 13 on page 30 describes the DC power specifications for an TCX1000-ILA .



NOTE: We recommend that the 48-VDC facility DC source be equipped with a circuit protector rated as required by local code.



NOTE: We recommend that the 60-VDC facility DC source be equipped with a circuit protector rated as required by local code.

Table 13: DC Power Supply Specifications for the TCX1000-ILA

| Item | Minimum |
|-------------------------|--|
| DC supply voltage range | Operating voltage range:-44 to -60 VDC |
| DC input current rating | 6 A |
| Typical power rating | 75 W |
| Maximum power rating | 115.5 W |

TCX1000-ILA DC Power Cable and Lugs Specifications

- [DC Power Cables on page 30](#)
- [DC Power Connector on page 31](#)

DC Power Cables

You must supply the DC power cables that meet the specifications in [Table 14 on page 31](#), or as required by the local code, laws, and standards.

Table 14: DC Power Cable Specifications

| Cable | Specification |
|--------------------|---------------------------------------|
| Minimum size cable | 18-AWG (0.8 mm ²) minimum |
| Maximum size cable | 12-AWG (3.3 mm ²) |



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



CAUTION: Before TCX1000-ILA installation begins, 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 TCX1000-ILA.



CAUTION: You must ensure that power connections maintain the proper polarity. The power source cables might be labeled (+) and (–) to indicate their polarity. There is no standard color coding for DC power cables. The color coding used by the external DC power source at your site determines the color coding for the leads on the power cables that attach to the terminals on each power supply.

DC Power Connector

The accessory box shipped with the TCX1000-ILA includes the DC power connector that attaches to the terminal studs of each power supply.

- See Also**
- [Connecting the TCX1000-ILA to Power on page 50](#)
 - [TCX1000-ILA DC Power Electrical Safety Guidelines on page 105](#)

TCX1000-ILA Chassis Grounding Cable and Lug Specifications

For installations that require a separate grounding conductor to the chassis, the TCX1000-ILA must be adequately grounded before power is connected to ensure proper operation and to meet safety and electromagnetic interference (EMI) requirements. To ground an TCX1000-ILA, connect a grounding cable to earth ground and then attach it to the chassis grounding points.



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

connected to earth ground for installations that require a separate grounding conductor to the chassis.



CAUTION: Before device installation begins, a licensed electrician must attach a cable lug to the grounding cables that you supply. See [Figure 22 on page 51](#). A cable with an incorrectly attached lug can damage the TCX1000-ILA.

Before connecting the TCX1000-ILA to earth ground, review the following information:

- A protective earthing terminal bracket is required for connecting the TCX1000-ILA to earth ground. This two-holed bracket is attached to the rear of the TCX1000-ILA chassis and provides a protective earthing terminal for the device. The grounding points require two #10-32 UNF screws. The grounding points are spaced at 0.63 in. (16 mm).
- The grounding lug required is a Panduit LCD6-14BH-L or equivalent (provided). The grounding lug accommodates 14–10 AWG (2–5.3 mm²) stranded wire.
- The grounding cable that you provide for an TCX1000-ILA must be the same size or heavier than the input wire of each power supply. Minimum recommendations are 14–10 AWG (2–5.3 mm²) stranded wire, 60° C wire, or as permitted by local code.

- See Also**
- [Prevention of Electrostatic Discharge Damage on page 103](#)
 - [Connecting the TCX1000-ILA to External Devices on page 47](#)
 - [Connecting the TCX1000-ILA to Power on page 50](#)

CHAPTER 2

Site Planning, Preparation, and Specifications

- [TCX1000-ILA Site Guidelines and Requirements on page 33](#)
- [TCX1000-ILA Management Cable Specifications and Pinouts on page 39](#)

TCX1000-ILA Site Guidelines and Requirements

- [TCX1000-ILA Site Preparation Checklist on page 33](#)
- [TCX1000-ILA Environmental Requirements and Specifications on page 34](#)
- [TCX1000-ILA Clearance Requirements for Airflow and Hardware Maintenance on page 35](#)
- [TCX1000-ILA Physical Specifications on page 36](#)
- [TCX1000-ILA Rack Requirements on page 37](#)
- [TCX1000-ILA Cabinet Requirements on page 38](#)
- [TCX1000-ILA Optical Specifications on page 39](#)

TCX1000-ILA Site Preparation Checklist

The checklist in [Table 15 on page 33](#) summarizes the tasks you need to perform when preparing a site for an TCX1000-ILA installation.

Table 15: 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 the TCX1000-ILA tolerances. | “TCX1000-ILA Environmental Requirements and Specifications” on page 34 | | |
| Power | | | |
| Measure the distance between external power sources and the TCX1000-ILA installation site. | | | |
| Calculate the power consumption and requirements. | “TCX1000-ILA Power System” on page 24 | | |

Table 15: Site Preparation Checklist (continued)

| Item or Task | For More Information | Performed by | Date |
|---|---|--------------|------|
| Rack or Cabinet | | | |
| Verify that your rack or cabinet meets the minimum requirements for the installation of the TCX1000-ILA. | “TCX1000-ILA Rack Requirements” on page 37 “TCX1000-ILA Cabinet Requirements” on page 38 | | |
| Plan rack or cabinet location, including required space clearances. | “TCX1000-ILA Clearance Requirements for Airflow and Hardware Maintenance” on page 35 | | |
| Secure the rack or cabinet to the floor and building structure. | | | |
| Cables | | | |
| Acquire cables and connectors: | | | |
| <ul style="list-style-type: none"> 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. | | | |
| Plan the cable routing and management. | | | |

- See Also**
- [General Electrical Safety Guidelines and Warnings on page 101](#)
 - [General Site Guidelines](#)
 - [Overview of Installing the TCX1000-ILA on page 43](#)
 - [Unpacking and Mounting the TCX1000-ILA on page 44](#)

TCX1000-ILA Environmental Requirements and Specifications

The TCX1000-ILA must be installed in a rack or cabinet. 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 TCX1000-ILA cooling system.
- Maintain ambient airflow for normal TCX1000-ILA operation. If the airflow is blocked or restricted, or if the intake air is too warm, the chassis might overheat, leading to the TCX1000-ILA temperature monitor shutting down the device to protect the hardware components.

Table 16 on page 35 provides the required environmental conditions for normal operation of the TCX1000-ILA.

Table 16: TCX1000-ILA Environmental Tolerances

| Description | Tolerance |
|-------------------|--|
| Altitude | No performance degradation up to 6000 feet (1828.8 meters). |
| Relative humidity | <p>Normal operation ensured in relative humidity range of 5% through 85%, noncondensing.</p> <ul style="list-style-type: none"> Short-term operation ensured in relative humidity range of 5% through 95%, noncondensing. <p>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.</p> |
| Temperature | <ul style="list-style-type: none"> Normal operation ensured in temperature range of 41° F (5° C) through 104° F (40° C). Short-term temperature is 23° F (–5° C) through 131° F (55° C) Nonoperating storage temperature in shipping container: 23°F (–5° C) through 185° F (85° C). |
| Seismic | Designed to comply with Zone 4 earthquake requirements per NEBS GR-63-CORE, Issue 3. |



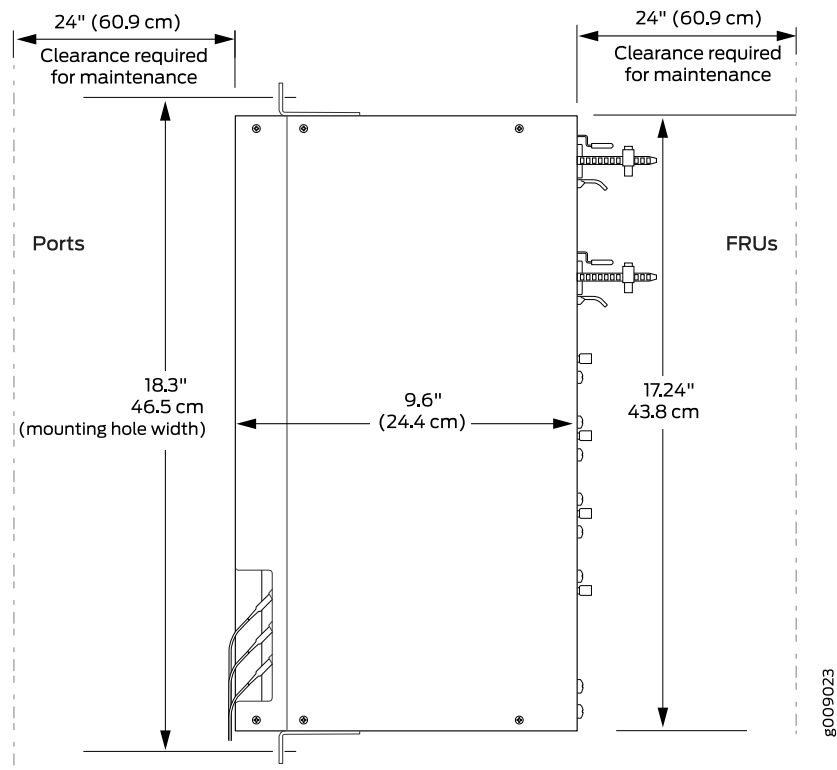
NOTE: Install the TCX1000-ILA only in restricted-access areas, such as dedicated equipment rooms and equipment closets, in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA 70.

See Also • [Overview of Installing the TCX1000-ILA on page 43](#)

TCX1000-ILA Clearance Requirements for Airflow and Hardware Maintenance

When planning the site for an TCX1000-ILA installation, you must allow sufficient clearance around the installed chassis (see [Figure 17 on page 36](#)).

Figure 17: Clearance Requirements for Airflow and Hardware Maintenance for an TCX1000-ILA



Follow these guidelines:

- For the cooling system to function properly, the airflow around the chassis must be unrestricted. See [“TCX1000-ILA Cooling System Description” on page 22](#) for more information about the airflow through the chassis.
- If you are mounting an TCX1000-ILA in a rack or cabinet with other equipment, ensure that the exhaust from other equipment does not blow into the intake vents of the TCX1000-ILA chassis.
- You must leave at least 24 in. (61 cm) both in front of and behind the TCX1000-ILA. For service personnel to remove and install hardware components, you must leave adequate space at the front and back of the TCX1000-ILA. NEBS GR-63 recommends that you allow at least 30 in. (76.2 cm) in front of the rack or cabinet and 24 in. (61 cm) behind the rack or cabinet.

TCX1000-ILA Physical Specifications

[Table 17 on page 37](#) lists the physical specifications for the TCX1000-ILA chassis and components.

Table 17: Physical Specifications for the TCX1000-ILA

| Model Numbers | Fans and Power | Height | Width | Depth | Weight |
|----------------|---|-----------------------|------------------------|--|--|
| TCX1000-ILA-AC | 3 fan modules and 2 AC power supplies installed | 1.72 in. (4.36 cm) | 17.24 in. (43.8 cm) | 9.6 in. (24.4 cm) without handles for fans or power supplies. | With field-replaceable units (FRUs) installed: 11.7 lb (5.30 kg) |
| TCX1000-ILA-DC | 3 fan modules and 2 DC power supplies installed | 1.72 in. (4.36 cm) | 17.4 in. (44.19 cm) | 9.8 in. (24.89 cm) without handles for fans or power supplies. | With FRUs installed: 11.7 lb (5.30 kg) |

TCX1000-ILA Rack Requirements

The TCX1000-ILA chassis is designed to be installed in two-post or four-post racks.

Rack requirements consist of:

- Rack type
- Mounting bracket hole spacing
- Rack size and strength

Table 18 on page 37 provides the rack requirements and specifications for the TCX1000-ILA.

Table 18: Rack Requirements for the TCX1000-ILA

| Rack Requirement | Guidelines |
|----------------------------------|--|
| Rack type: two-post or four-post | <p>Use a two-post or four-post rack that provides bracket patterns spaced at 1-U (1.75 in. or 4.45 cm) increments and that meets the size and strength requirements to support the weight.</p> <p>A U is the standard rack unit defined in <i>Cabinets, Racks, Panels, and Associated Equipment</i> (document number EIA-310-D) published by the Electronics Components Industry Association (http://www.ecianow.org/).</p> |
| Mounting bracket hole spacing | The holes in the mounting brackets are spaced at 1.25 in. (or 3.17 cm), so that the TCX1000-ILA can be mounted in any rack that provides holes spaced at that distance. |
| Rack size and strength | <ul style="list-style-type: none"> • Ensure that the rack complies with the standards for a 19-in. or 23-in. rack as defined in <i>Cabinets, Racks, Panels, and Associated Equipment</i> (document number EIA-310-D) published by the Electronics Components Industry Association (http://www.ecianow.org/). • Ensure that the rack rails are spaced widely enough to accommodate the TCX1000-ILA chassis. The outer edges of the front-mounting brackets extend the width to 19 in. (48.26 cm). • Ensure that the front and rear rack rails are spaced between 28 in. (71.1 cm) and 36 in. (91.4 cm) front-to-back. • Ensure that the rack is strong enough to support the weight of the TCX1000-ILA. • Ensure that the spacing of rails and adjacent racks allows for proper clearance around the TCX1000-ILA and rack. |

Table 18: Rack Requirements for the TCX1000-ILA (continued)

| Rack Requirement | Guidelines |
|---------------------------------------|---|
| Rack connection to building structure | <ul style="list-style-type: none"> 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. |

See Also • [Maintenance and Operational Safety Guidelines and Warnings on page 96](#)

TCX1000-ILA Cabinet Requirements

You can mount TCX1000-ILA models in a cabinet that contains a two-post 19-in. or four-post rack as defined in *Cabinets, Racks, Panels, and Associated Equipment* (document number EIA-310-E) published by the Electronics Components Industry Association (<http://www.ecianow.org/>).

Cabinet requirements consist of:

- Cabinet size and clearance
- Cabinet airflow requirements

[Table 19 on page 38](#) provides the cabinet requirements and specifications for the TCX1000-ILA.

Table 19: Cabinet Requirements for the TCX1000-ILA

| Cabinet Requirement | Guidelines |
|------------------------------|---|
| Cabinet size and clearance | <p>The minimum cabinet size for accommodating an TCX1000-ILA is 18 in. (45.7 cm) deep. Large cabinets improve airflow and reduce the chance of overheating.</p> <p>NOTE: The DC version of the TCX1000-ILA conforms to the ETSI 300 mm cabinets.</p> |
| Cabinet airflow requirements | <p>When you mount the TCX1000-ILA in a cabinet, ensure that ventilation through the cabinet is sufficient to prevent overheating.</p> <ul style="list-style-type: none"> • Ensure that the cool air supply you provide through the cabinet adequately dissipates the thermal output of the TCX1000-ILA (and other installed equipment). • Ensure that the cabinet allows the hot exhaust air of the chassis to exit the cabinet without recirculating into the TCX1000-ILA. An open cabinet (without a top or doors) that employs hot air exhaust extraction from the top allows the best airflow through the chassis. If the cabinet contains a top or doors, perforations in these elements assist with removing the hot air exhaust. • Install the TCX1000-ILA in the cabinet in a way that maximizes the open space on the field-replaceable unit (FRU) side of the chassis. This maximizes the clearance for critical airflow. The TCX1000-ILA exhausts hot air through the fans and power supplies. • Route and dress all cables to minimize the blockage of airflow to and from the TCX1000-ILA. • Ensure that the spacing of rails and adjacent cabinets allows for the proper clearance around the TCX1000-ILA and cabinet. |

TCX1000-ILA Optical Specifications

Table 20 on page 39 provides the optical specifications for the TCX1000-ILA.

Table 20: TCX1000-ILA Optical Specifications

| Parameter | Configurations | Minimum | Maximum |
|---------------------------|---------------------------------|-----------|----------|
| Input power range | Loaded system (96 channels) | –15.2 dBm | 9.8 dBm |
| | Single channel | –35 dBm | –10 dBm |
| Signal output power range | Loaded system (96 channels) | | 19.8 dBm |
| | Single channel | | 0 dBm |
| Gain range (standard) | Output gain tilt equal to 0 dB | 10 dB | 30 dB |
| Gain range (extended) | Output gain tilt not equal to 0 | 30 dB | 35 dB |

See Also • [Overview of Installing the TCX1000-ILA on page 43](#)

TCX1000-ILA Management Cable Specifications and Pinouts

- [Cable Specifications for Console and Management Connections for the TCX1000-ILA on page 39](#)
- [Management Port Connector Pinouts for the TCX1000-ILA on page 40](#)
- [Console Port Connector Pinouts for the TCX1000-ILA on page 40](#)

Cable Specifications for Console and Management Connections for the TCX1000-ILA

Table 21 on page 39 lists the specifications for the cables that connect the TCX1000-ILA to a management device.

Table 21: Cable Specifications for Console and Management Connections for the TCX1000-ILA

| Port on TCX1000-ILA | Cable Specification | Cable (Not Supplied) | Maximum Length | Device Receptacle |
|---------------------------------|--|--|-----------------------|-------------------|
| Console (CON) port | RS-232 (EIA-232) serial cable | One 7-foot (2.13-meter)-long RJ-45 patch cable and RJ-45 to DB-9 adapter | 7 feet (2.13 meters) | RJ-45 |
| Management (MGMT) port | Category 5 cable or equivalent suitable for 1000BASE-T operation | One 7-foot (2.13-meter)-long RJ-45 patch cable | 328 feet (100 meters) | RJ-45 |

Management Port Connector Pinouts for the TCX1000-ILA

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

Table 22 on page 40 provides the pinout information of the RJ-45 management port connector. The RJ-45 cable is not supplied with the TCX1000-ILA.

Table 22: RJ-45 Management Port Connector Pinouts for the TCX1000-ILA

| 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 |

Console Port Connector Pinouts for the TCX1000-ILA

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 23 on page 40 provides the pinout information for the RJ-45 console connector. The RJ-45 cable and RJ-45 to DB-9 adapter are not supplied with the TCX1000-ILA.



NOTE: If your laptop or PC does not have a DB-9 male connector pin and you want to connect your laptop or PC directly to an TCX1000-ILA, use a combination of the RJ-45 cable and RJ-45 to DB-9 adapter and a USB to DB-9 male adapter. You must provide the USB to DB-9 male adapter.

Table 23: Console Port Connector Pinouts for the TCX1000-ILA

| Pin | Signal | Description |
|-----|----------|------------------------------|
| 1 | Reserved | Reserved |
| 2 | Reserved | Data terminal ready/Reserved |

Table 23: Console Port Connector Pinouts for the TCX1000-ILA (continued)

| Pin | Signal | Description |
|-----|---------------|---------------|
| 3 | TxD Output | Transmit data |
| 4 | Signal Ground | Signal ground |
| 5 | Signal Ground | Signal ground |
| 6 | RxD Input | Receive data |
| 7 | Reserved | Reserved |
| 8 | Reserved | Reserved |

CHAPTER 3

Initial Installation and Configuration

- [Overview of Installing the TCX1000-ILA on page 43](#)
- [Unpacking and Mounting the TCX1000-ILA on page 44](#)
- [Connecting the TCX1000-ILA to External Devices on page 47](#)
- [Connecting the TCX1000-ILA to Power on page 50](#)
- [Configuring the Software on the TCX1000-ILA on page 56](#)

Overview of Installing the TCX1000-ILA

To install and connect an TCX1000-ILA:

1. [Unpack and mount your device by following the instructions in: “Unpacking and Mounting the TCX1000-ILA” on page 44.](#)
2. [Ground your device by following the instructions in:](#)
 - [Connecting the TCX1000-ILA Grounding Cable on page 50](#)
 - [Connecting the TCX1000-ILA to External Devices on page 47](#)
3. [Connect AC or DC power:](#)
 - [Connecting AC Power to an TCX1000-ILA on page 51](#)
 - [Connecting DC Power to an TCX1000-ILA on page 53](#)
4. [Configure the device following the instructions in:](#)
 - [Configuring the Software on the TCX1000-ILA on page 56](#)

Related Documentation

- [TCX1000-ILA Rack Requirements on page 37](#)
- [TCX1000-ILA Cabinet Requirements on page 38](#)
- [TCX1000-ILA Clearance Requirements for Airflow and Hardware Maintenance on page 35](#)

Unpacking and Mounting the TCX1000-ILA

- [Unpacking the TCX1000-ILA on page 44](#)
- [Mounting an TCX1000-ILA in a Rack or Cabinet on page 45](#)

Unpacking the TCX1000-ILA

The TCX1000-ILA chassis is a rigid sheet-metal structure that houses the hardware components. The TCX1000-ILA is shipped in a cardboard carton, secured with foam packing material. The carton also contains a pointer card with links to the quick start instructions and TCX Series documentation.



CAUTION: The TCX1000-ILA chassis is maximally protected inside the shipping carton. Do not unpack the TCX1000-ILA until you are ready to begin installation.

To unpack an TCX1000-ILA:

1. Move the shipping carton to a staging area as close to the installation site as possible, but where you have enough room to remove the system components.
2. Position the carton so that the arrows are pointing up.
3. Open the top flaps on the shipping carton.
4. Remove the accessory kit and verify the contents against the inventory of components listed in [Table 24 on page 44](#).
5. Pull out the packing material holding the TCX1000-ILA in place.
6. Verify the chassis components received:
 - Three fan modules
 - Two power supplies
7. Save the shipping carton and packing materials in case you need to move or ship the chassis later.

Table 24: Inventory of Components Supplied with an TCX1000-ILA

| Component | Quantity |
|---|----------|
| Chassis with three fan modules and two power supplies | 1 |
| 19-in. mounting brackets attached to the chassis | 2 |

Table 24: Inventory of Components Supplied with an TCX1000-ILA (continued)

| Component | Quantity |
|--|----------|
| Self-tapping 10-24 bolts to secure the chassis and mounting brackets to the rack | 4 |
| Two M5-0.8x8 mm screws to secure the grounding lug (attached to chassis) | 2 |
| 21-in. mounting brackets | 2 |
| 23-in. mounting brackets | 2 |
| Grounding lug (provided). | 1 |
| AC power cord (only with the AC version) | 2 |
| DC power connectors (only with the DC version) | 2 |
| Documentation Roadmap card | 1 |

Mounting an TCX1000-ILA in a Rack or Cabinet

You can mount an TCX1000-ILA in a two-post or four-post 19-in. rack or cabinet by using the attached mounting brackets. (The remainder of this topic uses *rack* to mean *rack or cabinet*.)

- [Before You Begin Mounting the TCX1000-ILA on page 45](#)
- [Mounting the TCX1000-ILA on page 46](#)

[Before You Begin Mounting the TCX1000-ILA](#)

Before you begin mounting an TCX1000-ILA in the rack:

1. Ensure that you understand how to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage” on page 103](#).
2. Verify that the site meets the requirements described in [“TCX1000-ILA Site Guidelines and Requirements” on page 33](#).
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 82](#), and [“Installation Instructions Warning” on page 86](#).
5. Remove the TCX1000-ILA from the shipping carton.
6. Ensure that you have the following parts and tools available to mount the TCX1000-ILA in a rack:

- ESD grounding strap (not provided).
- One pair of 19-inch mounting brackets (attached).
- One pair of 21-inch mounting brackets.
- One pair of 23-inch mounting brackets.
- Four screws to secure the chassis and mounting blades to the rack (not provided).
- Screwdriver appropriate for the rack mounting screws (not provided).



CAUTION: If you are mounting multiple devices in a rack, mount the device in the lowest position of the rack first. Proceed to mount the rest of the devices from the bottom to the top of the rack to minimize the risk of the rack toppling.



NOTE: This procedure requires two persons. Do not attempt to do it alone.

Mounting the TCX1000-ILA

To mount the TCX1000-ILA on two posts or four posts in a rack by using the provided mounting kit (see [Figure 18 on page 47](#)):



NOTE: The 19-inch brackets are attached to the TCX1000-ILA when they are shipped. If you want to attach the 21-inch or 23-inch brackets, unscrew the 19-inch brackets from the chassis, and attach the 21-inch or 23-inch brackets by using the same screws.

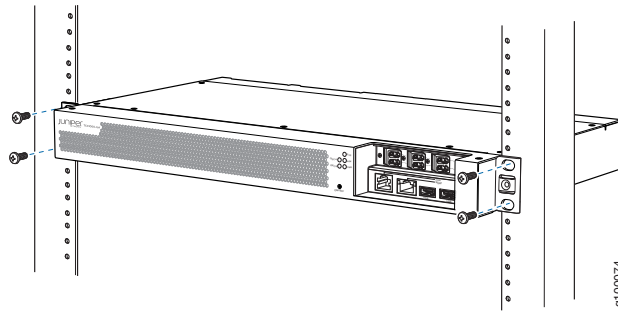
1. Attach the ESD grounding strap to your bare wrist and to a site ESD point.



NOTE: Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure. 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. AC-powered TCX1000-ILA version weighs 11.7 lb (5.30 kg) while the DC-powered TCX1000-ILA weighs 11.8 lb (5.35 kg).

2. Position the TCX1000-ILA in such a manner that the FRUs are next to the hot aisle.
3. Use four mounting screws (and cage nuts and washers if your rack requires them) to attach the brackets to the rack.

Figure 18: Installing the TCX1000-ILA on a Rack



4. Tighten the screws.

- See Also**
- [Connecting the TCX1000-ILA to Power on page 50](#)
 - [Overview of Installing the TCX1000-ILA on page 43](#)

Connecting the TCX1000-ILA to External Devices

- [Connecting the TCX1000-ILA to a Management Ethernet Device on page 47](#)
- [Connecting the TCX1000-ILA to a Management Console on page 48](#)
- [Connecting the TCX1000-ILA to the Network and External Devices on page 49](#)

Connecting the TCX1000-ILA to a Management Ethernet Device

You can monitor and manage the TCX1000-ILA by using a dedicated management channel. Use the management port to connect the TCX1000-ILA to a network for out-of-band management.



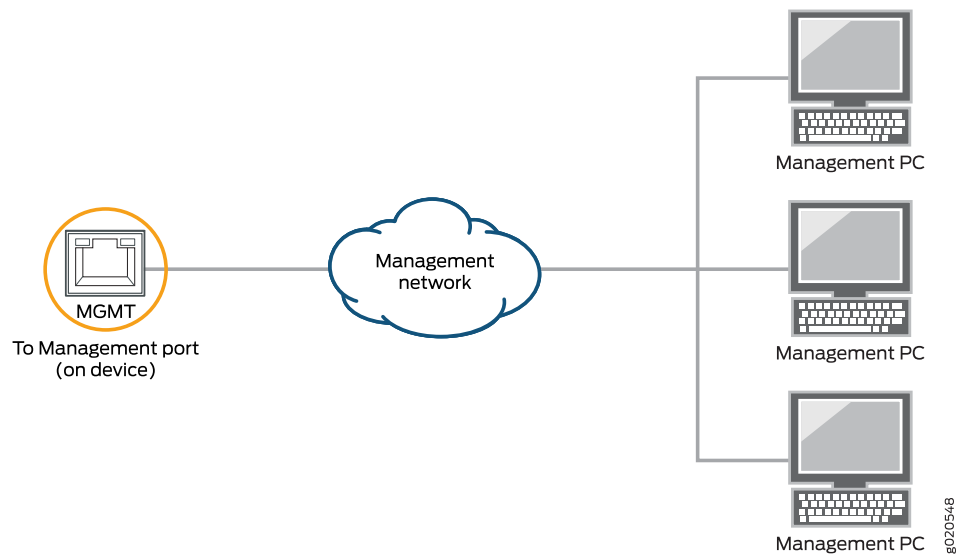
NOTE: You cannot use the management port to perform the initial configuration of the TCX1000-ILA. You must configure the management ports through the console connection before you can successfully connect to the TCX1000-ILA using the management ports. See [“Configuring the Software on the TCX1000-ILA” on page 56](#).

Ensure that you have an appropriate cable available. See [“TCX1000-ILA Management Cable Specifications and Pinouts” on page 39](#).

To connect an TCX1000-ILA to a network for out-of-band management (see [Figure 19 on page 48](#)):

1. Connect one end of the cable to the management port (labeled **MGMT**) on the TCX1000-ILA.
2. Connect the other end of the cable to the management network device.

Figure 19: Connecting an TCX1000-ILA to a Network for Out-of-Band Management



Connecting the TCX1000-ILA to a Management Console

The TCX1000-ILA has a console port with an RJ-45 connector. Use the console port to connect the device directly to a management console, such as a laptop, or to a console server.

Ensure that you have an RJ-45 to DB-9 rollover cable available. The RJ-45 cable and RJ-45 to DB-9 adapter is not provided with the device.



NOTE: If your laptop or PC does not have a DB-9 male connector pin and you want to connect your laptop or PC directly to the TCX1000-ILA, use a combination of the RJ-45 cable and RJ-45 to DB-9 adapter (not supplied with the device) and a USB to DB-9 male adapter. You must provide the USB to DB-9 male adapter.

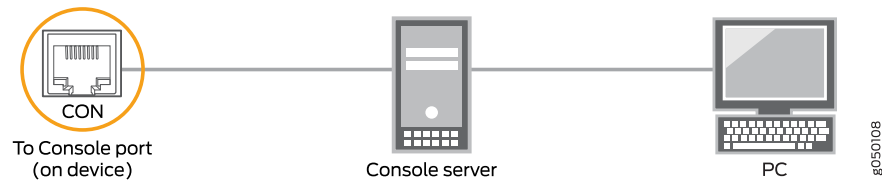
To connect the TCX1000-ILA to a management console (see [Figure 20 on page 49](#) or [Figure 21 on page 49](#)):

1. Connect one end of the Ethernet cable to the console port (labeled **CON**).
2. Connect the other end of the Ethernet cable directly to a management console or console server.

Figure 20: Connecting the TCX1000-ILA Directly to a Management Console



Figure 21: Connecting the TCX1000-ILA to a Management Console Through a Console Server



See Also • [TCX1000-ILA Management Cable Specifications and Pinouts on page 39](#)

Connecting the TCX1000-ILA to the Network and External Devices

The TCX1000-ILA provides signal amplification to boost the dense wavelength-division multiplexing (DWDM) signal as it propagates along the fiber-optic cable. It is used to connect to trunk fibers to enable long-distance transmission over many hundreds of kilometers of fiber-optic cable. Two pairs of the LC ports on the front panel of the chassis are used for this purpose. Typically, either another TCX1000-ILA or an TCX1000-RDM20 is connected at the far end of this trunk fiber. Additionally, the optical monitor ports can be connected through the LC single fiber cables to measurement equipment and test equipment such as optical spectrum analyzers or optical power monitors that are used for testing, monitoring, and debugging.

For detailed information on network requirements and configuration examples on how to deploy the TCX1000-ILA, see the *TCX Series Optical Transport System Feature Guide*. For instructions on how to enable the OSC forwarding on the TCX1000-RDM20, see the “Performing the Initial Configuration section” in the *TCX1000 Programmable ROADM Hardware Guide*. For information on network requirements and high availability (HA), see the *proNX Optical Director Installation Guide*. You can find these documents at: <https://www.juniper.net/documentation/>.

See Also • [TCX1000-ILA System Overview on page 13](#)

- [Maintaining the TCX1000-ILA Fiber-Optic Cables on page 67](#)
- [TCX1000-ILA Management Cable Specifications and Pinouts on page 39](#)

Connecting the TCX1000-ILA to Power

- [Connecting the TCX1000-ILA Grounding Cable on page 50](#)
- [Connecting AC Power to an TCX1000-ILA on page 51](#)
- [Connecting DC Power to an TCX1000-ILA on page 53](#)

Connecting the TCX1000-ILA Grounding Cable

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 TCX1000-ILA chassis to connect to the earth ground.



NOTE: An AC-powered TCX1000-ILA gains additional grounding when you plug the power supply in the device into a grounded AC power outlet by using an AC power cord appropriate for your geographical location. See [Table 12 on page 29](#).



CAUTION: Before you connect power to the TCX1000-ILA, 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 TCX1000-ILA (for example, by causing a short circuit).



NOTE: Mount the TCX1000-ILA in the rack or cabinet before attaching the grounding lug to the TCX1000-ILA. See [“Unpacking and Mounting the TCX1000-ILA” on page 44](#).

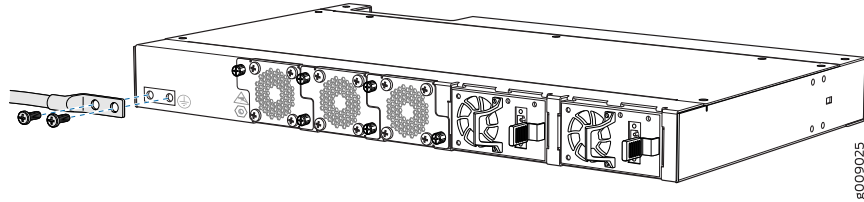
- Grounding cable (not provided)—The grounding cable must be 14–10 AWG (2–5.3 mm²), minimum 90° C wire, or as permitted by the local code.
- Grounding lug (provided) for your grounding cable—The grounding lug required is a Panduit LCD6-14BH-L or equivalent.
- Two M5-0.8x8 mm screws (provided)—The screws are secured on the chassis when it is shipped.
- Screwdriver appropriate for the M5-0.8x8 mm screws.

To connect a grounding cable to the TCX1000-ILA:

1. Connect one end of the grounding cable to a proper site earth ground, such as the rack in which the TCX1000-ILA is mounted.
2. Unscrew the screws that are attached to the chassis.

3. Place the grounding lug attached to the grounding cable over the protective earthing terminal on the chassis (see [Figure 22 on page 51](#)).

Figure 22: Connecting a Grounding Cable to the TCX1000-ILA



4. Secure the grounding lug to the protective earthing terminal with the screws.
5. Dress the grounding cable and ensure that it does not touch or block access to other device components and that it does not drape where people could trip over it.

See Also • [General Safety Guidelines and Warnings on page 82](#)

Connecting AC Power to an TCX1000-ILA

Before you begin connecting AC power to an TCX1000-ILA:

- Read [“General Electrical Safety Guidelines and Warnings” on page 101](#).
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [“Prevention of Electrostatic Discharge Damage” on page 103](#)).
- Ensure that you have connected the TCX1000-ILA chassis to earth ground.



CAUTION: Before you connect power to the TCX1000-ILA, 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 switch (for example, by causing a short circuit).



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 TCX1000-ILA chassis to connect to the earth ground (see [Figure 22 on page 51](#)).



NOTE: An AC-powered TCX1000-ILA gains additional grounding when you plug the power supply in the device into a grounded AC power outlet by using an AC power cord appropriate for your geographical location. See [Table 12 on page 29](#).

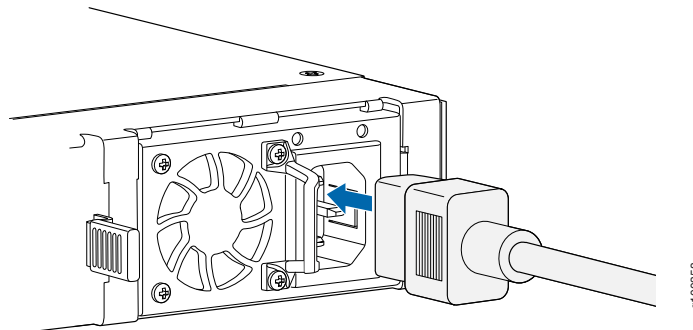


NOTE: Each power supply must be connected to a dedicated power source outlet.

To connect AC power to an TCX1000-ILA:

1. To prevent damage to the equipment caused by ESD, 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. Insert the coupler end of the power cord into the AC power cord inlet on the AC power supply faceplate (see [Figure 23 on page 52](#)).
4. Open the power cord retainer by pressing the protruding tab and prying it open. Wrap the power cord retainer around the AC power cord and press the cable clamp through the hole to tighten as shown in [Figure 23 on page 52](#).

Figure 23: Connecting an AC Power Cord to an AC Power Supply in an TCX1000-ILA



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



NOTE: The TCX1000-ILA powers on as soon as power is provided to the power supply.

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

7. Repeat the steps for each power supply you are connecting to power.
8. If the AC power source outlet has a power switch, set it to the on (I) position.
9. Verify that the status LEDs on each power supply are lit green.

If any of the LEDs is lit red, remove power from the power supply, and replace the power supply (see [Figure 27 on page 65](#)). Do not remove the power supply until you have a replacement power supply ready: either power supplies or blank cover panels must be installed in the TCX1000-ILA to ensure proper airflow.



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

See Also • [Table 11 on page 29](#)

Connecting DC Power to an TCX1000-ILA



WARNING: DC-powered TCX1000-ILA models are intended for installation only in a restricted access location.

Before you begin connecting DC power to the TCX1000-ILA:

- Read “[General Electrical Safety Guidelines and Warnings](#)” on page 101 and “[TCX1000-ILA DC Power Electrical Safety Guidelines](#)” on page 105.
- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see “[Prevention of Electrostatic Discharge Damage](#)” on page 103).
- Ensure that you have connected the TCX1000-ILA chassis to earth ground.



CAUTION: Before you connect power to the TCX1000-ILA, 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 switch (for example, by causing a short circuit).



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 TCX1000-ILA chassis to connect to the earth ground (see “[Connecting the TCX1000-ILA to Power](#)” on page 50).

- Install the power supply in the chassis following the instructions in ["Installing a Power Supply in an TCX1000-ILA" on page 65](#).
- Ensure that you have the following parts and tools available:
 - ESD grounding strap
 - Power cable or cables appropriate for your geographical location available to connect DC power to the TCX1000-ILA.

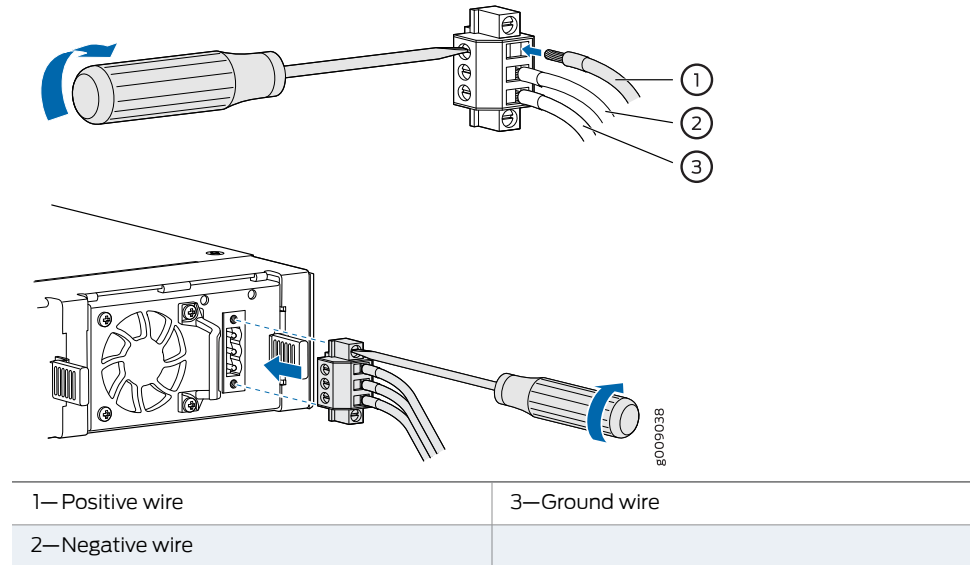


NOTE: Each power supply must be connected to a dedicated power source outlet.

To connect DC power to an TCX1000-ILA:

1. To prevent damage to the equipment caused by static discharge, 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. Ensure that the power source is turned off, the voltage across the DC power source cable leads is 0 V, and there is no chance that the cable leads might become active during installation.
4. Locate and remove the three-position DC connectors included in the accessory kit.
5. Identify the ground, positive, and negative feed positions for the DC connector. See [Figure 24 on page 55](#).
6. Strip each of the three wires coming out from the DC-input power source by 7–8 mm. Do not strip more than required, because doing so can leave the wire exposed from the DC connector after installation.

Figure 24: Connecting the DC Power Connector



7. Insert the stripped wires into the three-position DC connector.
8. Use a ratcheting torque screwdriver to apply a torque of 4.5 lb-in. (0.5 Nm) to each of the terminal block captive screws (see [Figure 24 on page 55](#)).
9. Insert the DC connector in the TCX1000-ILA DC power supply.
10. Tighten the attached screws (top and bottom) on the DC power connector to apply a torque of 4.5 lb-in. (0.5 Nm). See [Figure 24 on page 55](#).
11. Repeat Step 4 through Step 10 for each power supply you are connecting to power.



WARNING: Ensure that the power cables do not block access to device components or drape where people can trip on them.

12. Close the input circuit breaker.



NOTE: We recommend that the 48-VDC facility DC source be equipped with a circuit protector rated as required by local code.



NOTE: We recommend that the 60-VDC facility DC source be equipped with a circuit protector rated as required by local code.



NOTE: The TCX1000-ILA powers on as soon you connect the power.

13. Verify that the status LEDs on each power supply are lit green.

If the DC IN OK or DC OUT OK is lit steadily red, remove power from the power supply, and replace the power supply (see [“Removing a Power Supply from an TCX1000-ILA” on page 64](#)). Do not remove the power supply until you have a replacement power supply ready: the power supplies or a blank panel must be installed in the TCX1000-ILA to ensure proper airflow.



CAUTION: Replace a failed power supply with a new power supply within one minute of removal to prevent chassis overheating.

See Also • [TCX1000-ILA Power System on page 24](#)

Configuring the Software on the TCX1000-ILA

- [Performing Initial Software Configuration for the TCX1000-ILA on page 56](#)

Performing Initial Software Configuration for the TCX1000-ILA

You must perform the initial configuration of the TCX1000-ILA through the command-line interface (CLI). The TCX1000-ILA supports two command line modes. When you first log in to the TCX1000-ILA, you are placed into user mode. In user mode, you can issue basic commands such as ping but you do not have access to regular CLI commands. To get access to the regular CLI, you need to log in to the administrative mode from user mode. From the administrative mode, you can set the IP address and do other tasks.

Before you begin connecting and configuring a TCX1000-ILA, set the following parameter values on the management console or console server:

- Baud Rate—115200
- Flow Control—None
- Data—8
- Parity—None
- Stop Bits—1

The default IP address of the TCX1000-ILA is 192.168.1.248. You need to set the IP address to the Data Communication Network (DCN) subnet.

To set up the IP address:

1. Connect to the CLI through one of the following methods:
 - Connect the console port to a laptop or PC with an RJ-45 cable and an RJ-45 to DB-9 adapter (not provided). The console port (labeled **CON**) is located on the management panel of the TCX1000-ILA (see [“Connecting the TCX1000-ILA to a Management Console” on page 48](#) for more information). Start a serial connection to the TCX1000-ILA using your preferred application (such as PuTTY).
 - Connect the management port (labeled **MGMT**) to a PC with an Ethernet cable (not provided). From your PC or laptop, use SSH to connect to the TCX1000-ILA and log in to the user mode with the username (**admin**) and the password (**admin**). Make sure your PC is on the same subnet as the TCX1000-ILA IP address. The user mode username and password are used if you are using SSH to connect to the CLI interface.



NOTE: If you are using Linux, use the following command to initiate a connection: `ssh admin@192.168.1.248`.

If you are using a PC or laptop, refer to your preferred application (such as PuTTY) to initiate a connection.

Change the user mode password by entering a new password at the prompt.

```
root@localhost:~# ssh admin@192.168.1.248
The authenticity of host '192.168.1.248 (192.168.1.248)' can't be established.
ECDSA key fingerprint is 46:40:8b:4b:21:ea:71:8e:36:7e:33:e3:b2:51:6c:e9.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.1.248' (ECDSA) to the list of known
hosts.
admin@192.168.1.248's password:
default password is admin
SSH user "admin"
*****
Please change default password!!!
*****
Changing password for admin.

(current) UNIX password: ****
Enter new UNIX password: *****
Retype new UNIX password: *****

passwd: password updated successfully
*****
OK. Please remember new password!!!
*****

Welcome to Command Line

EDFA>
```

2. Log in to the administrative mode with the username (**WRuser**) and default password (**WRuser123**). Change the administrative mode password by entering a new password

at the prompt.

```
EDFA>login
Username: WRuser
Password: ***** CLI User "WRuser" default password is WRuser123
*****
      Please change default password!!!
*****

Enter new password:*****
Retype new password:*****
*****
      OK. Please remember new password!!!
*****

Completed!
EDFA>
```

3. Set the IP address. If you want to use IPv4 communication, see step 4 or if you want to use IPv6 communication see step 5.
4. For IPv4, enter the **system config network eth0 ipv4 *IP-address netmask gateway-address*** command.

See the following sample output to set the IPv4 address:

```
EDFA>system config network eth0 ipv4 192.0.2.0 255.255.255.0 192.0.2.1
04-12 02:12:04 Completed!

EDFA>
```

5. For IPv6, enter the **system config network eth0 ipv6 *IP-address gateway-address prefix*** command.

See the following sample output to set the IPv6 address:

```
EDFA>system config network eth0 ipv6 2001.db8::3 2001.db8::4 32
2018-12-12 02:40:58!

EDFA>
```

6. Set the hostname for the device:

Enter the **system config hostname *hostname*** command.

For example, set the hostname as ILA_1:

```
EDFA>system config hostname ILA_1
```



NOTE: You can enter the **show system config** command to confirm the changes.

7. Save the new configuration to the persistent storage.



NOTE: If you do not save, your changes will be lost.

```
EDFA>system savecfg
```

8. Reboot the TCX1000-ILA after you set the IP address.
9. Connect the management port (labeled **MGMT**) to the DCN to verify the IP address you configured. Use SSH to connect to the TCX1000-ILA and log in with the username (**admin**) and the configured password.
10. Use the proNX Optical Director to provision, monitor, and activate services on the TCX1000-ILA. See the TCX Series documentation at: https://www.juniper.net/documentation/product/en_US/pronx-optical-director.



NOTE: The proNX Optical Director uses the administrative mode username and password to log in via NETCONF.

CHAPTER 4

Maintaining Components

- [Maintaining the TCX1000-ILA Cooling System on page 61](#)
- [Maintaining the TCX1000-ILA Power System on page 63](#)
- [Maintaining the TCX1000-ILA Fiber-Optic Cables on page 67](#)
- [Removing the Device on page 70](#)

Maintaining the TCX1000-ILA Cooling System

- [Removing a Fan Module from an TCX1000-ILA on page 61](#)
- [Installing a Fan Module in an TCX1000-ILA on page 62](#)

Removing a Fan Module from an TCX1000-ILA

The fan modules in an TCX1000-ILA are hot-removable and hot-insertable field-replaceable units (FRUs)—you can remove and replace them without powering off the TCX1000-ILA or disrupting TCX1000-ILA functions.



CAUTION: Replace the fan module within 30 seconds of removal to prevent chassis overheating. Before removing the fan module, ensure that you have a replacement fan module available.

Before you remove a fan module from an TCX1000-ILA, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [“Prevention of Electrostatic Discharge Damage” on page 103](#)).

Ensure that you have the following parts and tools available:

- ESD grounding strap
- Antistatic bag or an antistatic mat
- Phillips (+) screwdriver, number 2

To remove a fan module from an TCX1000-ILA (see [Figure 25 on page 62](#)):

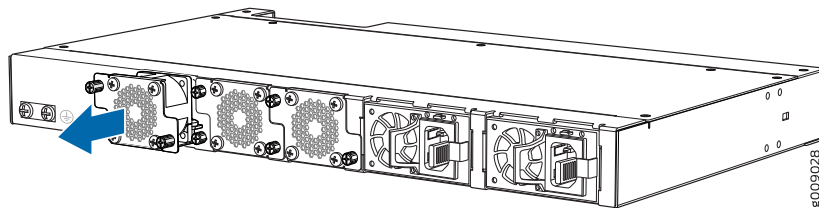
1. Place the antistatic bag or the antistatic mat on a flat, stable surface.
2. To prevent damage to the equipment caused by static discharge, attach an ESD grounding strap to your bare wrist, and connect the strap to one of the ESD points on the chassis.
3. Using a screwdriver, loosen the captive screws on the side of the fan.
4. Grasp the large captive screws on the fan module to slide the fan module halfway out of the chassis.



WARNING: To avoid injury, do not touch the fan with your hands or any tools as you slide the fan module out of the chassis—the fan might still be running.

5. When the fan stops rotating, slide the fan module completely out of the chassis.
6. Place the fan module in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

Figure 25: Removing a Fan Module from an TCX1000-ILA



NOTE: When a fan module is removed, the system raises an alarm. You can enter the `show alarm` CLI command to view the message.

Installing a Fan Module in an TCX1000-ILA

The fan modules in an TCX1000-ILA are hot-removable and hot-insertable field-replaceable units (FRUs)—you can remove and replace them without powering off the TCX1000-ILA or disrupting routing functions.



CAUTION: Replace the fan module within 30 seconds of removal to prevent chassis overheating. Before removing the fan module, ensure that you have a replacement fan module available.



NOTE: The fan module provides airflow out, which is also known as *front-to-back* airflow.

Before you install a fan module in an TCX1000-ILA, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [“Prevention of Electrostatic Discharge Damage” on page 103](#)).

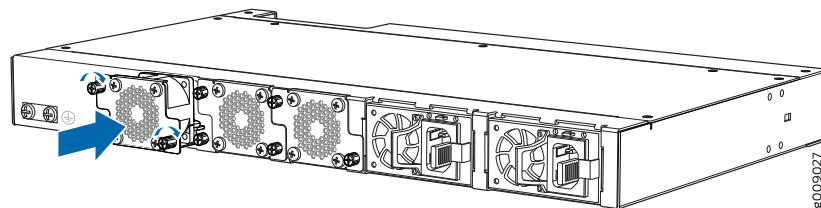
Ensure that you have the following parts and tools available:

- ESD grounding strap
- Phillips #2 (+) screwdriver

To install a fan module in an TCX1000-ILA (see [Figure 26 on page 63](#)):

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 TCX1000-ILA and slide it in until it is fully seated.
4. Use a screwdriver to secure the captive screws tightly on each side.

Figure 26: Installing a Fan Module in an TCX1000-ILA



See Also • [TCX1000-ILA Field-Replaceable Units on page 15](#)

Maintaining the TCX1000-ILA Power System

- [Removing a Power Supply from an TCX1000-ILA on page 64](#)
- [Installing a Power Supply in an TCX1000-ILA on page 65](#)

Removing a Power Supply from an TCX1000-ILA

The power supplies in an TCX1000-ILA are hot-removable and hot-insertable field-replaceable units (FRUs)—you can remove and replace them without powering off the TCX1000-ILA or disrupting TCX1000-ILA functions.



CAUTION: Replace the power supply within 1 minute of removal to prevent chassis overheating. Before removing the power supply, ensure that you have a replacement power supply available or install a blank cover.

Before you remove a power supply from an TCX1000-ILA, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [“Prevention of Electrostatic Discharge Damage” on page 103](#)).

Ensure that you have the following parts and tools available:

- ESD grounding strap
- Antistatic bag or an antistatic mat

To remove a power supply from an TCX1000-ILA (see [Figure 27 on page 65](#) and [Figure 28 on page 65](#)):

1. Place the antistatic bag or the antistatic mat on a flat, stable surface.
2. 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.



NOTE: If you will be removing all the power supplies installed in your TCX1000-ILA, you need to power off the TCX1000-ILA before removing the power supplies. See [“Removing the Device” on page 70](#).

3. Disconnect power to the TCX1000-ILA:
 - AC power supply—If the AC power source outlet has a power switch, set it to the off (O) position. If the AC power source outlet does not have a power switch, gently pull out the male end of the power cord connected to the power source outlet.
 - DC power supply—Switch the circuit breaker on the panel board that services the DC circuit to the off position.
4. Remove the power source cable from the power supply faceplate:
 - AC power supply—Gently pull out the female end of the power plug connected to the power supply faceplate.
 - DC power supply—Loosen the screws for the power connector and remove it.

5. Slide the locking lever toward the handle until it stops.
6. Grasp the power supply handle and pull firmly to slide the power supply halfway out of the chassis.
7. Place one hand under the power supply to support it and slide it completely out of the chassis. Take care not to touch power supply components, pins, leads, or solder connections.

Figure 27: Removing an AC Power Supply from an TCX1000-ILA

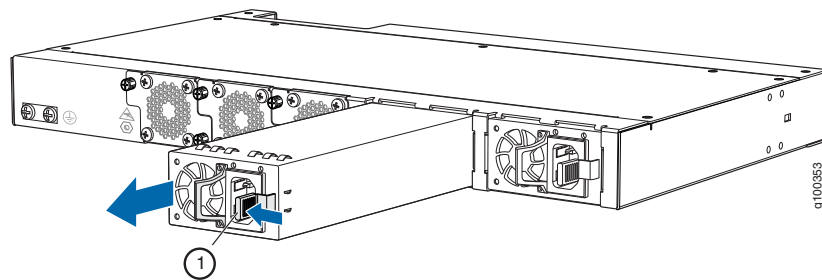
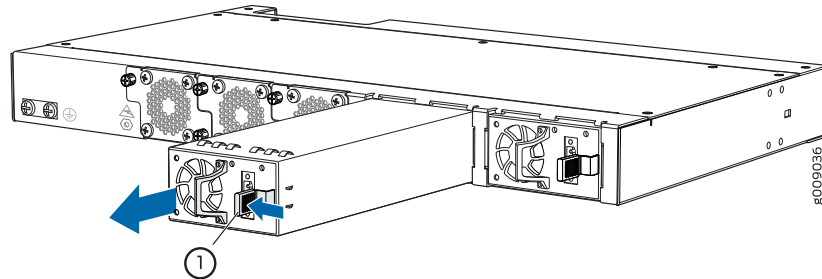


Figure 28: Removing a DC Power Supply from an TCX1000-ILA



8. Place the power supply in the antistatic bag or on the antistatic mat placed on a flat, stable surface.

Installing a Power Supply in an TCX1000-ILA

The power supplies in an TCX1000-ILA are hot-removable and hot-insertable field-replaceable units (FRUs)—you can remove and replace them without powering off the TCX1000-ILA or disrupting the ILA functions.



CAUTION: Replace the power supply within 1 minute of removal to prevent chassis overheating. Before removing the power supply, ensure that you have a replacement power supply available.

Before you install a power supply in an TCX1000-ILA, ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see [“Prevention of Electrostatic Discharge Damage” on page 103](#)).

Ensure that you have the following parts and tools available:

- ESD grounding strap

To install a power supply in an TCX1000-ILA (see [Figure 29 on page 66](#) and [Figure 30 on page 66](#)):

1. 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.
2. Taking care not to touch power supply components, pins, leads, or solder connections, remove the power supply from its bag.
3. Using both hands, place the power supply in the power supply slot on the FRU panel of the TCX1000-ILA and slide it in until it is fully seated and the locking lever slides into place.

Figure 29: Installing an AC Power Supply in an TCX1000-ILA

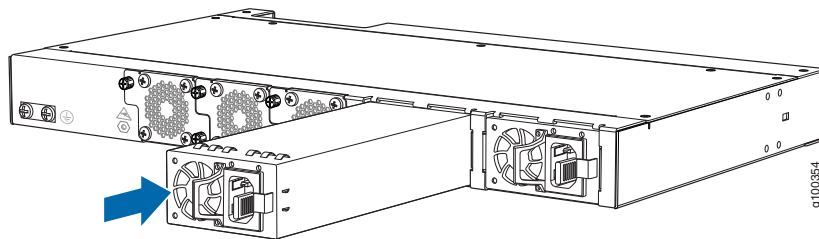
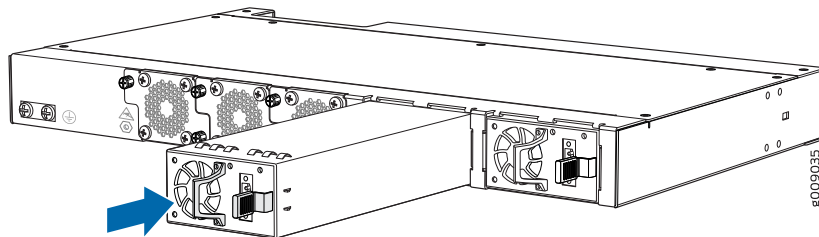


Figure 30: Installing a DC Power Supply in an TCX1000-ILA



See “Connecting AC Power to an TCX1000-ILA” on page 51 to connect the AC power supply. See “Connecting DC Power to an TCX1000-ILA” on page 53 to connect the DC 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.

Maintaining the TCX1000-ILA Fiber-Optic Cables

- [Disconnecting a Fiber-Optic Cable from a Device on page 67](#)
- [Connecting a Fiber-Optic Cable on page 68](#)
- [Maintaining Fiber-Optic Cables on page 70](#)

Disconnecting a Fiber-Optic Cable from a Device

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

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 Safety Warnings for Class 1M Juniper Networks Devices](#)” on page 94.

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

To disconnect a fiber-optic cable from an optical connector installed:



WARNING: Do not look directly into a fiber-optic connector or into the ends of fiber-optic cables. Fiber-optic connectors and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.



WARNING: Do not stare into the laser beam or view it directly with optical instruments even if the interface has been disabled.

1. Carefully unplug the fiber-optic cable connector from the LC connector. The port will be automatically disabled when the cable is removed.



WARNING: Do not leave a fiber-optic connector uncovered except when inserting or removing a cable. The rubber safety cap keeps the port clean and prevents accidental exposure to laser light.



WARNING: Class 1M laser product.

2. Cover the fiber-optic cable connector and the optical connector with the respective rubber safety caps.

Connecting a Fiber-Optic Cable

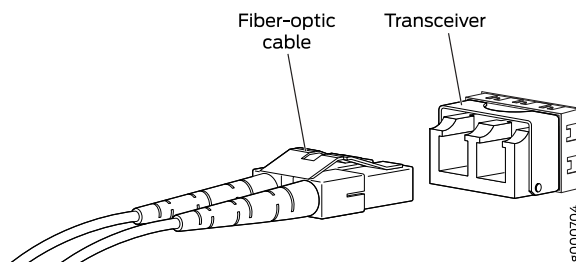
Before you connect a fiber-optic cable to an TCX1000-ILA, ensure that you have taken the necessary precautions for safe handling of lasers (see [“Laser Safety Warnings for Class 1M Juniper Networks Devices”](#) on page 94).

Also, inspect the fiber-optic cable with a scope, or use a fiber-cleaning device to clean the connector before inserting it into the TCX1000-ILA port.

To connect a fiber-optic cable to an optical connector in the TCX1000-ILA (see [Figure 31 on page 69](#)):

1. If the fiber-optic cable is covered by a rubber safety cap, remove the cap. Save the cap.

Figure 31: Connecting a Fiber-Optic Cable



WARNING: Do not look directly into a fiber-optic connector or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.



WARNING: Class 1M laser product.



WARNING: Do not stare into the laser beam or view it directly with optical instruments even if the interface has been disabled.

2. The TCX1000-ILA has a safety protective hinged/flap on its optical connectors, and a rubber safety cap, lift the hinged flap and open the cap.
3. Insert the cable connector into the optical connector.
4. 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. Bending the cables beyond their minimum bend radius can damage the cables and cause problems that are difficult to diagnose.



CAUTION: Do not let fiber-optic cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

Maintaining Fiber-Optic Cables

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

- When you unplug a fiber-optic cable from the TCX1000 connector, close the rubber safety caps over the connector and on the end of the cable.
- Anchor fiber-optic cable to avoid stress on the connectors. When attaching a fiber-optic cable to a connector, be sure to secure the fiber-optic cable so that does not support its own weight as it hangs to the floor. Never let a fiber-optic cable hang free from the connector.
- Do not bend fiber-optic cables beyond their minimum bend radius. Bending the cables beyond their minimum bend radius can damage the cables and cause problems that are difficult to diagnose.
- Frequent plugging and unplugging of fiber-optic cables in and out of optical instruments can damage the instruments, which are expensive to repair. Attach a short fiber extension to the optical equipment. Any wear and tear due to frequent plugging and unplugging is then absorbed by the short fiber extension, which is easier and less expensive to replace than the instruments.
- Keep fiber-optic cable connections clean. Microdeposits of oil and dust in the canal of the cable connector can cause loss of light, reduction in signal power, and possibly intermittent problems with the optical connection.

Removing the Device

- [Powering Off a TCX1000-ILA on page 70](#)
- [Uninstalling an TCX1000-ILA from a Rack or Cabinet on page 71](#)

Powering Off a TCX1000-ILA



NOTE: Use the following procedure to power off an TCX1000-ILA.

Before you power off an TCX1000-ILA:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See [“Prevention of Electrostatic Discharge Damage” on page 103](#).
- Ensure that you do not need to route traffic through the TCX1000-ILA.
- Ensure that you have the following parts and tools available to power off the TCX1000-ILA:
 - An ESD grounding strap
 - An external management device such as a PC
 - An RJ-45 to DB-9 rollover cable to connect the external management device to the console port

To power off an TCX1000-ILA by using the ON/OFF button:

1. Push and hold the button for a minimum of 5 seconds to power off the unit.
2. 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.
3. Disconnect power to the TCX1000-ILA:
 - AC power supply—If the AC power source outlet has a power switch, set it to the off (O) position. If the AC power source outlet does not have a power switch, gently pull out the male end of the power cord connected to the power source outlet.
 - DC power supply—Switch the circuit breaker on the panel board that services the DC circuit to the off position.
4. Remove the power source cable from the power supply faceplate:
 - AC power supply—Gently pull out the female end of the power plug connected to the power supply faceplate.
 - DC power supply—Loosen the screws for the power connector and remove the connector.

See Also • [Connecting the TCX1000-ILA to Power on page 50](#)

Uninstalling an TCX1000-ILA from a Rack or Cabinet

If you need to remove an TCX1000-ILA to return it or relocate an installed TCX1000-ILA, perform the following procedure. (The remainder of this topic uses *rack* to mean *rack* or *cabinet*.)



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

Before removing an TCX1000-ILA from a rack:

- Ensure that the rack is stable and secured to the building.
- Ensure that there is enough space to place the removed TCX1000-ILA in its new location and along the path to the new location.
- Read [“General Safety Guidelines and Warnings” on page 82](#), and [“Installation Instructions Warning” on page 86](#).
- Power off the device.
- Ensure that you have disconnected any cables or wires attached to the TCX1000-ILA (see [“Maintaining the TCX1000-ILA Fiber-Optic Cables” on page 67](#)).

Ensure that you have the following tool available:

- Screwdriver appropriate for your rack-mounting screws.

To remove an TCX1000-ILA from a rack:

1. Use a screwdriver to remove the front-mounting screws that attach the chassis mounting brackets to the rack or cabinet.
2. Remove the TCX1000-ILA from the rack.
3. Transport the TCX1000-ILA to your desired new location or pack it to prepare to return (see [“Returning a Hardware Component to Juniper Networks, Inc.” on page 75](#)).

CHAPTER 5

Contacting Customer Support and Returning the Chassis or Components

- Returning the TCX1000-ILA Chassis or Components on page 73

Returning the TCX1000-ILA Chassis or Components

- Contacting Customer Support on page 73
- Locating the Serial Number on an TCX1000-ILA Chassis or Component on page 74
- Returning a Hardware Component to Juniper Networks, Inc. on page 75
- Guidelines for Packing Hardware Components for Shipment on page 76
- Packing an TCX1000-ILA Chassis or Component for Shipping on page 76

Contacting 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 Case Manager link at:

<https://www.juniper.net/support/>

- By telephone:

From the US and Canada: 1-888-314-JTAC

From all other locations: 1-408-745-9500

If contacting JTAC by phone, enter your 12-digit case number followed by the # key if this is an existing case, or press the * 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 case number, if you have one
- Details of the failure or problem
- Type of activity being performed on the platform when the problem occurred
- Configuration data using one or more of the show commands

- See Also**
- [Returning a Hardware Component to Juniper Networks, Inc. on page 75](#)

Locating the Serial Number on an TCX1000-ILA Chassis or Component

If you are returning an TCX1000-ILA or an TCX1000-ILA field-replaceable unit (FRU) to Juniper Networks for repair or replacement, you must locate the serial number of the device or FRU. 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 [“Returning a Hardware Component to Juniper Networks, Inc.” on page 75](#).



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.



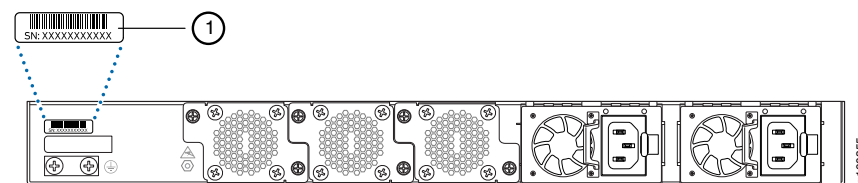
NOTE: You must remove the fan module to read the fan serial number from the serial number ID label. The fan module serial number cannot be viewed through the CLI.

- [Locating the Chassis Serial Number ID Label on an TCX1000-ILA on page 74](#)
- [Locating the Serial Number ID Labels on FRU Components on page 74](#)

Locating the Chassis Serial Number ID Label on an TCX1000-ILA

The serial number ID label is located on a label as shown in [Figure 32 on page 74](#).

Figure 32: Chassis Serial Number Label



Locating the Serial Number ID Labels on FRU Components

For each FRU, you must remove the FRU from the chassis to see the FRU's serial number ID label.

- AC power supply—The serial number ID label is on the top of the AC power supply. See [Figure 33 on page 75](#)
- DC power supply—The serial number ID label is on the top of the DC power supply. See [Figure 33 on page 75](#)
- Fan module—The serial number ID label is on the top of the fan module.

Figure 33: Power Supply Serial Number Label

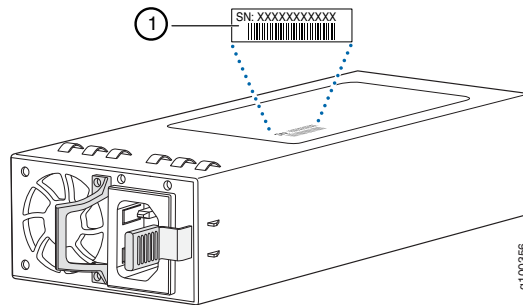
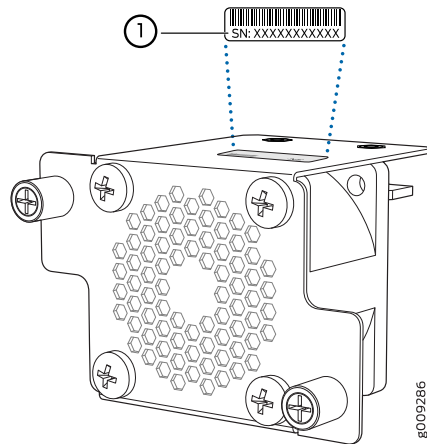


Figure 34: Fan Serial Number Label



See Also • [Returning a Hardware Component to Juniper Networks, Inc. on page 75](#)

Returning a Hardware Component to Juniper Networks, Inc.

In the event of a hardware failure, please contact Juniper Networks, Inc. to obtain a Return Material Authorization (RMA) number. This number is used to track the returned material at the factory and to return repaired or new components to the customer as needed.



NOTE: Do not return any component to Juniper Networks, Inc. unless you have first obtained an RMA number. Juniper Networks, Inc. reserves the right to refuse shipments that do not have an RMA. Refused shipments are returned to the customer by collect freight.

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

For product problems or technical support issues, contact the Juniper Networks Technical Assistance Center (JTAC) by using the Case Manager link at

<https://www.juniper.net/support/> or at 1-888-314-JTAC (within the United States) or 1-408-745-9500 (from outside the United States).

To return a defective hardware component:

1. Determine the part number and serial number of the defective component.
2. Obtain an RMA number from the Juniper Networks Technical Assistance Center (JTAC). You can send e-mail or telephone as described above.
3. Provide the following information in your e-mail message or during the telephone call:
 - Part number and serial number of component
 - Your name, organization name, telephone number, and fax number
 - Description of the failure
4. The support representative validates your request and issues an RMA number for return of the component.
5. Pack the component for shipment.

Guidelines for Packing Hardware Components for Shipment

To pack and ship individual components:

- When you return components, make sure they are adequately protected with packing materials and packed so that the pieces are prevented from moving around inside the carton.
- Use the original shipping materials if they are available.
- Place individual components in antistatic bags.
- Write the RMA number on the exterior of the box to ensure proper tracking.



CAUTION: Do not stack any of the hardware components.

Packing an TCX1000-ILA Chassis or Component for Shipping

If you are returning an TCX1000-ILA or component to Juniper Networks for repair or replacement, pack the item as described in this topic.

Before you pack an TCX1000-ILA or component:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage. See "[Prevention of Electrostatic Discharge Damage](#)" on page 103.
- Retrieve the original shipping carton and packing materials. Contact your JTAC representative if you do not have these materials, to learn about approved packing materials (see *Contacting Customer Support*).

Ensure that you have the following parts and tools available:

- ESD grounding strap.
- Antistatic bag, one for each component.
- If you are returning the chassis, an appropriate screwdriver for the mounting screws used on your rack or cabinet.
- [Packing an TCX1000-ILA for Shipping on page 77](#)
- [Packing TCX1000-ILA Components for Shipping on page 78](#)

[Packing an TCX1000-ILA for Shipping](#)

To pack an TCX1000-ILA for shipping:

1. Power off the TCX1000-ILA and remove the power cables. See [“Removing the Device” on page 70](#).
2. Remove the cables that connect the TCX1000-ILA to all external devices. See [“Maintaining the TCX1000-ILA Fiber-Optic Cables” on page 67](#).
3. Remove all field-replaceable units (FRUs) from the device. See:
 - [Maintaining the TCX1000-ILA Cooling System on page 61](#)
 - [Maintaining the TCX1000-ILA Power System on page 63](#)
4. Remove the TCX1000-ILA from the rack or cabinet. See [“Returning the TCX1000-ILA Chassis or Components” on page 73](#).
5. To return the accessories or FRUs with the TCX1000-ILA, pack them as instructed in [“Packing TCX1000-ILA Components for Shipping” on page 78](#).
6. Place the TCX1000-ILA in an antistatic bag.
7. Place the TCX1000-ILA in the shipping carton.
8. Place the packing foam on top of and around the TCX1000-ILA.
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 [“Returning a Hardware Component to Juniper Networks, Inc.” on page 75](#) for instructions on obtaining an RMA number.

Packing TCX1000-ILA Components for Shipping



CAUTION: Do not stack TCX1000-ILA components. Return individual components in separate boxes if they do not fit together on one level in the shipping box.

To pack and ship TCX1000-ILA components:

1. Place individual FRUs 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 [“Returning a Hardware Component to Juniper Networks, Inc.” on page 75](#) for instructions on obtaining an RMA number.

See Also • [Returning a Hardware Component to Juniper Networks, Inc. on page 75](#)

CHAPTER 6

Troubleshooting

- [Troubleshooting the TCX1000-ILA on page 79](#)

Troubleshooting the TCX1000-ILA

- [Troubleshooting Resources Overview on page 79](#)

Troubleshooting Resources Overview

To troubleshoot a TCX1000-ILA, you use LEDs on the ports, management panel, and components.

- LEDs—When the TCX1000-ILA 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 to troubleshoot the TCX1000-ILA. For more information, see the following topics:
 - [TCX1000-ILA Chassis Status LEDs on page 19](#)
 - [TCX1000-ILA Management Port LEDs on page 22](#)
 - [TCX1000-ILA Power Supply LEDs on page 26](#)
- For information on alarms and performance monitors (PMs), see the TCX Series Optical Transport System Feature 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.

CHAPTER 7

Safety and Compliance Information

- General Safety Guidelines and Warnings on page 82
- Definitions of Safety Warning Levels on page 83
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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.
- Ensure that the separate protective earthing terminal provided on this device is permanently connected to earth.
- Replace fuses only with fuses of the same type and rating.
- Do not open or remove chassis covers or sheet-metal parts unless instructions are provided in the hardware documentation for this device. Such an action could cause severe electrical shock.
- Do not push or force any objects through any opening in the chassis frame. Such an action could result in electrical shock or fire.
- Avoid spilling liquid onto the chassis or onto any device component. Such an action could cause electrical shock or damage the device.
- Avoid touching uninsulated electrical wires or terminals that have not been disconnected from their power source. Such an action could cause electrical shock.
- 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 of the 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.



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



WARNING: This symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents.

Waarschuwing Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen.

Varoitus Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista.

Attention Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents.

Warnung Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt.

Avvertenza Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti.

Advarsel Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker.

Aviso Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos 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.

Attention Tout installation ou remplacement de l'appareil doit être réalisé par du personnel qualifié et compétent.

Warnung Gerät nur von geschultem, qualifiziertem Personal installieren oder auswechseln lassen.

Avvertenza Solo personale addestrato e qualificato deve essere autorizzato ad installare o sostituire questo apparecchio.

Advarsel Kun kvalifisert personell med riktig opplæring bør montere eller bytte ut dette utstyret.

Aviso Este equipamento deverá ser instalado ou substituído apenas por pessoal devidamente treinado e qualificado.

¡Atención! Estos equipos deben ser instalados y reemplazados exclusivamente por personal técnico adecuadamente preparado y capacitado.

Varning! Denna utrustning ska endast installeras och bytas ut av utbildad och kvalificerad personal.

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 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.

Attention Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation.

Warnung Lesen Sie die Installationsanweisungen, bevor Sie das System an die Stromquelle anschließen.

Avvertenza Consultare le istruzioni di installazione prima di collegare il sistema all'alimentatore.

Advarsel Les installasjonsinstruksjonene før systemet kobles til strømkilden.

Aviso Leia as instruções de instalação antes de ligar o sistema à sua fonte de energia.

¡Atención! Ver las instrucciones de instalación antes de conectar el sistema a la red de alimentación.

Varning! Läs installationsanvisningarna innan du kopplar systemet till dess strömförsörjningsenhet.

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 most of the weight is borne by your legs 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.
 - 39.7 lb (18 kg) to 70.5 lb (32 kg): Two or more people.
 - 70.5 lb (32 kg) to 121.2 lb (55 kg): Three or more people.
 - Above 121.2 lbs (55 kg): Material handling systems (such as levers, slings, lifts and so on) must be used. When this is not practical, specially trained persons or systems must be used (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.

Attention Cet appareil est à installer dans des zones d'accès réservé. Ces dernières sont des zones auxquelles seul le personnel de service peut accéder en utilisant un outil spécial, un mécanisme de verrouillage et une clé, ou tout

autre moyen de sécurité. L'accès aux zones de sécurité est sous le contrôle de l'autorité responsable de l'emplacement.

Warnung Diese Einheit ist zur Installation in Bereichen mit beschränktem Zutritt vorgesehen. Ein Bereich mit beschränktem Zutritt ist ein Bereich, zu dem nur Wartungspersonal mit einem Spezialwerkzeugs, Schloß und Schlüssel oder anderer Sicherheitsvorkehrungen Zugang hat, und der von dem für die Anlage zuständigen Gremium kontrolliert wird.

Avvertenza Questa unità deve essere installata in un'area ad accesso limitato. Un'area ad accesso limitato è un'area accessibile solo a personale di assistenza tramite un'attrezzo speciale, lucchetto, o altri dispositivi di sicurezza, ed è controllata dall'autorità responsabile della zona.

Advarsel Denne enheten er laget for installasjon i områder med begrenset adgang. Et område med begrenset adgang gir kun adgang til servicepersonale som bruker et spesielt verktøy, lås og nøkkel, eller en annen sikkerhetsanordning, og det kontrolleres av den autoriteten som er ansvarlig for området.

Aviso Esta unidade foi concebida para instalação em áreas de acesso restrito. Uma área de acesso restrito é uma área à qual apenas tem acesso o pessoal de serviço autorizado, que possua uma ferramenta, chave e fechadura especial, ou qualquer outra forma de segurança. Esta área é controlada pela autoridade responsável pelo local.

¡Atención! Esta unidad ha sido diseñada para instalarse en áreas de acceso restringido. Área de acceso restringido significa un área a la que solamente tiene acceso el personal de servicio mediante la utilización de una herramienta especial, cerradura con llave, o algún otro medio de seguridad, y que está bajo el control de la autoridad responsable del local.

Varning! Denna enhet är avsedd för installation i områden med begränsat tillträde. Ett område med begränsat tillträde får endast 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.

Attention Ne pas utiliser une rampe dont l'inclinaison est supérieure à 10 degrés.

Warnung Keine Rampen mit einer Neigung von mehr als 10 Grad verwenden.

Avvertenza Non usare una rampa con pendenza superiore a 10 gradi.

Advarsel Bruk aldri en rampe som heller mer enn 10 grader.

Aviso Não utilize uma rampa com uma inclinação superior a 10 graus.

¡Atención! No usar una rampa inclinada más de 10 grados

Varning! Använd inte ramp med en lutning på mer än 10 grader.

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:

- The device must be installed in a rack that is secured to the building structure.
- The device should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting the device on a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing equipment, install the stabilizers before mounting or servicing the device in the rack.

Waarschuwing Om lichamelijk letsel te voorkomen wanneer u dit toestel in een rek monteert of het daar een servicebeurt geeft, moet u speciale voorzorgsmaatregelen nemen om ervoor te zorgen dat het toestel stabiel blijft. De onderstaande richtlijnen worden verstrekt om uw veiligheid te verzekeren:

- De Juniper Networks switch moet in een stellage worden geïnstalleerd die aan een bouwsel is verankerd.
- Dit toestel dient onderaan in het rek gemonteerd te worden als het toestel het enige in het rek is.

- Wanneer u dit toestel in een gedeeltelijk gevuld rek monteert, dient u het rek van onderen naar boven te laden met het zwaarste onderdeel onderaan in het rek.
- Als het rek voorzien is van stabiliseringshulpmiddelen, dient u de stabilisatoren te monteren voordat u het toestel in het rek monteert of het daar een servicebeurt geeft.

Varoitus Kun laite asetetaan telineeseen tai huolletaan sen ollessa telineessä, on noudatettava erityisiä varotoimia järjestelmän vakavuuden säilyttämiseksi, jotta vältetään loukkaantumisia. Noudata seuraavia turvallisuusohjeita:

- Juniper Networks switch on asennettava telineeseen, joka on kiinnitetty rakennukseen.
- Jos telineessä ei ole muita laitteita, aseta laite telineen alaosaan.
- Jos laite asetetaan osaksi täytettyyn telineeseen, aloita kuormittaminen sen alaosasta kaikkein raskaimmalla esineellä ja siirry sitten sen yläosaan.
- Jos telinettä varten on vakaimet, asenna ne ennen laitteen asettamista telineeseen tai sen huoltamista siinä.

Attention Pour éviter toute blessure corporelle pendant les opérations de montage ou de réparation de cette unité en casier, il convient de prendre des précautions spéciales afin de maintenir la stabilité du système. Les directives ci-dessous sont destinées à assurer la protection du personnel:

- Le rack sur lequel est monté le Juniper Networks switch doit être fixé à la structure du bâtiment.
- Si cette unité constitue la seule unité montée en casier, elle doit être placée dans le bas.
- Si cette unité est montée dans un casier partiellement rempli, charger le casier de bas en haut en plaçant l'élément le plus lourd dans le bas.
- Si le casier est équipé de dispositifs stabilisateurs, installer les stabilisateurs avant de monter ou de réparer l'unité en casier.

Warnung Zur Vermeidung von Körperverletzung beim Anbringen oder Warten dieser Einheit in einem Gestell müssen Sie besondere Vorkehrungen treffen, um sicherzustellen, daß das System stabil bleibt. Die folgenden Richtlinien sollen zur Gewährleistung Ihrer Sicherheit dienen:

- Der Juniper Networks switch muß in einem Gestell installiert werden, das in der Gebäudestruktur verankert ist.
- Wenn diese Einheit die einzige im Gestell ist, sollte sie unten im Gestell angebracht werden.

- Bei Anbringung dieser Einheit in einem zum Teil gefüllten Gestell ist das Gestell von unten nach oben zu laden, wobei das schwerste Bauteil unten im Gestell anzubringen ist.
- Wird das Gestell mit Stabilisierungszubehör geliefert, sind zuerst die Stabilisatoren zu installieren, bevor Sie die Einheit im Gestell anbringen oder sie warten.

Avvertenza Per evitare infortuni fisici durante il montaggio o la manutenzione di questa unità in un supporto, occorre osservare speciali precauzioni per garantire che il sistema rimanga stabile. Le seguenti direttive vengono fornite per garantire la sicurezza personale:

- Il Juniper Networks switch deve essere installato in un telaio, il quale deve essere fissato alla struttura dell'edificio.
- Questa unità deve venire montata sul fondo del supporto, se si tratta dell'unica unità da montare nel supporto.
- Quando questa unità viene montata in un supporto parzialmente pieno, caricare il supporto dal basso all'alto, con il componente più pesante sistemato sul fondo del supporto.
- Se il supporto è dotato di dispositivi stabilizzanti, installare tali dispositivi prima di montare o di procedere alla manutenzione dell'unità nel supporto.

Advarsel Unngå fysiske skader under montering eller reparasjonsarbeid på denne enheten når den befinner seg i et kabinett. Vær nøye med at systemet er stabilt. Følgende retningslinjer er gitt for å verne om sikkerheten:

- Juniper Networks switch må installeres i et stativ som er forankret til bygningsstrukturen.
- Denne enheten bør monteres nederst i kabinettet hvis dette er den eneste enheten i kabinettet.
- Ved montering av denne enheten i et kabinett som er delvis fylt, skal kabinettet lastes fra bunnen og opp med den tyngste komponenten nederst i kabinettet.
- Hvis kabinettet er utstyrt med stabiliseringsutstyr, skal stabilisatorene installeres før montering eller utføring av reparasjonsarbeid på enheten i kabinettet.

Aviso Para se prevenir contra danos corporais ao montar ou reparar esta unidade numa estante, deverá tomar precauções especiais para se certificar de que o sistema possui um suporte estável. As seguintes directrizes ajudá-lo-ão a efectuar o seu trabalho com segurança:

- O Juniper Networks switch deverá ser instalado numa prateleira fixa à estrutura do edifício.
- Esta unidade deverá ser montada na parte inferior da estante, caso seja esta a única unidade a ser montada.
- Ao montar esta unidade numa estante parcialmente ocupada, coloque os itens mais pesados na parte inferior da estante, arrumando-os de baixo para cima.
- Se a estante possuir um dispositivo de estabilização, instale-o antes de montar ou reparar a unidade.

¡Atención! Para evitar lesiones durante el montaje de este equipo sobre un bastidor, oerriormente 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: The device is intended to be grounded. During normal use, ensure that you have connected earth ground to the chassis.

Waarschuwing Deze apparatuur hoort geaard te worden. Zorg dat de host-computer tijdens normaal gebruik met aarde is verbonden.

Varoitus Tämä laitteisto on tarkoitettu maadoitettavaksi. Varmista, että isäntälaitte on yhdistetty maahan normaalikäytön aikana.

Attention Cet équipement doit être relié à la terre. S'assurer que l'appareil hôte est relié à la terre lors de l'utilisation normale.

Warnung Dieses Gerät muß geerdet werden. Stellen Sie sicher, daß das Host-Gerät während des normalen Betriebs an Erde gelegt ist.

Avvertenza Questa apparecchiatura deve essere collegata a massa. Accertarsi che il dispositivo host sia collegato alla massa di terra durante il normale utilizzo.

Advarsel Dette utstyret skal jordes. Forviss deg om vertsterminalen er jordet ved normalt bruk.

Aviso Este equipamento deverá estar ligado à terra. Certifique-se que o host se encontra ligado à terra durante a sua utilização normal.

¡Atención! Este equipo debe conectarse a tierra. Asegurarse de que el equipo principal esté conectado a tierra durante el uso normal.

Varning! Denna utrustning är avsedd att jordas. Se till att värdenheten är jordad vid normal användning.

Radiation from Open Port Apertures Warning



WARNING: Because invisible radiation might be emitted from the aperture of the port when no fiber cable is connected, avoid exposure to radiation and do not stare into open apertures.

Waarschuwing Aangezien onzichtbare straling vanuit de opening van de poort kan komen als er geen fiberkabel aangesloten is, dient blootstelling aan straling en het kijken in open openingen vermeden te worden.

Varoitus Koska portin aukosta voi emittoitua näkymätöntä säteilyä, kun kuitukaapelia ei ole kytkettynä, vältä säteilylle altistumista äläkä katso avoimiin aukkoihin.

Attention Des radiations invisibles à l'il nu pouvant traverser l'ouverture du port lorsqu'aucun câble en fibre optique n'y est connecté, il est recommandé de ne pas regarder fixement l'intérieur de ces ouvertures.

Warnung Aus der Port-Öffnung können unsichtbare Strahlen emittieren, wenn kein Glasfaserkabel angeschlossen ist. Vermeiden Sie es, sich den Strahlungen auszusetzen, und starren Sie nicht in die Öffnungen!

Avvertenza Quando i cavi in fibra non sono inseriti, radiazioni invisibili possono essere emesse attraverso l'apertura della porta. Evitate di esporvi alle radiazioni e non guardate direttamente nelle aperture.

Advarsel Unngå utsettelse for stråling, og stirr ikke inn i åpninger som er åpne, fordi usynlig stråling kan emitteres fra portens åpning når det ikke er tilkoblet en fiberkabel.

Aviso Dada a possibilidade de emissão de radiação invisível através do orifício da via de acesso, quando esta não tiver nenhum cabo de fibra conectado, deverá evitar a exposição à radiação e não deverá olhar fixamente para orifícios que se encontrarem a descoberto.

¡Atención! Debido a que la apertura del puerto puede emitir radiación invisible cuando no existe un cable de fibra conectado, evite mirar directamente a las aperturas para no exponerse a la radiación.

Varning! Osynlig strålning kan avges från en portöppning utan ansluten fiberkabel och du bör därför undvika att bli utsatt för strålning genom att inte stirra in i oskyddade öppningar.

Laser Safety Warnings for Class 1M Juniper Networks Devices

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 EN 60825-1 requirements.

Observe the following guidelines and warnings:

- [General Laser Safety Guidelines on page 94](#)
- [Class 1M Laser Product Warning on page 95](#)
- [Class 1 LED Product Warning on page 95](#)
- [Laser Beam Warning on page 96](#)

General Laser Safety Guidelines

When working around ports that support optical transceivers, observe the following safety guidelines to prevent eye injury:

- Do not look into unterminated ports or at fibers that connect to unknown sources.
- Do not examine unterminated optical ports with optical instruments.

- Avoid direct exposure to the beam.



WARNING: Unterminated optical connectors can emit invisible laser radiation. The lens in the human eye focuses all the laser power on the retina, so focusing the eye directly on a laser source—even a low-power laser—could permanently damage the eye.

Class 1M Laser Product Warning



WARNING: Class 1M laser product.

Waarschuwing Laserproducten van Klasse 1M (IEC).

Varoituis Luokan 1M (IEC) lasertuotteita.

Attention Produits laser catégorie 1M (IEC).

Warnung Laserprodukte der Klasse 1M (IEC).

Avvertenza Prodotti laser di Classe 1M (IEC).

Advarsel Klasse 1M (IEC) laserprodukter.

Aviso Produtos laser Classe 1M (IEC).

¡Atención! Productos láser de Clase 1M (IEC).

Varning! Laserprodukter av Klass 1M (IEC).

Class 1 LED Product Warning



WARNING: Class 1 LED product.

Waarschuwing Klasse 1 LED-product.

Varoituis Luokan 1 valodiodituote.

Attention Alarme de produit LED Class 1.

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



WARNING: Do not stare into the laser beam or view it directly with optical instruments.

Waarschuwing Niet in de straal staren of hem rechtstreeks bekijken met optische instrumenten.

Varoitus Älä katso säteeseen äläkä tarkastele sitä suoraan optisen laitteen avulla.

Attention Ne pas fixer le faisceau des yeux, ni l'observer directement à l'aide d'instruments optiques.

Warnung Nicht direkt in den Strahl blicken und ihn nicht direkt mit optischen Geräten prüfen.

Avvertenza Non fissare il raggio con gli occhi né usare strumenti ottici per osservarlo direttamente.

Advarsel Stirr eller se ikke direkte p strlen med optiske instrumenter.

Aviso Não olhe fixamente para o raio, nem olhe para ele directamente com instrumentos ópticos.

iAtención! No mirar fijamente el haz ni observarlo directamente con instrumentos ópticos.

Varning! Rikta inte blicken in mot strålen och titta inte direkt på den genom optiska instrument.

Related Documentation

- [General Safety Guidelines and Warnings on page 82](#)
- [Radiation from Open Port Apertures Warning on page 93](#)
- [Installation Instructions Warning on page 86](#)
- [Grounded Equipment Warning on page 93](#)

Maintenance and Operational Safety Guidelines and Warnings

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

- [Battery Handling Warning on page 97](#)
- [Jewelry Removal Warning on page 98](#)
- [Lightning Activity Warning on page 99](#)

- [Operating Temperature Warning on page 99](#)
- [Product Disposal Warning on page 101](#)

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 ontplofingsgevaar als de batterij verkeerd vervangen wordt. Vervang de batterij slechts met hetzelfde of een equivalent type dat door de fabrikant aanbevolen is. Gebruikte batterijen dienen overeenkomstig fabrieksvoorschriften weggeworpen te worden.

Varoitus Räjähdyksen vaara, jos akku on vaihdettu väärään akkuun. Käytä vaihtamiseen ainoastaan saman- tai vastaavantyyppistä akkua, joka on valmistajan suosittelema. Hävitä käytetyt akut valmistajan ohjeiden mukaan.

Attention Danger d'explosion si la pile n'est pas remplacée correctement. Ne la remplacer que par une pile de type semblable ou équivalent, recommandée par le fabricant. Jeter les piles usagées conformément aux instructions du fabricant.

Warnung Bei Einsetzen einer falschen Batterie besteht Explosionsgefahr. Ersetzen Sie die Batterie nur durch den gleichen oder vom Hersteller empfohlenen Batterietyp. Entsorgen Sie die benutzten Batterien nach den Anweisungen des Herstellers.

Advarsel Det kan være fare for eksplosjon hvis batteriet skiftes på feil måte. Skift kun med samme eller tilsvarende type som er anbefalt av produsenten. Kasser brukte batterier i henhold til produsentens instruksjoner.

Avvertenza Pericolo di esplosione se la batteria non è installata correttamente. Sostituire solo con una di tipo uguale o equivalente, consigliata dal produttore. Eliminare le batterie usate secondo le istruzioni del produttore.

Aviso Existe perigo de explosão se a bateria for substituída incorrectamente. Substitua a bateria por uma bateria igual ou de um tipo equivalente recomendado pelo fabricante. Destrua as baterias usadas conforme as instruções do fabricante.

¡Atención! Existe peligro de explosión si la batería se reemplaza de manera incorrecta. Reemplazar la batería exclusivamente con el mismo tipo o el equivalente recomendado por el fabricante. Desechar las baterías gastadas según las instrucciones del fabricante.

Varning! Explosionsfara vid felaktigt batteribyte. Ersätt endast batteriet med samma batterityp som rekommenderas av tillverkaren eller motsvarande. Följ tillverkarens anvisningar vid kassering av använda batterier.

Jewelry Removal Warning



WARNING: Before working on equipment that is connected to power lines, remove jewelry, including rings, necklaces, and watches. Metal objects heat up when connected to power and ground and can cause serious burns or can be welded to the terminals.

Waarschuwing Alvorens aan apparatuur te werken die met elektrische leidingen is verbonden, sieraden (inclusief ringen, kettingen en horloges) verwijderen. Metalen voorwerpen worden warm wanneer ze met stroom en aarde zijn verbonden, en kunnen ernstige brandwonden veroorzaken of het metalen voorwerp aan de aansluitklemmen lassen.

Varoitus Ennen kuin työskentelet voimavirtajohtoihin kytkettyjen laitteiden parissa, ota pois kaikki korut (sormukset, kaulakorut ja kellot mukaan lukien). Metalliesineet kuumenevat, kun ne ovat yhteydessä sähkövirran ja maan kanssa, ja ne voivat aiheuttaa vakavia palovammoja tai hitsata metalliesineet kiinni liitäntänapoihin.

Attention Avant d'accéder à cet équipement connecté aux lignes électriques, ôter tout bijou (anneaux, colliers et montres compris). Lorsqu'ils sont branchés à l'alimentation et reliés à la terre, les objets métalliques chauffent, ce qui peut provoquer des blessures graves ou souder l'objet métallique aux bornes.

Warnung Vor der Arbeit an Geräten, die an das Netz angeschlossen sind, jeglichen Schmuck (einschließlich Ringe, Ketten und Uhren) abnehmen. Metallgegenstände erhitzen sich, wenn sie an das Netz und die Erde angeschlossen werden, und können schwere Verbrennungen verursachen oder an die Anschlußklemmen angeschweißt werden.

Avvertenza Prima di intervenire su apparecchiature collegate alle linee di alimentazione, togliersi qualsiasi monile (inclusi anelli, collane, braccialetti ed orologi). Gli oggetti metallici si riscaldano quando sono collegati tra punti di alimentazione e massa: possono causare ustioni gravi oppure il metallo può saldarsi ai terminali.

Advarsel Fjern alle smykker (inkludert ringer, halskjeder og klokker) før du skal arbeide på utstyr som er koblet til kraftledninger. Metallgjenstander som er koblet til kraftledninger og jord blir svært varme og kan forårsake alvorlige brannskader eller smelte fast til polene.

Aviso Antes de trabalhar em equipamento que esteja ligado a linhas de corrente, retire todas as jóias que estiver a usar (incluindo anéis, fios e relógios). Os objectos metálicos aquecerão em contacto com a corrente e em contacto com a ligação à terra, podendo causar queimaduras graves ou ficarem soldados aos terminais.

¡Atención! Antes de operar sobre equipos conectados a líneas de alimentación, quitarse las joyas (incluidos anillos, collares y relojes). Los

objetos de metal se calientan cuando se conectan a la alimentación y a tierra, lo que puede ocasionar quemaduras graves o que los objetos metálicos queden soldados a los bornes.

Varning! Tag av alla smycken (inklusive ringar, halsband och armbandsur) innan du arbetar på utrustning som är kopplad till kraftledning. 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.

Attention Ne pas travailler sur le système ni brancher ou débrancher les câbles pendant un orage.

Warnung Arbeiten Sie nicht am System und schließen Sie keine Kabel an bzw. trennen Sie keine ab, wenn es gewittert.

Avvertenza Non lavorare sul sistema o collegare oppure scollegare i cavi durante un temporale con fulmini.

Advarsel Utfør aldri arbeid på systemet, eller koble kabler til eller fra systemet når det tordner eller 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.

Varoituis Ettei Juniper Networks switch-sarjan reititin ylikuumentuisi, sitä ei saa käyttää tilassa, jonka lämpötila ylittää korkeimman suositellun ympäristölämpötilan 40° C. Ettei ilmanvaihto estyisi, tuuletusaukkojen ympärille on jätettävä ainakin 15,2 cm tilaa.

Attention Pour éviter toute surchauffe des routeurs de la gamme Juniper Networks switch, ne l'utilisez pas dans une zone où la température ambiante est supérieure à 40° C. Pour permettre un flot d'air constant, dégagez un espace d'au moins 15,2 cm autour des ouvertures de ventilations.

Warnung Um einen Router der switch vor Überhitzung zu schützen, darf dieser nicht in einer Gegend betrieben werden, in der die Umgebungstemperatur das empfohlene Maximum von 40° C überschreitet. Um Lüftungsverschluß zu verhindern, achten Sie darauf, daß mindestens 15,2 cm lichter Raum um die Lüftungsöffnungen herum frei bleibt.

Avvertenza Per evitare il surriscaldamento dei switch, non adoperateli in un locale che ecceda la temperatura ambientale massima di 40° C. Per evitare che la circolazione dell'aria sia impedita, lasciate uno spazio di almeno 15.2 cm di fronte alle aperture delle ventole.

Advarsel Unngå overoppheting av eventuelle rutere i Juniper Networks switch Disse skal ikke brukes på steder der den anbefalte maksimale omgivelsestemperaturen overstiger 40° C (104° F). Sørg for at klaringen rundt lufteåpningene er minst 15,2 cm (6 tommer) for å forhindre nedsatt luftsirkulasjon.

Aviso Para evitar o sobreaquecimento do encaminhador Juniper Networks switch, não utilize este equipamento numa área que exceda a temperatura máxima recomendada de 40° C. Para evitar a restrição à circulação de ar, deixe pelo menos um espaço de 15,2 cm à volta das aberturas de ventilação.

¡Atención! Para impedir que un encaminador de la serie Juniper Networks switch se recaliente, no lo haga funcionar en un área en la que se supere la temperatura ambiente máxima recomendada de 40° C. Para impedir la restricción de la entrada de aire, deje un espacio mínimo de 15,2 cm alrededor de las aperturas para ventilación.

Varning! Förhindra att en Juniper Networks switch överhettas genom att inte använda den i ett område där den maximalt rekommenderade omgivningstemperaturen på 40° C överskrids. Förhindra att luftcirkulationen

inskränks genom att se till att det finns fritt utrymme på minst 15,2 cm omkring ventilationsöppningarna.

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.

Attention La mise au rebut définitive de ce produit doit être effectuée conformément à toutes les lois et réglementations en vigueur.

Warnung Dieses Produkt muß den geltenden Gesetzen und Vorschriften entsprechend entsorgt werden.

Avvertenza L'eliminazione finale di questo prodotto deve essere eseguita osservando le normative italiane vigenti in materia

Advarsel Endelig disponering av dette produktet må skje i henhold til nasjonale lover og forskrifter.

Aviso A descarte 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 requirements and protect against lightning surges and commercial power disturbances, the intrabuilding ports *must not* be metallically connected to interfaces that connect to the OSP or its wiring. The intrabuilding ports on the device are suitable for connection to intrabuilding or unexposed wiring or cabling only. The addition of primary protectors is not sufficient protection for connecting these interfaces metallically to OSP wiring.



CAUTION: Before removing or installing components of a device, 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.

- Install the device in compliance with the following local, national, and international electrical codes:
 - United States—National Fire Protection Association (NFPA 70), United States National Electrical Code.
 - Other countries—International Electromechanical Commission (IEC) 60364, Part 1 through Part 7.
 - Evaluated to the TN power system.
 - Canada—Canadian Electrical Code, Part 1, CSA C22.1.
- Locate the emergency power-off switch for the room in which you are working so that if an electrical accident occurs, you can quickly turn off the power.
- Make sure that grounding surfaces are cleaned and brought to a bright finish before grounding connections are made.
- Do not work alone if potentially hazardous conditions exist anywhere in your workspace.
- Never assume that power is disconnected from a circuit. Always check the circuit before starting to work.
- Carefully look for possible hazards in your work area, such as moist floors, ungrounded power extension cords, and missing safety grounds.
- Operate the device within marked electrical ratings and product usage instructions.
- To ensure that the device and peripheral equipment function safely and correctly, use the cables and connectors specified for the attached peripheral equipment, and make certain they are in good condition.

You can remove and replace many device components without powering off or disconnecting power to the device, as detailed elsewhere in the hardware documentation for this device. Never install equipment 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, 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 35 on page 103](#)) in one hand and touch the exposed, bare metal of the device with the other hand immediately before inserting the component into the device.



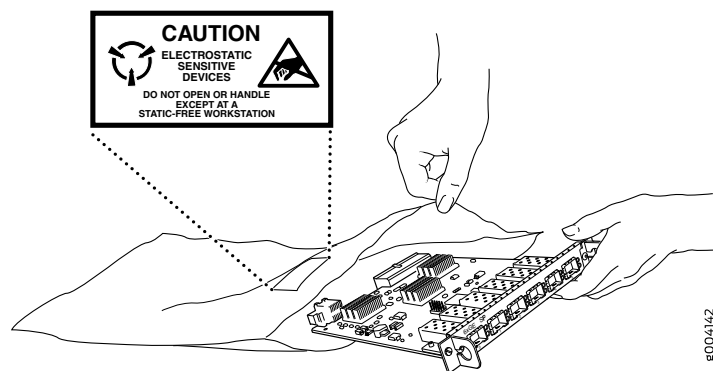
WARNING: For safety, periodically check the resistance value of the ESD grounding strap. The measurement must be in the range 1 through 10 Mohms.

- 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 35 on page 103](#)). If you are returning a component, place it in an antistatic bag before packing it.

Figure 35: 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.

AC Power Electrical Safety Guidelines



CAUTION: For devices with AC power supplies, an external surge protective device (SPD) must be used at the AC power source.

The following electrical safety guidelines apply to AC-powered devices:

- Note the following warnings printed on the device:

“CAUTION: THIS UNIT HAS MORE THAN ONE POWER SUPPLY CORD. DISCONNECT ALL POWER SUPPLY CORDS BEFORE SERVICING TO AVOID ELECTRIC SHOCK.”

“ATTENTION: CET APPAREIL COMPORTE PLUS D'UN CORDON D'ALIMENTATION. AFIN DE PRÉVENIR LES CHOCS ÉLECTRIQUES, DÉBRANCHER TOUT CORDON D'ALIMENTATION AVANT DE FAIRE LE DÉPANNAGE.”
- AC-powered devices are shipped with a three-wire electrical cord with a grounding-type plug that fits only a grounding-type power outlet. Do not circumvent this safety feature. Equipment grounding must comply with local and national electrical codes.
- You must provide an external certified circuit breaker (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。

g017253

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.

Attention Avant de travailler sur un châssis ou à proximité d'une alimentation électrique, débrancher le cordon d'alimentation des unités en courant alternatif.

Warnung Bevor Sie an einem Chassis oder in der Nähe von Netzgeräten arbeiten, ziehen Sie bei Wechselstromeinheiten das Netzkabel ab bzw.

Avvertenza Prima di lavorare su un telaio o intorno ad alimentatori, scollegare il cavo di alimentazione sulle unità CA.

Advarsel Før det utføres arbeid på kabinettet eller det arbeides i nærheten av strømforsyningsenheter, skal strømledningen trekkes ut på vekselstrømsenheter.

Aviso Antes de trabalhar num chassis, ou antes de trabalhar perto de unidades de fornecimento de energia, desligue o cabo de alimentação nas unidades de corrente alternada.

¡Atención! Antes de manipular el chasis de un equipo o trabajar cerca de una fuente de alimentación, desenchufar el cable de alimentación en los equipos de corriente alterna (CA).

Varning! Innan du arbetar med ett chassi eller nära strömförsörjningsenheter skall du för växelströmsenheter dra ur nätsladden.

TCX1000-ILA DC Power Electrical Safety Guidelines

- A DC-powered optical TCX1000-ILA is equipped with a DC terminal block that is rated for the power requirements of a maximally configured TCX1000-ILA. To supply sufficient power, terminate the DC input wiring on a facility DC source capable of supplying at least 10 A @ –48 VDC or 5 A @ –60 VDC per input for the DC power supply. Incorporate an easily accessible disconnect device into the facility wiring. In the United States and Canada, the –48 VDC or –60 VDC facility should be equipped with a circuit breaker rated a minimum of 125% of the power provisioned for the input in accordance with the National Electrical Code in the US and the Canadian Electrical Code in Canada. Be

sure to connect the ground wire or conduit to a solid office (earth) ground. A closed loop ring is recommended for terminating the ground conductor at the ground stud.

- Run two wires from the circuit breaker box to a source of 48 VDC or 60 VDC.
- A DC-powered TCX1000-ILA 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 should protect against excess currents, short circuits, and earth faults in accordance with NEC ANSI/NFPA70.

**Related
Documentation**

- [Site Electrical Wiring Guidelines for Juniper Networks Devices](#)
- [General Safety Guidelines and Warnings on page 82](#)

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 schakelaarhandel van de stroomverbreker met plakband in de UIT positie vast.

Varoitus Varmista, että tasavirtapiirissä ei ole virtaa ennen seuraavien toimenpiteiden suorittamista. Varmistaaksesi, että virta on KATKAISTU täysin, paikanna tasavirrasta huolehtivassa kojetaulussa sijaitseva suojakytkin, käännä suojakytkin KATKAISTU-asentoon ja teippaa suojakytkimen varsi niin, että se pysyy KATKAISTU-asennossa.

Attention Avant de pratiquer l'une quelconque des procédures ci-dessous, vérifiez que le circuit en courant continu n'est plus sous tension. Pour en être sûr, localiser le disjoncteur situé sur le panneau de service du circuit en courant continu, placer le disjoncteur en position fermée (OFF) et, à l'aide d'un ruban adhésif, bloquer la poignée du disjoncteur en position OFF.

Warnung Vor Ausführung der folgenden Vorgänge ist sicherzustellen, daß die Gleichstromschaltung keinen Strom erhält. Um sicherzustellen, daß sämtlicher Strom abgestellt ist, machen Sie auf der Schalttafel den Unterbrecher für die Gleichstromschaltung ausfindig, stellen Sie den Unterbrecher auf AUS, und kleben Sie den Schaltergriff des Unterbrechers mit Klebeband in der AUS-Stellung fest.

Avvertenza Prima di svolgere una qualsiasi delle procedure seguenti, verificare che il circuito CC non sia alimentato. Per verificare che tutta l'alimentazione sia scollegata (OFF), individuare l'interruttore automatico sul quadro strumenti che alimenta il circuito CC, mettere l'interruttore in posizione OFF e fissarlo con nastro adesivo in tale posizione.

Advarsel Før noen av disse prosedyrene utføres, kontroller at strømmen er frakoblet likestrømkretsen. Sørg for at all strøm er slått AV. Dette gjøres ved å lokalisere strømbryteren på brytertavlen som betjener likestrømkretsen, slå strømbryteren AV og teipe bryterhåndtaket på strømbryteren i AV-stilling.

Aviso Antes de executar um dos seguintes procedimentos, certifique-se que desligou a fonte de alimentação de energia do circuito de corrente contínua. Para se assegurar que toda a corrente foi DESLIGADA, localize o disjuntor no painel que serve o circuito de corrente contínua e coloque-o na posição OFF (Desligado), segurando nessa posição a manivela do interruptor do disjuntor com fita isoladora.

¡Atención! Antes de proceder con los siguientes pasos, comprobar que la alimentación del circuito de corriente continua (CC) esté cortada (OFF). Para asegurarse de que toda la alimentación esté cortada (OFF), localizar el interruptor automático en el panel que alimenta al circuito de corriente continua, cambiar el interruptor automático a la posición de Apagado (OFF),

y sujetar con cinta la palanca del interruptor automático en posición de Apagado (OFF).

Varning! Innan du utför någon av följande procedurer måste du kontrollera att strömförsörjningen till likströmskretsen är bruten. Kontrollera att all strömförsörjning är BRUTEN genom att slå AV det överspänningsskydd som skyddar likströmskretsen och tejpa fast överspänningsskyddets omkopplare i FRÅN-läget.

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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.

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WARNING: When you install the device, the ground connection must always be made first and disconnected last.

Waarschuwing Bij de installatie van het toestel moet de aardverbinding altijd het eerste worden gemaakt en het laatste worden losgemaakt.

Varoitus Laitetta asennettaessa on maahan yhdistäminen aina tehtävä ensiksi ja maadoituksen irti kytkeminen viimeiseksi.

Attention Lors de l'installation de l'appareil, la mise à la terre doit toujours être connectée en premier et déconnectée en dernier.

Warnung Der Erdanschluß muß bei der Installation der Einheit immer zuerst hergestellt und zuletzt abgetrennt werden.

Avvertenza In fase di installazione dell'unità, eseguire sempre per primo il collegamento a massa e disconnetterlo per ultimo.

Advarsel Når enheten installeres, må jordledningen alltid tilkobles først og frakobles sist.

Aviso Ao instalar a unidade, a ligação à terra deverá ser sempre a primeira a ser ligada, e a última a ser desligada.

¡Atención! Al instalar el equipo, conectar la tierra la primera y desconectarla la última.

Varning! Vid installation av enheten måste jordledningen alltid anslutas först och kopplas bort sist.

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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 V naar –48 V, +RTN naar +RTN, aarde naar aarde.

Varoitus Oikea yhdistettävä kytkentäjäjestys on maajohto maajohtoon, +RTN varten +RTN, –48 V varten –48 V. Oikea irrotettava kytkentäjäjestys on –48 V varten –48 V, +RTN varten +RTN, maajohto maajohtoon.

Attention Câblez l'alimentation 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 na extremidade da fiação. Ao conectar a potência, a sequência apropriada da fiação é moída para moer, +RTN a +RTN, então –48 V a –48 V. Ao desconectar a potência, a sequência 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.

Attention Quand des fils torsadés sont nécessaires, utiliser des douilles terminales homologuées telles que celles à circuit fermé ou du type à plage ouverte avec cosses rebroussées. Ces douilles terminales doivent être de la taille qui convient aux fils et doivent être refermées sur la gaine isolante et sur le conducteur.

Warnung Wenn Litzenverdrahtung erforderlich ist, sind zugelassene Verdrahtungsabschlüsse, z.B. für einen geschlossenen Regelkreis oder gabelförmig, mit nach oben gerichteten Kabelschuhen zu verwenden. Diese Abschlüsse sollten die angemessene Größe für die Drähte haben und sowohl die Isolierung als auch den Leiter festklemmen.

Avvertenza Quando occorre usare trecce, usare connettori omologati, come quelli a occhiello o a forcilla con linguette rivolte verso l'alto. I connettori

devono avere la misura adatta per il cablaggio e devono serrare sia l'isolante che il conduttore.

Advarsel Hvis det er nødvendig med flertrådede ledninger, brukes godkjente ledningsavslutninger, som for eksempel lukket sløyfe eller spadetype med oppoverbøyde kabelsko. Disse avslutningene skal ha riktig størrelse i forhold til ledningene, og skal klemme sammen både isolasjonen og ledaren.

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.

Attention 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.

TCX1000-ILA Agency Approvals and Compliance Statements

- [TCX1000-ILA Agency Approvals on page 112](#)
- [Compliance Statements for EMC Requirements on page 113](#)
- [Compliance Statements for Environmental Requirements on page 114](#)
- [Compliance Statements for NEBS on page 115](#)
- [TCX1000-ILA Compliance Statements for Acoustic Noise on page 115](#)

TCX1000-ILA Agency Approvals

The TCX1000-ILA complies with the following standards:

- Safety
 - CAN/CSA-C22.2 No. 60950-1 (2007) Information Technology Equipment - Safety
 - EN 60950-1:2006/A2:2013 Information Technology Equipment - Safety
 - IEC 60950-1:2005/A2:2013 Information Technology Equipment - Safety (All country deviations): CB Scheme
 - EN 60825-1:2007/60825-1:2014 (Third Edition) Safety of Laser Products - Part 1: Equipment classification and requirements
 - UL 60950-1 (2nd Ed.) Information Technology Equipment - Safety
- EMC Class A
 - AS/NZS CISPR 32:2015 /A1:2010 (Australia and New Zealand)
 - BSMI (Taiwan)
 - BT GS7

- CISPR 22 / EN 55022
- CISPR 32 / EN 55032
- DT 1TR9 (Germany)
- EN 300 386 (EU)
- EN55032 (Europe)
- FCC Part 15 (USA)
- ICES-003 (Canada)
- KN 32 / KN 35 (Korea)
- VCCI (Japan)
- 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
 - EN 61000-4-11 Voltage Dips and Short Interruptions
 - EN 61000-3-2 Harmonics
- ETSI EN-300386-2 Telecommunication Network Equipment. Electromagnetic Compatibility Requirements

The TCX1000-ILA is designed to comply with the following standard:

- NEBS Level 3
 - GR-63-CORE: Physical Protection
 - GR-1089-CORE: EMC and Electrical Safety for Network Telecommunications Equipment

See Also • [TCX1000-ILA System Overview on page 13](#)

Compliance Statements for EMC Requirements

- [Canada on page 114](#)
- [European Community on page 114](#)
- [Israel on page 114](#)
- [Japan on page 114](#)
- [United States on page 114](#)

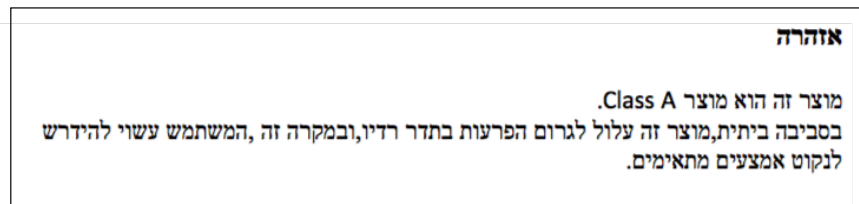
Canada

CAN ICES-3 (A)/NMB-3(A)

European Community

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

Israel



Translation from Hebrew—Warning: This product is Class A. In residential environments, the product might cause radio interference, and in such a situation, the user might 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 based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this product is used near a radio or television receiver in a domestic environment, it might cause radio interference. Install and use the equipment according to the instruction manual. VCCI-A.

United States

The hardware equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, might 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.

Compliance Statements for Environmental Requirements

Batteries in this product are not based on mercury, lead, or cadmium substances. The batteries used in this product are in compliance with EU Directives 91/157/EEC, 93/86/EEC,

and 98/101/EEC. The product documentation includes instructional information about the proper method of reclamation and recycling.

Compliance Statements for NEBS

- The equipment is suitable for installation as part of the Common Bonding Network (CBN).
- The equipment is suitable for installation in locations where the National Electrical Code (NEC) applies.
- The battery return connection is to be treated as an isolated DC return (that is, DC-I), as defined in GR-1089-CORE.
- You must provision a readily accessible device outside of the equipment to disconnect power. The device must also be rated based on local electrical code practice.

TCX1000-ILA Compliance Statements for 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 70dB(A) per EN ISO 7779.

