Cisco IE 4000 Switch Hardware Installation Guide

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Preface

Audience

This guide is for the networking or computer technician responsible for installing Cisco IE 4000 series switches. We assume that you are familiar with the concepts and terminology of Ethernet and local area networking.

Purpose

This guide documents the hardware features of the Cisco IE 4000 switches. It describes the physical and performance characteristics of each switch, explains how to install a switch, and provides troubleshooting information.

For information about the standard Cisco IOS commands, see
http://www.cisco.com/cisco/web/psa/configure.html?mode=prod&level0=268438303

Conventions

This document uses the following conventions and symbols for notes, cautions, and warnings.

Note: Means *reader take note*. Notes contain helpful suggestions or references to materials not contained in this manual.

Caution: Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Warning: This warning 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. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071

The safety warnings for this product are translated into several languages in the *Regulatory Compliance and Safety Information for the Cisco IE 4000 Switch* that ships with the product. The EMC regulatory statements are also included in that guide.

Related Publications

Before installing, configuring, or upgrading the switch, see the release notes on Cisco.com for the latest information.

These documents provide complete information about the switch and are available on Cisco.com:

- *Regulatory Compliance and Safety Information for the Cisco IE 4000 Switch*

- *Release Notes for the Cisco IE 4000 Switch*

- *Cisco IE 4000 Switch Software Configuration Guide*

- Device Manager online help (available on the switch)

These compatibility matrix documents are available from this Cisco.com site:

http://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html

- *Cisco Gigabit Ethernet Transceiver Modules Compatibility Matrix* (not orderable but available on Cisco.com)

- *Cisco Small Form-Factor Pluggable Modules Compatibility Matrix* (not orderable but available on Cisco.com)

Obtaining Documentation, Obtaining Support, and Security Guidelines

For information on obtaining documentation, obtaining support, providing documentation feedback, security guidelines, and also recommended aliases and general Cisco documents, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

Product Overview

The Cisco® Industrial Ethernet (IE) 4000 Series is the latest addition to our ruggedized switching platforms and provides superior high-bandwidth switching and proven Cisco IOS® Software-based routing capabilities for industrial environments. The IE 4000 Series delivers highly secure access and industry-leading convergence using the Cisco Resilient Ethernet Protocol (REP) and is built to withstand extreme environments while adhering to overall IT network design, compliance, and performance requirements.

The IE 4000 Series is ideal for industrial Ethernet applications where hardened products are required, including factory automation, energy and process control, intelligent transportation systems (ITS), oil and gas field sites, city surveillance programs, and mining. With improved overall performance, greater bandwidth, a richer feature set, and enhanced hardware, the Cisco IE 4000 Series complements the current industrial Ethernet portfolio of related Cisco industrial switches.

The Cisco IE 4000 can easily be installed in your network. Through a user-friendly web device manager, the Cisco IE 4000 provides easy out-of-the-box configuration and simplified operational manageability to deliver advanced security, data, video, and voice services over industrial networks.

Switch Models

Model	Description
IE-4000-4TC4G-E	4 FE Combo DL ports, 4 GE combo UL ports, w/FPGA
IE-4000-8T4G-E	8 FE Copper DL ports, 4 GE combo UL ports, w/FPGA
IE-4000-8S4G-E	8 FE Fiber DL ports, 4 GE combo UL ports, w/FPGA
IE-4000-4T4P4G-E	4 FE Copper DL ports + 4 FE Copper DL ports with POE[1], 4 GE combo UL ports, w/FPGA
IE-4000-16T4G-E	16 FE Copper DL ports, 4 GE combo UL ports, w/FPGA
IE-4000-4S8P4G-E	4 FE Fiber DL ports + 8 FE Copper DL ports with POE[1], 4 GE combo UL ports, w/FPGA
IE-4000-8GT4G-E	8 GE Copper DL ports, 4 GE combo UL ports, w/FPGA
IE-4000-8GS4G-E	8 GE Fiber DL ports, 4 GE combo UL ports, w/FPGA
IE-4000-4GC4GP4G-E	4 GE Combo DL ports + 4 GE Copper DL ports with POE[1], 4 GE combo UL ports, w/FPGA
IE-4000-16GT4G-E	16 GE Copper DL ports, 4 GE combo UL ports, w/FPGA
IE-4000-8GT8GP4G-E	8 GE Copper DL ports + 8 GE Copper DL ports with POE[1], 4 GE combo UL ports, w/FPGA
IE-4000-4GS8GP4G-E	4 GE Fiber DL ports + 8 GE Copper DL ports with POE[1], 4 GE combo UL ports, w/FPGA

1. IE-4000-8GT8GP4G-E supports up to 240W PoE, consisting of eight ports of PoE+ (30 W per port; IEEE 802.3at) with temperature derating (131°F (55°C) at full 240W PoE power) and depending on the power source used. All other PoE-capable models support up to 120W PoE, either PoE (15.4 W per port; IEEE 802.3af) or PoE+ (30 W per port; IEEE 802.3at) over the full operating temperature range.

Front Panel Overview

The illustrations in this section provide an overview of the variety of components available on the various switch models in this product family. Not all models are illustrated.

Figure 1   Cisco IE-4000-8GT8GP4G-E shown
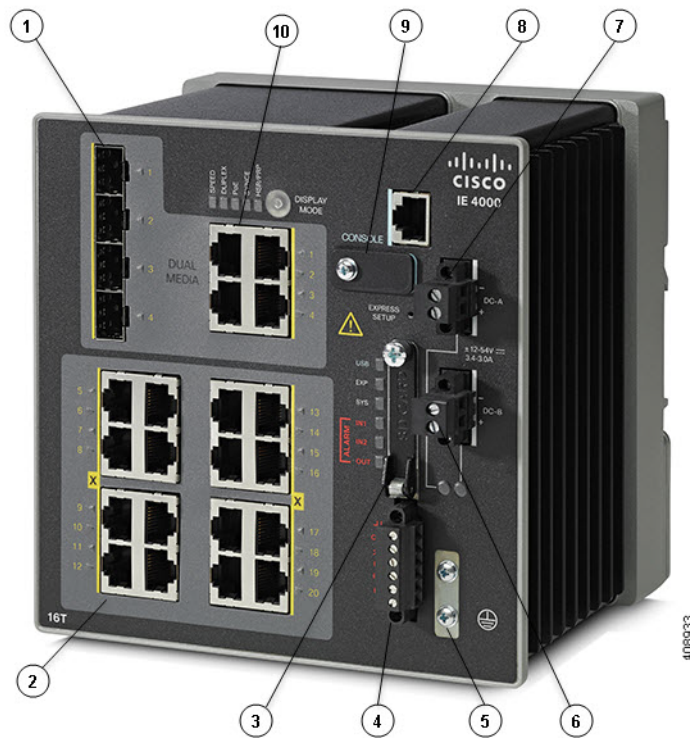
1	SFP module slots (uplink ports)	6	Power connector DC-B
2	10/100/1000 Ethernet ports (downlink ports)	7	Power connector DC-A
3	Flash memory card slot	8	RJ-45 console port
4	Alarm connector	9	USB mini-Type B (console) port[1]
5	Protective ground connection	10	Dual-purpose ports (uplink ports)

1. Use a screwdriver to remove the port cover and access the port.

Ports and Slots

Note: Different configurations are available. Not all ports or slots are present in all configurations.

10/100/1000 BASE-T Downlink Ports

You can set the 10/100BASE-T downlink ports to operate at 10 or 100 Mb/s in full-duplex or half-duplex mode. You can also set these ports for speed and duplex autonegotiation in compliance with IEEE 802.3AB. (The default setting is autonegotiate.) When set for autonegotiation, the port senses the speed and duplex settings of the attached device and advertises its own capabilities. If the connected device also supports autonegotiation, the switch port negotiates the best connection (that is, the fastest line speed that both devices support, and full-duplex transmission if the attached device supports it) and configures itself accordingly. In all cases, the attached device must be within 328 feet (100 meters). 100BASE-TX traffic requires Category 5 cable. 10BASE-T traffic can use Category 3 or Category 4 cables.

When connecting the switch to workstations, servers, routers, and Cisco IP phones, make sure that the cable is a straight-through cable.

You can use the **mdix auto** interface configuration command in the command-line interface (CLI) to enable the automatic medium-dependent interface crossover (auto-MDIX) feature. When the auto-MDIX feature is enabled, the switch detects the required cable type for copper Ethernet connections and configures the interfaces accordingly. For configuration information for this feature, see the switch software configuration guide or the switch command reference.

10/100/1000BASE-T Uplink Ports

The IEEE 802.3u 10/100/1000BASE-T uplink ports provide full-duplex 10, 100 or 1000 Mb/s connectivity over Category 5 unshielded twisted pair (UTP) copper cabling. The default setting is autonegotiate. The cable can be up to 100 m (0.1 km) in length.

100/1000 Mb/s SFP Module Downlink Slots

The IEEE 802.3u 100 Mb/s SFP module downlink slots provide full-duplex 100 Mb/s connectivity over multi-mode (MM) fiber cables or single-mode (SM) fiber cables. These ports use a SFP fiber-optic transceiver module that accepts a dual LC connector. Check the SFP specifications for the cable type and length.

100/1000 Mb/s SFP Module Uplink Slots

The IEEE 802.3u 100 Mb/s SFP module uplink slots provide full-duplex 100 or 1000 Mb/s connectivity over multi-mode (MM) fiber cables or single-mode (SM) fiber cables. These ports use a SFP fiber-optic transceiver module that accepts a dual LC connector. Check the SFP specifications for the cable type and length.

Dual-Purpose Fast Ethernet Downlink Ports

You can configure the dual-purpose Fast Ethernet Downlink ports on the switch as either 10/100BASE-T ports or as 100 Mb/s SFP-module ports. You can set the 10/100 ports to autonegotiate, or you can configure them as fixed 10 or 100 Mb/s ports.

By default, the switch selects the medium for each dual-purpose port (10/100BASE-T or SFP). When a link is achieved on one media type, the switch disables the other media type until the active link goes down. If links are active on both media, the SFP-module port has priority, but you can use the **media-type** interface configuration command to manually designate the port as an RJ-45 port or an SFP port.

You can configure the speed and duplex settings consistent with the selected media type. For information on configuring interfaces, see the switch software configuration guide.

Dual-Purpose Gigabit Ethernet Uplink or Downlink Ports

You can configure the dual-purpose Gigabit Ethernet uplink or downlink ports on the switch as either 10/1001000BASE-T ports or as 100/1000 Mb/s SFP-module ports. You can set the 10/100/1000BASE-T ports to autonegotiate, or you can configure them as fixed 10, 100, or 1000 Mb/s (Gigabit) Ethernet ports.

By default, the switch selects the medium for each dual-purpose port (10/100/1000BASE-T or SFP). When a link is achieved on one media type, the switch disables the other media type until the active link goes down. If links are active on both media, the SFP-module port has priority, but you can use the **media-type** interface configuration command to manually designate the port as an RJ-45 port or an SFP port.

You can configure the speed and duplex settings consistent with the selected media type. For information on configuring interfaces, see the switch software configuration guide.

Management Ports

You can connect the switch to a PC running Microsoft Windows or to a terminal server through either the RJ-45 console port or the USB mini-Type B console port, also referred to as the USB-mini console port. These ports use the following connectors:

- RJ-45 console port uses an RJ-45-to-DB-9 female cable.

- USB-mini console port (5-pin connector) uses a USB Type A-to-5-pin mini-Type B cable.

The USB-mini console interface speeds are the same as the RJ-45 console interface speeds.

To use the USB-mini console port, you must install the Cisco Windows USB device driver on the device that is connected to the USB-mini console port and that is running Microsoft Windows.

Note: For information about downloading the Cisco USB device driver, see Installing the Cisco Microsoft Windows XP, 2000, Vista, 7, 8, and 10 USB Device Driver, page 48.

With the Cisco Windows USB device driver, connecting and disconnecting the USB cable from the console port does not affect Windows HyperTerminal operations. Mac OS X or Linux require no special drivers.

Note: The 5-pin mini-Type B connectors resemble the 4-pin mini-Type B connectors, but they are not compatible. Use only the 5-pin mini-Type B. See Figure 2 on page 4.

Figure 2   USB Mini-Type B Port
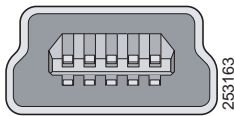
The configurable inactivity timeout reactivates the RJ-45 console port if the USB-mini console port is activated, but no input activity occurs for a specified time period. When the USB-mini console port deactivates due to a timeout, you can restore its operation by disconnecting and reconnecting the USB cable. For information on using the CLI to configure the USB-mini console interface, see the switch software guide.

Power Connectors

DC Power Connector

You connect the DC power to the switch through the front panel connectors. The switch has a dual-feed DC power supply; two connectors provide primary and secondary DC power (DC-A and DC-B). The DC power connectors are near the top right of the front panel. See Figure 1 on page 2. Each power connector has an LED status indicator.

The switch power connectors are attached to the switch chassis. Each power connector has screw terminals for terminating the DC power. All connectors are attached to the switch front panel with the provided captive screws.

The power connector labeling is on the panel. The positive DC power connection is labeled "+", and the return connection is labeled "–".

The switch can operate with a single power source or with dual power sources. When both power sources are operational, the switch draws power from the DC source with the higher voltage. If one of the two power sources fail, the other continues to power the switch.

Alarm Connector

You connect the alarm signals to the switch through the alarm connector. The switch supports two alarm inputs and one alarm output relay. The alarm connector is on the bottom right of the front panel. See Figure 3 on page 5.

The alarm connector provides six alarm wire connections. The connector is attached to the switch front panel with the provided captive screws.

Figure 3   Alarm Connector
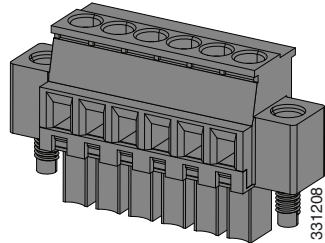
Both alarm input circuits can sense if the alarm input is open or closed. The alarm inputs can be activated for environmental, power supply, and port status alarm conditions. From the CLI, you can configure each alarm input as an open or closed contact.

The alarm output circuit is a relay with a normally open and a normally closed contact. The switch is configured to detect faults that are used to energize the relay coil and change the state on both of the relay contacts: normally open contacts close, and normally closed contacts open. The alarm output relay can be used to control an external alarm device, such as a bell or a light.

See the switch software configuration guide for instructions on configuring the alarm relays.

For more information about the alarm connector, see Cable and Connectors, page 63

SFP Modules Supported

The SFP modules are switch Ethernet SFP modules that provide connections to other devices. Depending on the switch model, these field-replaceable transceiver modules provide uplink or downlink interfaces. The modules have LC connectors for fiber-optic connections.

Refer to the IE4000 Data Sheet for details about the supported SFP Modules.

Alarm Connector

LEDs

You can use the LEDs to monitor the switch status, activity, and performance. show the front panel LEDs.

Figure 4   LEDs on the Cisco IE 4000 Switch
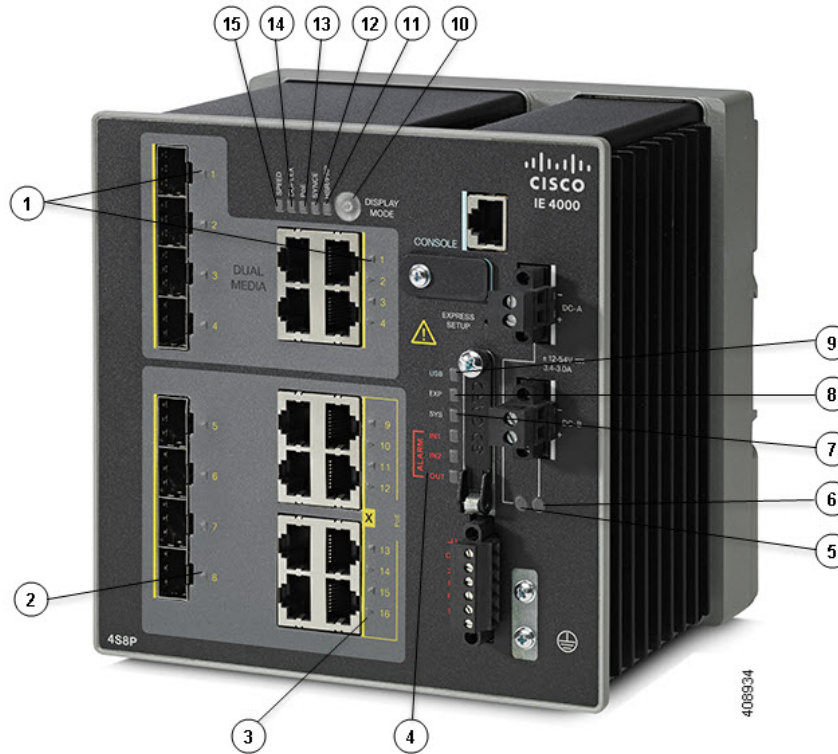
1	Dual Media port LEDs	9	USB mini-Type B (console) port LED
2	SFP module slot LEDs	10	Display Mode Switch
3	10/100/1000 BASE-T downlink port LEDs	11	HSR/PRP
4	Alarm LEDs	12	SYNCE LED
5	Power connector DC-A LED	13	POE port status LED
6	Power connector DC-B LED	14	Duplex LED
7	System LED	15	Speed
8	Express Setup LED		

Display Mode Switch

The Display Mode Switch allows you to choose the mode you want displayed by the port LEDs (items 7, 8, and 9 in). The LEDs to the left of the switch indicate the chosen display mode. Each time you press the switch, the mode indicator will move from Speed, Duplex, PoE, Synce, and HSR/PRP respectively.

Alarm Connector

Express Setup LED

The Express Setup LED displays the express setup mode for the initial configuration.

Color	Setup Status
Off (dark)	Switch is configured as a managed switch.
Solid green	Switch is operating normally.
Blinking green	Switch is in initial setup, in recovery, or initial setup is incomplete.
Solid red	Switch failed to start initial setup or recovery because there is no available switch port to which to connect the management station. Disconnect a device from a switch port, and then press the Express Setup button.

System LED

The System LED shows whether the system is receiving power and is functioning properly.

Color	System Status
Off	System is not powered on.
Blinking green	Boot fast is in progress.
Green	System is operating normally.
Red	Switch is not functioning properly.

USB-Mini Console LED

The USB-mini console LED shows which console port is in use. See Figure 4 on page 6 for the LED location. If you connect a cable to a console port, the switch automatically uses that port for console communication. If you connect two console cables, the USB-mini console port has priority.

Color	Description
Green	USB-mini console port is active. RJ-45 console port LED is not active.
Off	Port is not active. RJ-45 console port is active.

Alarm LEDs

Alarm OUT

Color	System Status
Off	Alarm OUT is not configured, or the switch is off.
Green	Alarm OUT is configured, no alarm detected.
Blinking red	Switch has detected a major alarm.
Red	Switch has detected a minor alarm.

Alarm IN1 and IN2

Color	System Status
Off	Alarm IN1 or IN2 not configured.
Green	Alarm IN1 or IN2 configured, no alarm detected.
Blinking red	Major alarm detected.
Red	Minor alarm detected.

Power Status LEDs

The switch can operate with one or two DC power sources. Each DC input has an associated LED that shows the status of the corresponding DC input. If power is present on the circuit, the LED is green. If power is not present, the LED color depends on the alarm configuration. If alarms are configured, the LED is red when power is not present; otherwise, the LED is off.

If the switch has dual power sources, the switch draws power from the power source with the higher voltage. If one of the DC sources fails, the alternate DC source powers the switch, and the corresponding power status LED is green. The power status for the failed DC source is either off or red, depending on the alarm configuration.

Color	System Status
Green	Power is present on the associated circuit, system is operating normally.
Off	Power is not present on the circuit, or the system is not powered up.
Red	Power is not present on the associated circuit, and the power supply alarm is configured.

The Power A and Power B LEDs show that power is not present on the switch if the power input drops below the low valid level. The power status LEDs only show that power is present if the voltage at the switch input exceeds the valid level.

For information about the power LED colors during the boot fast sequence, see Verifying Switch Operation, page 39.

Port Status LEDs

Each port and SFP uplink slot has a status LED, as shown in Figure 4 on page 6 and described below.

Color	System Status
Off	No link.
Solid green	Link present.
Blinking green	Activity. Port is sending or receiving data.
Alternating green-amber	Link fault. Error frames can affect connectivity, and errors such as excessive collisions, CRC errors, and alignment and jabber errors are monitored for a link-fault indication.
Solid amber	Port is not forwarding. The port was disabled by management, an address violation, or STP. After a port is reconfigured, the port LED can remain amber for up to 30 seconds while STP checks the switch for possible loops.

Dual-Purpose Port LEDs

The Dual Purpose LEDs show how the port is being used (Ethernet or SFP module). The LED colors have the same meanings as for the Port Status LEDs, page 8.

PoE Status LED

The PoE STATUS LEDs are located on the front panel, next to the PoE ports (models equipped with PoE ports).The LEDs display the functionality and status of the adjacent PoE ports.

Color	PoE Status
Off	PoE is off. If the powered device is receiving power from a non-PoE power source, the port LED is off even if the powered device is connected to the switch port.
Green	PoE is on. The port LED is green only when the PoE port is providing power.
Alternating green and amber	PoE is denied because providing power to the powered device will exceed the switch power capacity.
Flashing amber	PoE is off due to a fault. **Caution: Noncompliant cabling or powered devices can cause a PoE port fault. Use only standard-compliant cabling to connect Cisco pre-standard IP Phones and wireless access points or IEEE 802.3af-compliant devices. You must remove any cable or device that causes a PoE fault.**
Amber	PoE for the port is disabled. (PoE is enabled by default.)

Flash Memory Card

The switch supports a flash memory card that makes it possible to replace a failed switch without reconfiguring the new switch. The slot for the flash memory card is on the front of the switch. The flash card is hot swappable and can be accessed on the front panel in non hazardous locations only. A cover protects the flash card and holds the card firmly in place. The cover is hinged and closed with a captive screw. This prevents the card from coming loose and protects against shock and vibration.

Note: For more information on inserting and removing the flash memory card, see Installing or Removing the Flash Memory Card (Optional), page 16.

Note: The replacement SD card part number is SD-IE-1GB.

Rear Panel

The rear panel of the switch has a latch for installation on a DIN rail. See Figure 5 on page 10. The latch is spring-loaded to move down to position the switch over a DIN rail and return to the original position to secure the switch to a DIN rail.

Figure 5   Cisco IE 4000 Switch Rear Panel

Management Options

The switch supports these management options:

- Cisco Network Assistant

  Cisco Network Assistant is a PC-based network management GUI application optimized for LANs of small- and medium-sized businesses. Using the GUI, you can configure and manage switch clusters or standalone switches. Cisco Network Assistant is available at no cost and can be downloaded from this URL:

  http://www.cisco.com/en/US/products/ps5931/tsd_products_support_series_home.html

  For information on starting the Cisco Network Assistant application, see the *Getting Started with Cisco Network Assistant* guide on Cisco.com.

- Device Manager

  You can use Device Manager, which is in the switch memory, to manage individual and standalone switches. This web interface offers quick configuration and monitoring. You can access Device Manager from anywhere in your network through a web browser. For more information, see the Device Manager online help.

- Cisco IOS CLI

  The switch CLI is based on Cisco IOS software and is enhanced to support desktop-switching features. You can fully configure and monitor the switch. You can access the CLI either by connecting your management station directly to the switch management port, or a console port, or by using Telnet from a remote management station. See the switch command reference on Cisco.com for more information.

- SNMP network management

    You can manage switches from a SNMP-compatible management station that is running platforms such as HP OpenView or SunNet Manager. The switch supports a comprehensive set of Management Information Base (MIB) extensions and four Remote Monitoring (RMON) groups. See the switch software configuration guide on Cisco.com and the documentation that came with your SNMP application for more information.

- Common Industrial Protocol

    The Common Industrial Protocol (CIP) management objects are supported. The Cisco IE 4000 can be managed by CIP-based management tools, allowing the user to manage an entire industrial automation system with one tool.

- PROFINET TCP/IP and RT

    This switch supports PROFINET TCP/IP and RT and can be managed by Siemens' automation software such as STEP 7.

Network Configurations

See the switch software configuration guide on Cisco.com for network configuration concepts and examples of using the switch to create dedicated network segments and interconnecting the segments through Gigabit Ethernet connections.

Network Configurations

Switch Installation

This chapter describes how to install your switch, verify the boot fast, and connect the switch to other devices. It also includes information specifically for installations in hazardous environments.

Read these topics, and perform the procedures in this order:

Preparing for Installation

This section provides information about these topics:

Warnings

These warnings are translated into several languages in the *Regulatory Compliance and Safety Information* for this switch.

Warning: Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals. Statement 43

Warning: Exposure to some chemicals could degrade the sealing properties of materials used in the sealed relay device. Statement 381

Warning: Do not work on the system or connect or disconnect cables during periods of lightning activity. Statement 1001

Warning: Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003

Warning: Read the installation instructions before you connect the system to its power source. Statement 1004

Warning: This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. Statement 1017

Warning: This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

Warning: This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028

Warning: Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030

Warning: Ultimate disposal of this product should be handled according to all national laws and regulations. Statement 1040

Warning: For connections outside the building where the equipment is installed, the following ports must be connected through an approved network termination unit with integral circuit protection.
10/100/1000 Ethernet Statement 1044

Warning: To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of:
158 F (70 C). For IE-4000-8GT8GP4G maximum recommend ambient is 131 F (55 C) at max POE budget of 240W. Statement 1047

Warning: In switch installations in a hazardous location, the DC power source could be located away from the vicinity of the switch. Before performing any of the following procedures, locate the DC circuit to ensure that the power is removed and cannot be turned on accidentally, or verify that the area is nonhazardous before proceeding. Statement 1059

Warning: This equipment is supplied as "open type" equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The interior of the enclosure must be accessible only by the use of a tool.

The enclosure must meet IP 54 or NEMA type 4 minimum enclosure rating standards. Statement 1063

Warning: When used in a Class I, Division 2, hazardous location, this equipment must be mounted in a suitable enclosure with proper wiring method, for all power, input and output wiring, that complies with the governing electrical codes and in accordance with the authority having jurisdiction over Class I, Division 2 installations. Statement 1066

Warning: Installation of the equipment must comply with local and national electrical codes. Statement 1074

Warning: Explosion Hazard—The area must be known to be nonhazardous before installing, servicing, or replacing the unit. Statement 1082

Warning: Explosion Hazard—Substitution of components may impair suitability for Class I, Division 2/Zone 2. Statement 1083

Caution: When installed in a Class I, Div/Zone 2 hazardous location environment, this equipment must be installed in a min. IP54, ATEX certified enclosure.

Caution: Airflow around the switch must be unrestricted. To prevent the switch from overheating, there must be the following minimum clearances:
– Top and bottom: 2.0 in. (50.8 mm)
– Sides: 2.0 in. (50.8 mm)
– Front: 2.0 in. (50.8 mm)
Contact your Cisco Technical Assistance Centre (TAC) if tighter spacings are required.

Caution: When installed in a Class I, Div/Zone 2 hazardous location environment, this equipment must be installed in a pollution degree 2 environment per IEC 60664-1)

Caution: This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D, or only nonhazardous locations.

Caution: Airflow around the switch must be unrestricted. To prevent the switch from overheating, there must be the following minimum clearances:
– Top and bottom: 2.0 in. (50.8 mm)
– Sides: 2.0 in. (50.8 mm)
– Front: 2.0 in. (50.8 mm)

Installation Guidelines

When determining where to place the switch, observe these guidelines.

Environment and Enclosure Guidelines

Review these environmental and enclosure guidelines before installation:

■ This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC publication 60664-1), at altitudes up to 9842 ft (3 km) without derating.

■ This equipment is considered Group 1, Class A industrial equipment, according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.

■ This equipment is supplied as open-type equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The enclosure must have suitable flame-retardant properties to prevent or minimize the spread of flame, complying with a flame-spread rating of 5VA, V2, V1, V0 (or equivalent) if nonmetallic. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication might contain additional information regarding specific enclosure-type ratings that are required to comply with certain product safety certifications.

General Guidelines

Before installation, observe these general guidelines:

Caution: Proper ESD protection is required whenever you handle Cisco equipment. Installation and maintenance personnel should be properly grounded by using ground straps to eliminate the risk of ESD damage to the switch.

Do not touch connectors or pins on component boards. Do not touch circuit components inside the switch. When not in use, store the equipment in appropriate static-safe packaging.

■ The switch only meets the requirements of IEC 61850-3 when powered by a redundant power supply configuration.

■ If you are responsible for the application of safety-related programmable electronic systems (PES), you need to be aware of the safety requirements in the application of the system and be trained in using the system.

Caution: The device is designed to mount on a DIN rail that conforms to Standard EN50022.

When determining where to place the switch, observe these guidelines:

■ Before installing the switch, first verify that the switch is operational by powering it on and observing boot fast. Follow the procedures in the .

■ For 10/100 ports and 10/100/1000 ports, the cable length from a switch to an attached device cannot exceed 328 feet (100 meters).

■ For 100BASE-FX fiber-optic ports, the cable length from a switch to an attached device cannot exceed 6562 ft (2 km).

■ Clearance to front and rear panels meets these conditions:

— Front-panel LEDs can be easily read.

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   — Access to ports is sufficient for unrestricted cabling.

   — Front-panel direct current (DC) power connectors and the alarm connector are within reach of the connection to the DC power source.

■ Airflow around the switch must be unrestricted. To prevent the switch from overheating, you must have the following minimum clearances:

   — Top and bottom: 2.0 in. (50.8 mm)

   — Sides: 2.0 in. (50.8 mm)

   — Front: 2.0 in. (50.8 mm)

Caution: **When the switch is installed in an industrial enclosure, the temperature within the enclosure is greater than normal room temperature outside the enclosure.**

Ensure temperatures inside the enclosure conform to device specifications detailed in Table 3 on page 59.

■ Cabling is away from sources of electrical noise, such as radios, power lines, and fluorescent lighting fixtures.

Verifying Package Contents

If any item is missing or damaged, contact your Cisco representative or reseller for support.

Installing or Removing the Flash Memory Card (Optional)

The software/firmware is stored on the SD card memory from factory default. Optionally, you can execute the sync command to copy the software/firmware (including directory) to on-board memory (flash memory), then remove the SD card. it is strongly recommended that you use the SD card to boot or store the config for future easy replacement, in case of a hardware failure.

Warning: **Do not insert or remove the flash card while power is on; an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding. Statement 379**

To install or replace the flash memory card, follow these steps:

1. On the front of the switch, locate the door that protects the flash memory card slot. Loosen the captive screw at the top of the door using a Phillips screwdriver to open the door. See Figure 6 on page 17.

Figure 6   Installing the Flash Memory Card in the Switch

1	Flash Memory Card Slot

2. Install or remove the card:

■ To install a card, slide it into the slot, and press it in until it clicks in place. The card is keyed so that you cannot insert it the wrong way.

■ To remove the card, push it in until it releases for it to pop out. Place it in an antistatic bag to protect it from static discharge.

3. After the card is installed, close the guard door and fasten the captive screw using a Phillips screwdriver to keep the door in place.

Connecting to a Console Port (Optional)

You can also enter CLI commands through the console port. For more information about this process see Accessing the CLI Through the Console Port, page 45.

**Warning: If you connect or disconnect the console cable with power applied to the switch or any device on the network, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.
Statement 1080**

Connecting to Power

Tools and Equipment

Obtain these necessary tools and equipment:

- Ratcheting torque flathead screwdriver that exerts up to 18 in-lb (2.03 N-m) of pressure.

- For the protective ground connector, obtain a single or pair of stu size 6 ring terminals (such as Hollingsworth part number R3456B or equivalent).

- Crimping tool (such as Thomas & Bett part number WT4000, ERG-2001, or equivalent).

- 10-gauge copper ground wire.

- For DC power connections, use UL- and CSA-rated, style 1007 or 1569 twisted-pair copper appliance wiring material (AWM) wire.

- Wire-stripping tools for stripping 10- and 18-gauge wires.

- A number-2 Phillips screwdriver.

- A flat-blade screwdriver.

Supported Power Supplies

The supported power supplies are listed in Table 2 on page 18.

Table 2   Supported Power Supplies

	PWR-IE65W-PC-DC	PWR-IE65W-PC-AC	PWR-IE170W-PC-DC	PWR-IE170W-PC-AC	PWR-IE50W-AC-IEC	PWR-IE50W-AC
Current	DC-DC	AC-DC	DC-DC	AC-DC	AC-DC	AC-DC
Input	18-60 VDC/4.3 Amp	110/220 VAC and 88-300 VDC	10.8-60 VDC/23 Amp	110/220 VAC and 88-300 VDC/2.1 Amp	110/220 VAC	110/220VAC and 88-300 VDC
Output	54VDC/1.2 Amp	54VDC/1.2 Amp	54VDC/3.15 Amp	54VDC/3.15 Amp	24VDC/2.1Amp	24 VDC / 2.1Amp
Dimensions	5.9 in H x 2.1 in. W x 4.9 in. D	5.9 in. H x 2.1 in. W x 4.9 in. D	5.93 in (149.8 mm) H x 4.47 in. (113.5 mm) W x 5.7 in. (144.7 mm) D	5.93 in. (150.6mm) H x 3.72 in. (94.5mm) W x 5.6 in. (142.2mm) D	5.8 in. H x 2 in. W x 4.4 in. D	5.8 in. H x 2 in. W x 4.4 in. D
Usage	Designed for up to 25W of POE load	Designed for up to 25W of POE load	Designed for up to 8 POE ports or 123W of POE power.	Designed for up to 8 POE ports or 123W of POE power.	No POE support	No POE support

Installing the Power Converter on a DIN Rail, Wall, or Rack Adapter

You install the power converter on a DIN rail, wall, or rack as you would a switch module.

Warning: This equipment is supplied as "open type" equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The interior of the enclosure must be accessible only by the use of a tool.

The enclosure must meet IP 54 or NEMA type 4 minimum enclosure rating standards. Statement 1063

Caution: To prevent the switch assemble from overheating, there must be sufficient spacings as explained under Installation Guidelines, page 15, between any other switch assembly.

Grounding the Switch

Make sure to follow any grounding requirements at your site.

Warning: This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

Warning: This equipment is intended to be grounded to comply with emission and immunity requirements. Ensure that the switch functional ground lug is connected to earth ground during normal use. Statement 1064

Caution: To make sure that the equipment is reliably connected to earth ground, follow the grounding procedure instructions, and use a UL-listed ring terminal lug suitable for number 10-to-12 AWG wire, such as Hollingsworth part number R3456B or equivalent)

Caution: Use at least a 4 mm2 conductor to connect to the external grounding screw.

The ground lug is not supplied with the switch. You can use one of the these options:

- Single ring terminal

- Two single ring terminals

To ground the switch to earth ground by using the ground screw, follow these steps:

1. Use a standard Phillips screwdriver or a ratcheting torque screwdriver with a Phillips head to remove the ground screw from the front panel of the switch. Store the ground screw for later use.

2. Use the manufacturer's guidelines to determine the wire length to be stripped.

3. Insert the ground wire into the ring terminal lug, and using a crimping tool, crimp the terminal to the wire. See Figure 7 on page 19. If two ring terminals are being used, repeat this action for a second ring terminal.

Figure 7   Crimping the Ring Terminal
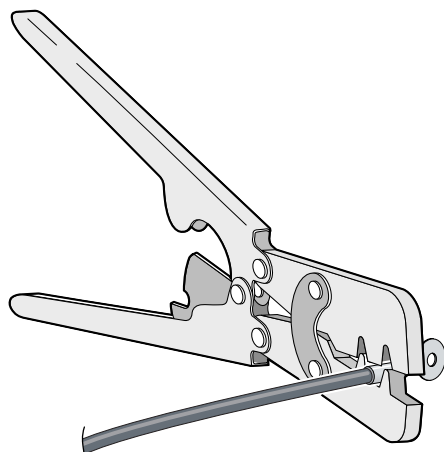
4. Slide the ground screw through the terminal.

5. Insert the ground screw into the functional ground screw opening on the front panel.

6. Use a ratcheting torque screwdriver to tighten the ground screws and ring terminal to the switch front panel. The torque should not exceed 4.5 in-lb (0.51 N-m). See Figure 8 on page 20.

Figure 8   Ground-Lug Screw

1	Ground-Lug Screw

7. Attach the other end of the ground wire to a grounded bare metal surface, such as a ground bus, a grounded DIN rail, or a grounded bare rack.

Connecting the Power Converter to an AC Power Source

These sections describe the steps required to connect the power converter to an AC power source:

- Preparing the AC Power Connection, page 20

- Connecting the AC Power Source to the Power Converter, page 20

Preparing the AC Power Connection

To connect the power converter to an AC power source, you need an AC power cord. Power cord connector types and standards vary by country. Power-cord wiring color codes also vary by country. You must to have a qualified electrician select, prepare, and install the appropriate power cord to the power supply.

Note: Use copper conductors only, rated at a minimum temperature of 167°F (75°C).

Note: This section does not apply to PWR-IE50W-AC-IEC, which has pluggable IEC connector.

Connecting the AC Power Source to the Power Converter

Caution: AC power sources must be dedicated AC branch circuits. Each branch circuit must be protected by a dedicated two-pole circuit breaker.

Caution: Do not turn on AC power until the wiring is secured.

1. Remove the plastic cover from the input power terminals and set it aside.

2. Insert the exposed ground wire lead (10-to-12 AWG cable) into the power converter ground wire connection. Ensure that only wire *with insulation* extends from the connector. Note that the position of the power converter may vary on different switch models.

3. Tighten the ground wire terminal block screw.

Note: Torque to 10 in-lb (1.13Nm).

4. Insert the line and neutral wire leads into the terminal block line and neutral connections. Make sure that you cannot see any wire lead. Ensure that only wire *with insulation* extends from the connectors.

5. Tighten the line and neutral terminal block screws.

Note: Torque to 10 in-lb (1.13Nm).

6. Replace the plastic cover over the terminal block.

7. Connect the other end of the wiring to your AC power source.

Connecting the Power Converter to a DC Power Source

You can also connect the power converter to a DC power source. Several power supplies can be used. Refer to Table 2 on page 18 for the appropriate DC input ratings.

Note: Use copper conductors only, rated at a minimum temperature of 167°F (75°C).

1. Measure a single length of stranded copper wire long enough to connect the power converter to the earth ground. The wire color might differ depending on the country that you are using it in.

For connections from the power converter to earth ground, use shielded 14-AWG stranded copper wire.

2. Measure a length of twisted-pair copper wire long enough to connect the power converter to the DC power source.

For DC connections from the power converter to the DC source, use 10-AWG twisted-pair copper wire.

3. Using a 18-gauge wire-stripping tool, strip the ground wire and both ends of the twisted pair wires to 0.25 inch (6.3 mm) ± 0.02 inch (0.5 mm). Do not strip more than 0.27 inch (6.8 mm) of insulation from the wires. Stripping more than the recommended amount of wire can leave exposed wire from the power and relay connector after installation.

4. Connect one end of the stranded copper wire to a grounded bare metal surface, such as a ground bus, a grounded DIN rail, or a grounded bare rack.

5. Insert the other end of the exposed ground wire lead into the earth-ground wire connection on the power converter terminal block. Note that the position of the power converter may vary on different switch models.

6. Tighten the earth-ground wire connection terminal block screw.

Note: Torque to 8 in.-lb, not to exceed 10 in-lb.

Warning: An exposed wire lead from a DC-input power source can conduct harmful levels of electricity. Be sure that no exposed portion of the DC-input power source wire extends from the power and relay connector. Statement 122

7. Insert the twisted-pair wire leads into the terminal block line and neutral connections. Insert the wire (labeled number 1 in Figure 8 on page 20) lead into the neutral wire connection and the wire (labeled number 2 in Figure 8 on page 20) lead into the line wire connection. Ensure that only wire *with insulation* extends from the connectors. See Figure 8 on page 20.

8. Tighten the line and neutral terminal block screws.

Note: Torque to 8 in.-lb, not to exceed 10 in-lb.

9. Connect the red wire to the positive pole of the DC power source, and connect the black wire to the return pole. Ensure that each pole has a current-limiting-type fuse rated to 30 Amp.

Wiring the DC Power Source

Read these cautions and warnings before wiring the switch the DC power source.

Warning: A readily accessible two-poled disconnect device must be incorporated in the fixed wiring. Statement 1022

Warning: This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 3A.
Statement 1005

Warning: Installation of the equipment must comply with local and national electrical codes. Statement 1074

Warning: Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003

Warning: Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030

Caution: For wire connections to the power and alarm connectors, you must use UL- and CSA-rated, style 1007 or 1569 twisted-pair copper appliance wiring material (AWM) wire (such as Belden part number 9318).

Caution: On switches that support PoE, do not connect the negative (return) terminal of the DC power source to earth ground

To wire the switch to a DC power source, follow these steps:

1. Locate the two power connectors on the switch front panel labeled DC-A and DC-B.

2. Identify the connector positive and return DC power connections. The labels for power connectors DC-A and DC-B are on the switch panel as displayed below.

Label	Connection
+	Positive DC power connection
–	Return DC power connection

3. Measure two strands of twisted-pair copper wire (16-to-18 AWG) long enough to connect to the DC power source.

4. Using an 18-gauge wire-stripping tool, strip each of the two twisted pair wires coming from each DC-input power source to 0.25 inch (6.3 mm) ± 0.02 inch (0.5 mm). Do not strip more than 0.27 inch (6.8 mm) of insulation from the wire. Stripping more than the recommended amount of wire can leave exposed wire from the power connector after installation.

Figure 9   Stripping the Power Connection Wire
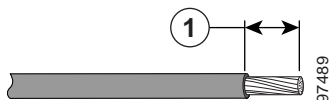
1	0.25 in. (6.3 mm) ± 0.02 in. (0.5 mm)

5. Remove the two captive screws that attach the power connector to the switch, and remove the power connector. Remove both connectors if you are connecting to two power sources. See .

Figure 10   Removing the Power Connectors from the Switch

1	Power Connectors

6. On the power connector, insert the exposed part of the positive wire into the connection labeled "+" and the exposed part of the return wire into the connection labeled "–". See Figure 11 on page 24. Make sure that you cannot see any wire lead. Only wire *with insulation* should extend from the connector.

Warning: An exposed wire lead from a DC-input power source can conduct harmful levels of electricity. Be sure that no exposed portion of the DC-input power source wire extends from the connector(s) or terminal block(s). Statement 122

Connecting to Power

Figure 11   Inserting Wires in the Power Connector
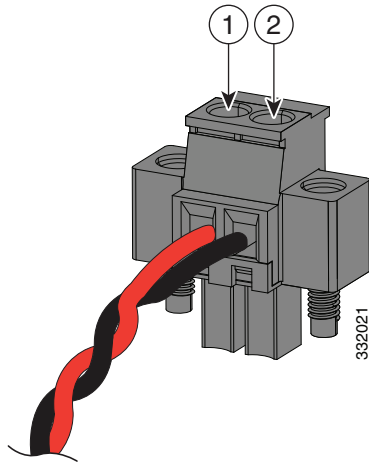
1	Power source positive connection	2	Power source return connection

7. Use a ratcheting torque flathead screwdriver to torque the power connector captive screws (above the installed wire leads) to 5in-lb (0.565 Nm). See Figure 12 on page 25.

Caution: **Do not over-torque the power connector's captive screws. The torque should not exceed 5in-lb (0.565 Nm).**

Connecting to Power

Figure 12   Torquing the Power Connector Captive Screws
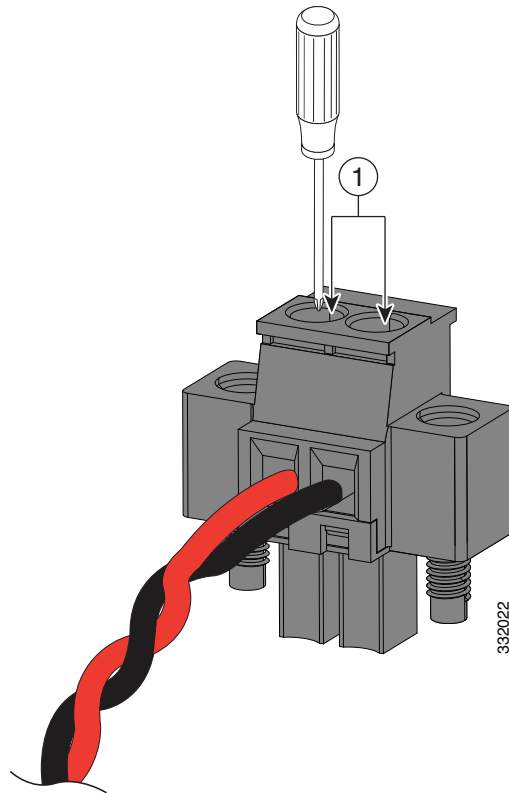
1	Power connector captive screws

8. Connect the other end of the positive wire to the positive terminal on the DC power source, and connect the other end of the return wire to the return terminal on the DC power source.

When you are testing the switch, one power connection is sufficient. If you are installing the switch and are using a second power source, repeat Step 4 through Step 8 using the second power connector.

Figure 13 on page 26 shows the completed DC-input wiring on a power connector for a primary power source and an optional secondary power source.

Figure 13   Completed DC Power Connections on the Power Connectors
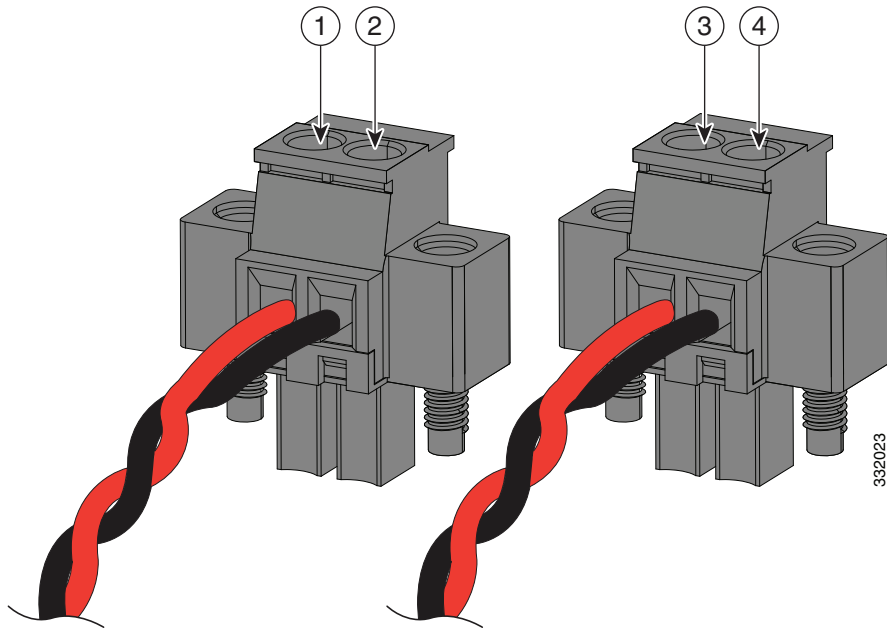
1	Power source A positive connection	3	Power source B positive connection
2	Power source A return connection	4	Power source B return connection

If your power source is –48 VDC, this table describes the your wiring connections for Figure 13 on page 26.

1	Power source A ground connection	3	Power source B ground connection
2	Power source A –48 VDC connection	4	Power source B –48 VDC connection

Attaching the Power Connectors to the Switch

To attach the power connectors to the front panel of the switch, follow these steps:

1. Insert one power connector into the DC-A receptacle on the switch front panel, and the other into the DC-B receptacle. See Figure 10 on page 23.

Warning: **Failure to securely tighten the captive screws can result in an electrical arc if the connector is accidentally removed. Statement 397**

Warning: **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 7.5A. Statement 1005**

Warning: **When you connect or disconnect the power and/or alarm connector with power applied, an electrical arc can occur. This could cause an explosion in hazardous area installations. Be sure that all power is removed from the switch and any other circuits. Be sure that power cannot be accidentally turned on or verify that the area is nonhazardous before proceeding. Statement 1058**

Warning: **Use twisted-pair supply wires suitable for 86°F (30°C) above surrounding ambient temperature outside the enclosure. Statement 1067**

Warning: **Installation of the equipment must comply with local and national electrical codes. Statement 1074**

2. Use a ratcheting torque flathead screwdriver to tighten the captive screws on the sides of the power connectors.

When you are testing the switch, one power source is sufficient. If you are installing the switch and are using a second power source, repeat this procedure for the second power connector (DC-B), which installs just below the primary power connector (DC-A).

When you are installing the switch, secure the wires coming from the power connector so that they cannot be disturbed by casual contact. For example, use tie wraps to secure the wires to the rack.

Applying Power to the Power Converter

Move the circuit breaker for the AC outlet or the DC control circuit to the *on* position.

The LED on the power converter front panel is green when the unit is operating normally. The LED is off when the unit is not powered or is not operating normally. After the power is connected, the switch automatically begins the power-on self- test (POST), a series of tests that verifies that the switch functions properly.

Running Boot Fast

When the switch powers on, it automatically initiates a boot fast sequence. To test the switch, follow the steps in these sections:

Powering On the Switch

To apply power to a switch that is directly connected to a DC power source, locate the circuit breaker on the panel board that services the DC circuit, and switch the circuit breaker to the ON position.

Verifying Boot Fast

When you power on the switch, it automatically begins a boot fast sequence. The System LED blinks green as the Cisco IOS software image loads. If the boot fast sequence fails, the System LED turns red.

Note: Boot fast failures are usually fatal. Call Cisco TAC immediately if your switch does not complete boot fast successfully.

Note: You can disable the boot fast and run POST by using the Cisco IOS CLI. See the *Cisco IE 4000 Switch Software Configuration Guide* for more information.

Disconnecting Power

To disconnect power after successfully running boot fast, follow these steps:

1. Turn off power to the switch.

2. Disconnect the cables.

Installing the Switch

This section describes how to install the switch:

Warning: This equipment is supplied as "open type" equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The interior of the enclosure must be accessible only by the use of a tool.

The enclosure must meet IP 54 or NEMA type 4 minimum enclosure rating standards. Statement 1063

Warning: When used in a Class I, Division 2, hazardous location, this equipment must be mounted in a suitable enclosure with proper wiring method, for all power, input and output wiring, that complies with the governing electrical codes and in accordance with the authority having jurisdiction over Class I, Division 2 installations. Statement 1066

Caution: To prevent the switch from overheating, ensure these minimum clearances:
– Top and bottom: 2.0 in. (50.8 mm)
– Exposed side (not connected to the module): 2.0 in. (50.8 mm)
– Front: 2.0 in. (50.8 mm)

Installing the Switch on a DIN Rail

The switch ships with a spring-loaded latch on the rear panel for a mounting on a DIN rail.

You can install the switch as a standalone device on the DIN rail or with the expansion modules already connected. You must connect expansion modules to the switch before installing the switch on the DIN rail.

To attach the switch to a DIN rail, follow these steps:

1. Position the rear panel of the switch directly in front of the DIN rail, making sure that the DIN rail fits in the space between the two hooks near the top of the switch and the spring-loaded latch near the bottom.

2. Holding the bottom of the switch away from the DIN rail, place the two hooks on the back of the switch over the top of the DIN rail.

Caution: Do not stack any equipment on the switch.

Installing the Switch

Figure 14   Position the Hooks Over the DIN Rail
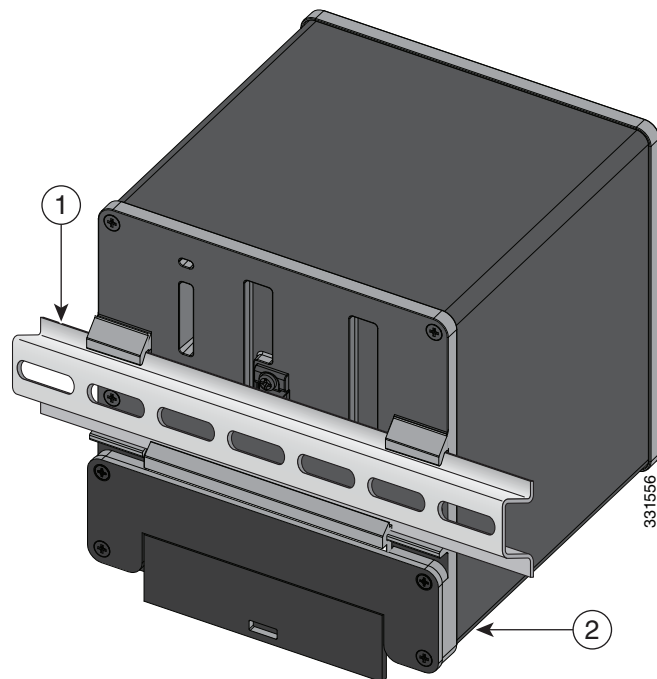
1	DIN Rail	2	Switch

   3. Push the switch toward the DIN rail to cause the spring-loaded latch at the bottom rear of the switch to move down, and snap into place.

After the switch is mounted on the DIN rail, connect the power and alarm wires, as described in Connecting Alarm Circuits, page 30.

For configuration instructions about the CLI setup program, see Configuring the Switch with the CLI-Based Setup Program, page 45.

Note: For instructions on how to remove the switch from a DIN rail, see Removing the Switch from a DIN Rail, page 29.

Removing the Switch from a DIN Rail

To remove the switch from a DIN rail, follow these steps:

   1. Ensure that power is removed from the switch, and disconnect all cables and connectors from the front panel of the switch.

   2. Insert a tool such as a flathead screwdriver in the slot at the bottom of the spring-loaded latch and use it to release the latch from the DIN rail. See Figure 15 on page 30.

   3. Pull the bottom of the switch away from the DIN rail, and lift the hooks off the top of the DIN rail. See Figure 15 on page 30.

Figure 15   Releasing the Spring-Loaded Latch from the DIN Rail
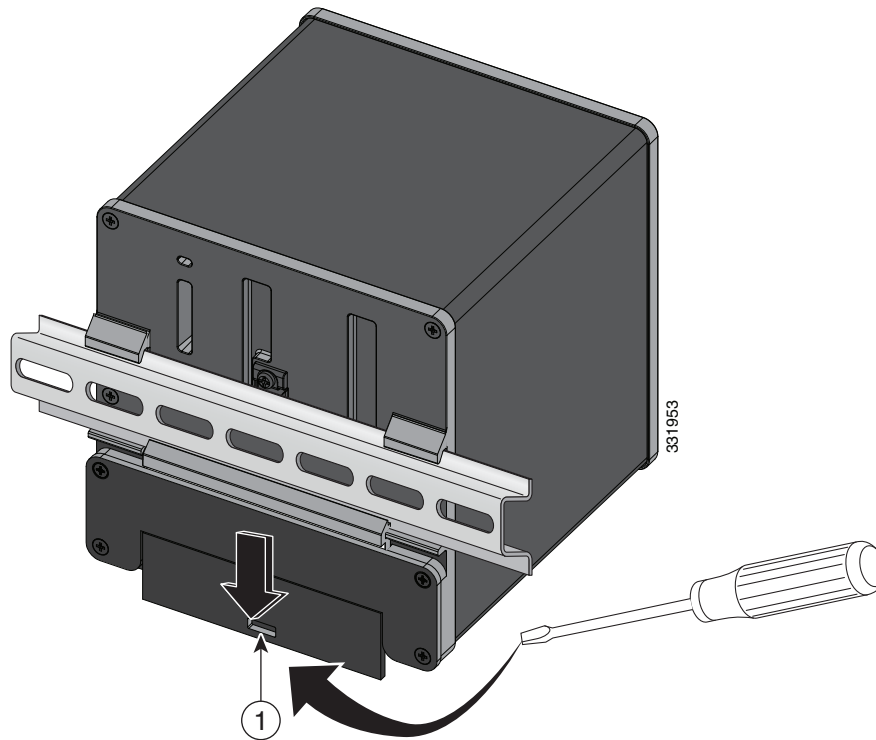
1	Push latch down

4. Remove the switch from the DIN rail.

Connecting Alarm Circuits

After the switch is installed, you are ready to connect the DC power and alarm connections.

- Wiring the Protective Ground and DC Power for Alarm Circuits, page 30

- Wiring the External Alarms, page 30

Wiring the Protective Ground and DC Power for Alarm Circuits

For instructions on grounding the switch and connecting the DC power, see the Grounding the Switch, page 19.

Wiring the External Alarms

The switch has two alarm input and one alarm output relay circuits for external alarms. The alarm input circuits are designed to sense if the alarm input is open or closed relative to the alarm input reference pin. Each alarm input can be configured as an open or closed contact. The alarm output relay circuit has a normally open and a normally closed contact.

Connecting Alarm Circuits

Alarm signals are connected to the switch through the six-pin alarm connector. Three connections are dedicated to the two alarm input circuits: alarm input 1, alarm input 2, and a reference ground. An alarm input and the reference ground wiring connection are required to complete a single alarm input circuit. The three remaining connections are for the alarm output circuit: a normally open output, a normally closed output, and a common signal. An alarm output and the common wiring connection are required to complete a single alarm output circuit.

The labels for the alarm connector are on the switch panel and are displayed below.

Label	Connection
NO	Alarm Output Normally Open (NO) connection
COM	Alarm Output Common connection
NC	Alarm Output Normally Closed (NC) connection
IN2	Alarm Input 2
REF	Alarm Input Reference Ground connection
IN1	Alarm Input 1

Warning: Explosion Hazard—Do not connect or disconnect wiring while the field-side power is on; an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or that the area is nonhazardous before proceeding. Statement 1081

Caution: The input voltage source of the alarm output relay circuit must be an isolated source and limited to less than or equal to 24 VDC, 1.0 A or 48 VDC, 0.5 A.

Note: Wire connections to the power and alarm connectors must be UL- and CSA-rated, style 1007 or 1569 twisted-pair copper appliance wiring material (AWM) wire (such as Belden part number 9318).

To wire the switch to an external alarm device, follow these steps:

1. Remove the captive screws that hold the alarm connector on the switch, and remove the connector from the switch chassis. See .

Figure 16   Alarm Connector

1	Alarm Connector

2. Measure two strands of twisted-pair wire (16-to-18 AWG) long enough to connect to the external alarm device. Choose between setting up an external alarm input or output circuit.

3. Use a wire stripper to remove the casing from both ends of each wire to 0.25 inch (6.3 mm) ± 0.02 inch (0.5 mm). Do not strip more than 0.27 inch (6.8 mm) of insulation from the wires. Stripping more than the recommended amount of wire can leave exposed wire from the alarm connector after installation.

4. Insert the exposed wires for the external alarm device into the connections based on an alarm input or output circuit setup. For example, to wire an alarm input circuit, complete the IN1 and REF connections (See Figure 17 on page 33).

Figure 17   Inserting Wires into the Alarm Connector (Alarm Input Circuit)
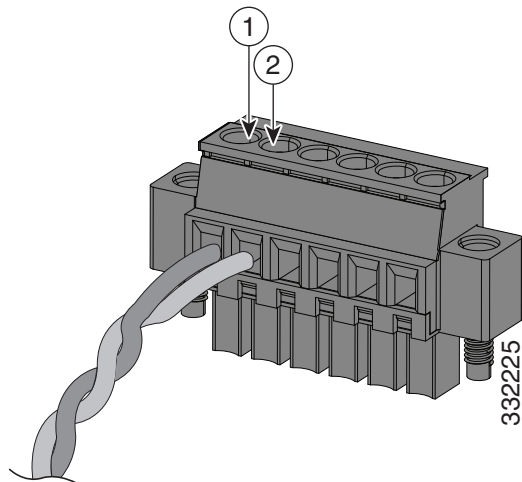
1	IN1 - External device connection 1	2	REF - External device connection 2

5. Use a ratcheting torque flathead screwdriver to tighten the alarm connector captive screw (above the installed wire leads) to 2 in-lb (0.23 N-m). (See Figure 18 on page 33.)

Caution: Do not over-torque the power and alarm connectors' captive screws. The torque should not exceed 2 in-lb (0.23 N-m).

Figure 18   Securing the Alarm Connector Captive Screws
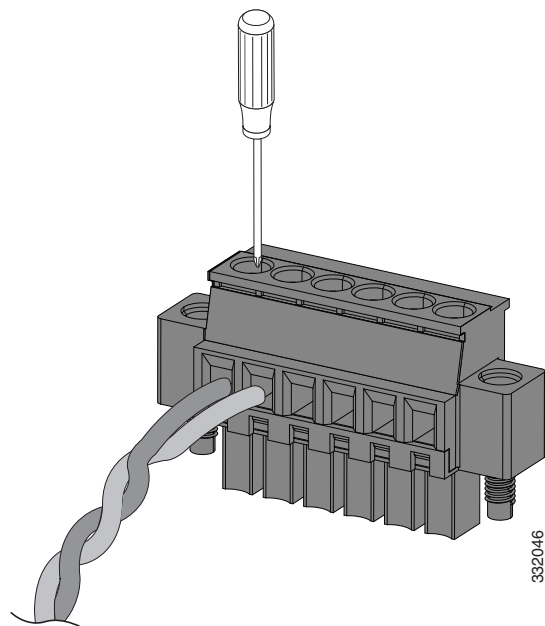
6. Repeat Step 2 through Step 5 to insert the input and output wires of one additional external alarm device into the alarm connector.

Figure 19 on page 34 shows the completed wiring for two external alarm devices. The first alarm device circuit is wired as an alarm input circuit; the IN1 and REF connections complete the circuit. The second alarm device circuit is wired as an alarm output circuit that works on a normally open contact basis; the NO and COM connections complete the circuit.

Figure 19   Completed Connections for Three External Alarm Devices on the Alarm Connector
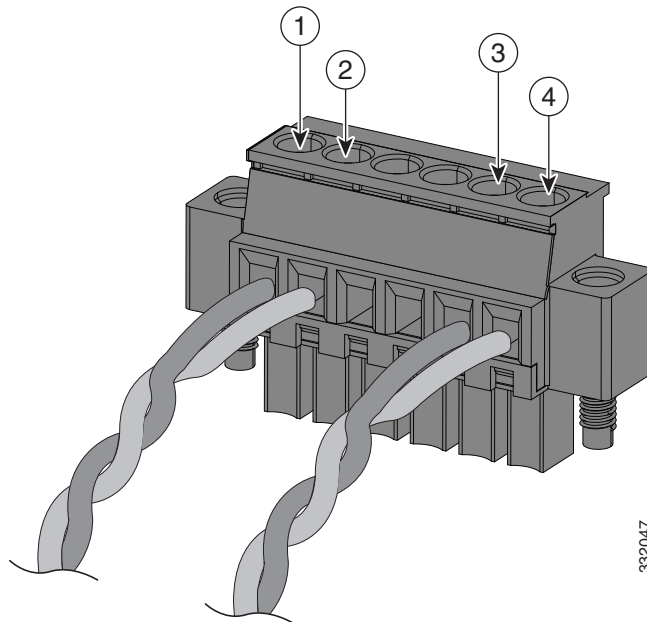
1	IN1 wired connection	3	COM wired connection
2	REF wired connection	4	NO wired connection

Attaching the Alarm Connector to the Switch

Warning: Failure to securely tighten the captive screws can result in an electrical arc if the connector is accidentally removed. Statement 397

Warning: When you connect or disconnect the power and/or alarm connector with power applied, an electrical arc can occur. This could cause an explosion in hazardous area installations. Be sure that all power is removed from the switch and any other circuits. Be sure that power cannot be accidentally turned on or verify that the area is nonhazardous before proceeding. Statement 1058

To attach the alarm connector to the front panel of the switch, follow these steps:

1. Insert the alarm connector into the receptacle on the switch front panel.

2. Use a ratcheting torque flathead screwdriver to tighten the captive screws on the sides of the alarm connector.

Connecting Destination Ports

These section provide more information about connecting to the destination ports:

■   Connecting to 10/100 and 10/100/1000 Ports, page 35

■   Installing and Removing SFP Modules, page 35

■   Connecting to SFP Modules, page 37

■   Connecting to a Dual-Purpose Port, page 37

Connecting to 10/100 and 10/100/1000 Ports

The switch 10/100/1000 ports automatically configure themselves to operate at the speed of attached devices. If the attached ports do not support autonegotiation, you can explicitly set the speed and duplex parameters. Connecting devices that do not autonegotiate or that have their speed and duplex parameters manually set can reduce performance or result in no linkage.

Warning: Do not connect or disconnect cables to the ports while power is applied to the switch or any device on the network because an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed from the switch and cannot be accidentally be turned on, or verify that the area is nonhazardous before proceeding. Statement 1070

To maximize performance, choose one of these methods for configuring the Ethernet ports:

- Let the ports autonegotiate both speed and duplex.

- Set the port speed and duplex parameters on both ends of the connection.

The models that support PoE provide up to four ports of either PoE (15.4 W per port; IEEE 802.3af) or PoE+ (30 W per port; IEEE 802.3at), depending on the power source used.

Caution: To prevent electrostatic-discharge (ESD) damage, follow your normal board and component handling procedures.

To connect to 10BASE-T, 100BASE-TX or 1000BASE-T devices, follow these steps:

1. When connecting to workstations, servers, routers, and Cisco IP phones, connect a straight-through cable to an RJ-45 connector on the front panel.

When connecting to 1000BASE-T-compatible devices, use a twisted four-pair, Category 5 or higher cable.

The auto-MDIX feature is enabled by default. For configuration information for this feature, see the *Cisco IE 4000 Switch Software Configuration Guide* .

2. Connect the other end of the cable to an RJ-45 connector on the other device. The port LED turns on when both the switch and the connected device have established a link.

The port LED is amber while Spanning Tree Protocol (STP) discovers the topology and searches for loops. This can take up to 30 seconds, and then the port LED turns green. If the port LED does not turn on:

- The device at the other end might not be turned on.

- There might be a cable problem or a problem with the adapter installed in the attached device. See for solutions to cabling problems.

3. Reconfigure and reboot the connected device if necessary.

4. Repeat Steps 1 through 3 to connect each device.

Installing and Removing SFP Modules

These sections describe how to install and remove SFP modules. SFP modules are inserted into SFP module slots on the front of the switch. These field-replaceable modules provide the uplink optical interfaces, send (TX) and receive (RX).

You can use any combination of rugged SFP modules. See the release notes on Cisco.com for the list of supported modules. Each SFP module must be of the same type as the SFP module on the other end of the cable, and the cable must not exceed the stipulated cable length for reliable communications.

Caution: When you use commercial SFP modules such as CWDM and 1000BX-U/D, reduce the maximum operating temperature by 59°F (15°C). The minimum operating temperature is 32°F (0°C).

For detailed instructions on installing, removing, and cabling the SFP module, see your SFP module documentation.

Warning: Do not insert and remove SFP modules while power is on; an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding. Statement 1087

Installing SFP Modules into SFP Module Slots

Figure 20 on page 36 shows an SFP module that has a bale-clasp latch.

Caution: We strongly recommend that you do not install or remove the SFP module with fiber-optic cables attached to it because of the potential damage to the cables, the cable connector, or the optical interfaces in the SFP module. Disconnect all cables before removing or installing an SFP module.

Removing and installing an SFP module can shorten its useful life. Do not remove and insert SFP modules more often than is absolutely necessary.

Figure 20   SFP Module with a Bale-Clasp Latch
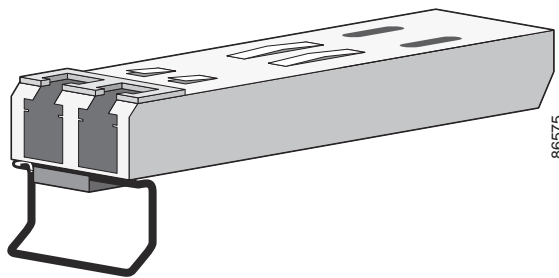
To insert an SFP module into the SFP module slot:

1. Attach an ESD-preventive wrist strap to your wrist and to a grounded bare metal surface.

2. Find the send (TX) and receive (RX) markings that identify the correct side of the SFP module.

On some SFP modules, the send and receive (TX and RX) markings might be replaced by arrows that show the direction of the connection, either send or receive (TX or RX).

3. Align the SFP module sideways in front of the slot opening.

4. Insert the SFP module into the slot until you feel the connector on the module snap into place in the rear of the slot.

5. Remove the dust plugs from the SFP module optical ports and store them for later use.

Caution: Do not remove the dust plugs from the SFP module port or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the SFP module ports and cables from contamination and ambient light.

6. Insert the LC cable connector into the SFP module.

Removing SFP Modules from SFP Module Slots

To remove an SFP module from a module receptacle:

1. Attach an ESD-preventive wrist strap to your wrist and to a grounded bare metal surface.

2. Disconnect the LC from the SFP module.

3. Insert a dust plug into the optical ports of the SFP module to keep the optical interfaces clean.

4. Unlock and remove the SFP module.

If the module has a bale-clasp latch, pull the bale out and down to eject the module. If the bale-clasp latch is obstructed and you cannot use your index finger to open it, use a small, flat-blade screwdriver or other long, narrow instrument to open the bale-clasp latch.

5. Grasp the SFP module between your thumb and index finger, and carefully remove it from the module slot.

6. Place the removed SFP module in an antistatic bag or other protective environment.

Connecting to SFP Modules

This section describes how to connect to a fiber-optic SFP port. To connect to an RJ-45 Gigabit Ethernet port instead of a fiber-optic port, see Connecting to a Dual-Purpose Port, page 37. For instructions on how to install or remove an SFP module, see Installing and Removing SFP Modules, page 35.

Warning: Class 1 laser product. Statement 1008

Warning: Do not connect or disconnect cables to the ports while power is applied to the switch or any device on the network because an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed from the switch and cannot be accidentally be turned on, or verify that the area is nonhazardous before proceeding. Statement 1070

Caution: Do not remove the rubber plugs from the SFP module port or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the SFP module ports and cables from contamination and ambient light.

Before connecting to the SFP module, be sure that you understand the port and cabling guidelines in the Preparing for Installation, page 13.

To connect a fiber-optic cable to an SFP module, follow these steps:

1. Remove the rubber plugs from the module port and fiber-optic cable, and store them for future use.

2. Insert one end of the fiber-optic cable into the SFP module port.

3. Insert the other cable end into a fiber-optic receptacle on a target device.

4. Observe the port status LED:

    —   The LED turns green when the switch and the target device have an established link.

    —   The LED turns amber while the STP discovers the network topology and searches for loops. This process takes about 30 seconds, and then the port LED turns green.

    —   If the LED is off, the target device might not be turned on, there might be a cable problem, or there might be a problem with the adapter installed in the target device. See Troubleshooting, page 53 for solutions to cabling problems.

5. If necessary, reconfigure and restart the switch or the target device.

Connecting to a Dual-Purpose Port

The dual-purpose port is a single port with two interfaces, one for an RJ-45 cable and another for an SFP module. Only one interface can be active at a time. If both interfaces are connected, the SFP module has priority.

Warning: Class 1 laser product. Statement 1008

Caution: Do not remove the rubber plugs from the SFP module port or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the SFP module ports and cables from contamination and ambient light.

Before connecting to the SFP module, be sure that you understand the port and cabling stipulations in the Preparing for Installation, page 13.

To connect to a dual-purpose port, follow these steps:

1. Connect an RJ-45 connector to the 10/100/1000 port, or install an SFP module into the SFP module slot, and connect a cable to the SFP module port.

   For more information about RJ-45 connections, SFP modules, and optical connections, see Connecting to 10/100 and 10/100/1000 Ports, page 35, Installing and Removing SFP Modules, page 35, and Connecting to SFP Modules, page 37.

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

By default, the switch detects whether an RJ-45 connector or SFP module is connected to a dual-purpose port and configures the port accordingly. You can change this setting and configure the port to recognize only an RJ-45 connector or only an SFP module by using the **media typ**e interface configuration command. For more information, see the *Cisco IE 4000 Switch Command Reference*.

Verifying Switch Operation

Before installing the switch in its final location, power on the switch, and verify that the switch powers up in boot fast style. The boot fast sequence allows the switch to boot up in less than 60 seconds.

Where to Go Next

If the default configuration is satisfactory, the switch does not need further configuration. You can use any of these management options to change the default configuration:

■ Start Device Manager, which is in the switch memory, to manage individual and standalone switches. This is an easy-to-use web interface that offers quick configuration and monitoring. You can access Device Manager from anywhere in your network through a web browser. For more information, see the *Software Configuration Guide* and the Device Manager online help.

■ Start the Cisco Network Assistant application, which is described in the *Getting Started with Cisco Network Assistant* guide. Using the GUI, you can configure and monitor a switch cluster or an individual switch.

■ Use the CLI to configure the switch as an individual switch from the console. See the *Command Reference* on Cisco.com for information about using the CLI.

■ Start an SNMP application such as the CiscoView application.

■ Start the Common Industrial Protocol (CIP) management tool. You can manage an entire industrial automation system with the CIP-based tools.

Running Express Setup

When you first set up the switch, you should use Express Setup to enter the initial IP information. This process enables the switch to connect to local routers and the Internet. You can then access the switch through the IP address for additional configuration.

Required Equipment

You need this equipment to set up the switch:

- Computer with Windows 2000/Vista/2003/XP/Window7/Mac.

- A Web browser (IE or Firefox) with JavaScript enabled.

- A straight-through or crossover Category 5 Ethernet cable to connect your computer to the switch port.

    Note: Do not use the RS232 serial console port for express setup.

- A small paper clip to reach to button.

Note: Before running Express Setup, disable any pop-up blockers or proxy settings on your browser and any wireless client running on your computer.

Express Setup Procedure

To run Express Setup:

1. Make sure that nothing is connected to the switch.

2. Ensure theIE4000 is in default factory mode.

    Skip to next step if freshly out of the box.

    a. If not freshly out of the package, use a paper clip to reset the switch for 10 seconds until the SYS LED light turns red, then release the paper clip.

        Switch will automatically reboot once the SYS led goes red.

3. Ensure no data port is connected to the switch.

    Note: During Express Setup, the switch acts as a DHCP server.

    — You can add a serial console cable to monitor the booting sequence. *Do not hit [return key] on console screen*.

    — Ensure the computer connected to switch is configured with DHCP.

4. Web Browser: disable pop-up blockers and proxy settings.

5. Connect power to the switch.

    See the wiring instructions in Grounding the Switch, page 19 and Wiring the DC Power Source, page 22.

6. Power on or reset the IE4000:

Use LEDs to monitor boot progress:

— Sys blinking: bootloader

— Sysl Blank: POST

— Sys solid: exit post, IOS initializing

— Sys and alarm LEDs green: IOS init done

— ~90 – 100 seconds after power on

— EXP blinking: ready for express setup process

7. Insert paper clip into express setup button for 1-2 seconds.

   When released, port Gig1/1 LED starts flashing green.

8. Connect computer to port Gig1/1.

   LED continues to blink.

9. After computer has IP Address (169.254.0.2), point browser to http://169.254.0.1.

10. Leave the **username** blank and enter the default password, **cisco**.

    Note The switch ignores text in the **username** field. The Express Setup window appears.

    Troubleshooting: If the Express Setup window does not appear, make sure that any pop-up blockers or proxy settings on your browser are disabled and that any wireless client is disabled on your computer.

11. Enter all entries in English letters and Arabic numbers.

    In the Network Settings (Required for Static IP):

— **IP Address**: Enter a valid IP address for the switch.

  You can later use the IP address to access the switch through Device Manager.

— Switch **Username** and **Password**: Enter a password. The password can be from 1 to 25 alphanumeric characters, can start with a number, is case sensitive, allows embedded spaces, but does not allow spaces at the beginning or end. In the Confirm Password field, enter the password again.

Note You must change the password from the default password, **cisco**.

— Default Gateway: Enter the IP address of the router.

12. Enter the Control Industrial Protocol (CIP) VLAN settings (optional):

— CIP VLAN: Enter the VLAN on which CIP will be enabled. The CIP VLAN can be the same as the management VLAN, or you can isolate CIP traffic on another VLAN that is already configured on the switch. The default CIP VLAN is VLAN 1. Only one VLAN on a switch can have CIP enabled.

— IP Address: Enter the IP address for the CIP VLAN. If the CIP VLAN is different from the management VLAN, you must specify an IP address for the CIP VLAN. Make sure that the IP address that you assign to the switch is not being used by another device in your network.

— Subnet Mask: Select a mask from the drop-down list.

For more information about the CIP VLAN settings, click Help on the tool-bar.

13. Optional Settings

You can enter the optional information now, or enter it later by using Device Manager. For more information about the Express Setup fields, see the on-line help for the Express Setup window.

Click Submit to save your changes and to complete the initial setup.

For more information about the optional settings, click Help on the tool-bar.

14. After you click Submit, these events occur:

a. The switch is configured and exits Express Setup mode.

b. The browser displays a warning message and tries to connect with the earlier switch IP address.

c. Typically, connectivity between the computer and the switch is lost because the configured switch IP address is in a different subnet from the IP address on the computer.

15. Turn off DC power at the source, disconnect all cables to the switch, and install the switch in your network. See Management Options, page 10 for information about configuring and managing the switch.

16. If you changed the static IP address on your computer in Step 1, change it to the previously configured static IP address.

17. You can now manage the switch by using the Cisco Network Assistant, Device Manager, or both. See Management Options, page 10 for information about configuring and managing the switch.

You can display Device Manager by following these steps:

a. Start a web browser on your computer.

b. Enter the switch **IP address**, **username**, and **password** in the web browser, and press Enter. The Device Manager page appears.

Troubleshooting:

If the Device Manager page does not appear:

— Confirm that the port LED for the switch port connected to your network is green.

— Confirm that the computer that you are using to access the switch has network connectivity by connecting it to a well known web server in your network. If there is no network connection, troubleshoot the network settings on the computer.

— Make sure that the switch IP address in the browser is correct.

— If the switch IP address in the browser is correct, the switch port LED is green, and the computer has network connectivity, continue troubleshooting by reconnecting the computer to the switch. Configure a static IP address on the computer that is in the same subnet as the switch IP address.

— When the LED on the switch port connected to the computer is green, reenter the switch IP address in a web browser to display the Device Manager. When Device Manager appears, you can continue with the switch configuration.

Configuring the Switch with the CLI-Based Setup Program

This appendix provides a command-line interface (CLI)-based setup procedure for a switch.

Before connecting the switch to a power source, review the safety warnings in Warnings, page 13

For installation procedures, see Switch Installation, page 13

Accessing the CLI Through the Console Port

You can enter Cisco IOS commands and parameters through the CLI. Use one of these options to access the CLI:

- RJ-45 Console Port, page 46

- USB Mini-Type B Console Port, page 47

Removing the USB Mini-Type B Console Port Cover

To remove the cover from the USB mini-type B console port:

1. Use a Phillips screwdriver to loosen the captive screw on the USB mini-type B console port cover. See Figure 21 on page 46. Remove the screw and take off the cover.

Figure 21   USB Mini-Type B Console Port Cover

1	USB Mini-Type B Console Port Cover

RJ-45 Console Port

1. Connect the RJ-45-to-DB-9 adapter cable to the 9-pin serial port on the PC. Connect the other end of the cable to the switch console port.

2. Start the terminal-emulation program on the PC or the terminal. The program, frequently a PC application such as HyperTerminal or ProcommPlus, makes communication between the switch and your PC or terminal possible.

Figure 22 **Connecting the Console Cable**

1	RJ-45 console port

3. Configure the baud rate and character format of the PC or terminal to match the console port characteristics:

- 9600 baud

- 8 data bits

- 1 stop bit

- No parity

- None (flow control)

4. Connect power to the switch as described in Connecting to Power, page 17.

5. The PC or terminal displays the bootloader sequence. Press **Enter** to display the setup prompt. Follow the steps in the Completing the Setup Program, page 49.

USB Mini-Type B Console Port

1. If you are connecting the switch USB-mini console port to a Windows-based PC for the first time, install a USB driver. See Installing the Cisco Microsoft Windows XP, 2000, Vista, 7, 8, and 10 USB Device Driver, page 48 for more information.

2. Connect a USB cable to the PC USB port. Connect the other end of the cable to the switch mini-B (5-pin-connector) USB-mini console port.

3. Identify the COM port assigned to the USB-mini console port:

      c. Choose **Start** > **Control Panel** > **Systems**.

      d. Click the **Hardware** tab and choose **Device Manager**. Expand the **Ports** section. The assigned COM port appears in parenthesis at the end of the line with this entry: Cisco USB System Management Console.

4. Start the terminal-emulation program on the PC or the terminal. The program, frequently a PC application such as HyperTerminal or ProcommPlus, makes communication possible between the switch and your PC or terminal.

5. Configure the COM port.

6. Configure the baud rate and character format of the PC or terminal to match the console port characteristics:

- 9600 baud

- 8 data bits

- 1 stop bit

- No parity

- None (flow control)

7. Connect power to the switch as described in Connecting to Power, page 17.

8. The PC or terminal displays the bootloader sequence. Press **Enter** to display the setup prompt. Follow the steps in the Completing the Setup Program, page 49.

Installing the Cisco Microsoft Windows XP, 2000, Vista, 7, 8, and 10 USB Device Driver

A USB device driver must be installed the first time a Microsoft Windows-based PC is connected to the USB console port on the switch. Use this procedure to install the USB driver on Windows XP, Windows 2000, Windows Vista, Windows 7, Windows 8, and Windows 10.

1. Obtain the file Cisco_usbconsole_driver_3_1.zip from the Cisco.com website https://software.cisco.com/download/release.html?mdfid=282979369&softwareid=282855122&release=3.1

   The file details are as follows:

   — Description: Cisco_usbconsole_driver_3_1.zip

   — Release: 3.1

   — Release Date: 27/Nov/2014

   — File Name: Cisco_usbconsole_driver_3_1.zip

   — Size: 14.35 MB (15045453 bytes)

   — MD5 Checksum: eff2e955edcdc70209e6f9c8f6bd59cd

2. Unzip the file and install the corresponding exe file.

3. Navigate to the **Device Manager** window by performing a search in WIndows for **Device Manager** and opening it.

4. Connect the USB cable from the Windows PC to the Cisco switch.

5. From the **Device Manager** page, expand **Ports (COM & LPT)**. Select **USB Serial Port**. Right-click and select **Update Driver Software ...**

6. In the Update Driver Software window, select **Browse my computer for driver software**. Then choose **Let me pick from a list of device drivers on my computer** and click **Next**.

7. Enable **Show compatible hardware** and choose **Cisco Serial** as the model. Click **Next**.

    After the update is completed, Windows displays **Windows has successfully updated your driver software**.

8. Click **Close**.

Uninstalling the Cisco Microsoft Windows XP, 2000, Vista, 7, 8, and 10 USB Driver

Note: Disconnect the switch console terminal before uninstalling the driver.

1. Run setup.exe for Windows 32-bit or setup(x64).exe for Windows-64bit.

2. Click **Next**.

3. When the InstallShield Wizard for Cisco Virtual Com appears, click **Next**.

4. When the Program Maintenance window appears, select the **Remove** radio button.

5. Click **Next**.

6. When the Remove the Program window appears, click **Remove**.

    If a User Account Control warning appears, click **Allow - I trust this program to proceed**.

7. When the InstallShield Wizard Completed window appears, click **Finish**.

Entering the Initial Configuration Information

To set up the switch, you need to complete the setup program, which runs automatically after the switch is powered on. You must assign an IP address and other configuration information necessary for the switch to communicate with the local routers and the Internet. This information is also required if you plan to use Device Manager or Cisco Network Assistant to configure and manage the switch.

IP Settings

You need this information from your network administrator before you complete the setup program:

- Switch IP address

- Subnet mask (IP netmask)

- Default gateway (router)

- Enable secret password

- Enable password

- Telnet password

Completing the Setup Program

To complete the setup program and to create an initial configuration for the switch:

1. Enter **Yes** at these two prompts:

```
Would you like to enter the initial configuration dialog? [yes/no]: yes
```

Entering the Initial Configuration Information

```
At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.

Basic management setup configures only enough connectivity
for management of the system, extended setup will ask you
to configure each interface on the system.

Would you like to enter basic management setup? [yes/no]: yes
```

2. Enter a hostname for the switch, and press **Return**.

On a command switch, the hostname is limited to 28 characters; on a member switch, it is limited to 31 characters. Do not use -*n*, where *n* is a number, as the last character in a hostname for any switch.

```
Enter host name [Switch]: host_name
```

3. Enter an enable secret password, and press **Return**.

The password can be from 1 to 25 alphanumeric characters, can start with a number, is case sensitive, allows spaces, but ignores leading spaces. The secret password is encrypted, and the enable password is in plain text.

```
Enter enable secret: secret_password
```

4. Enter an enable password, and press **Return**.

```
Enter enable password: enable_password
```

5. Enter a virtual terminal (Telnet) password, and press **Return**.

The password can be from 1 to 25 alphanumeric characters, is case sensitive, allows spaces, but ignores leading spaces.

```
Enter virtual terminal password: terminal-password
```

6. (Optional) Configure Simple Network Management Protocol (SNMP) by responding to the prompts. You can also configure SNMP later through the CLI, Device Manager, or the Cisco Network Assistant application. To configure SNMP later, enter **no**.

```
Configure SNMP Network Management? [no]: no
```

7. Enter the interface name (physical interface or VLAN name) of the interface that connects to the management network, and press **Return**. For this release, always use **vlan1** as that interface.

```
Enter interface name used to connect to the
management network from the above interface summary: vlan1
```

8. Configure the interface by entering the switch IP address and subnet mask and pressing **Return**. The IP address and subnet masks shown here are examples.

```
Configuring interface vlan1:
Configure IP on this interface? [yes]: yes
IP address for this interface: 10.4.120.106
Subnet mask for this interface [255.0.0.0]: 255.0.0.0
```

9. **Enter Y to configure the switch as the cluster command switch. Enter N to configure it as a member switch or as a standalone switch.**

If you enter **N**, the switch appears as a candidate switch in the Cisco Network Assistant GUI. You can configure the switch as a command switch later through the CLI, Device Manager, or the Cisco Network Assistant application. To configure it later, enter **no**.

```
Would you like to enable as a cluster command switch? [yes/no]: no
```

You have now completed the initial configuration of the switch, and the switch displays its initial configuration script:

```
The following configuration command script was created:
```

```
hostname Switch
enable secret 5 $1$ZQRe$DPulYXyQLm77v/a4Bmu6Y.
enable password cisco
line vty 0 15
password cisco
no snmp-server
!
!
interface Vlan1
no shutdown
ip address 10.4.120.106 255.0.0.0
!
interface FastEthernet1/1
!
interface FastEthernet1/2
!
interface FastEthernet1/3
!
...(output abbreviated)
!
interface GigabitEthernet1/1
!
interface GigabitEthernet1/2
!
end
```

10. These choices appear:

```
[0] Go to the IOS command prompt without saving this config.

[1] Return back to the setup without saving this config.

[2] Save this configuration to nvram and exit.

If you want to save the configuration and use it the next time the switch reboots, save it in NVRAM by
selecting option 2.

Enter your selection [2]:2
```

Make your selection, and press **Return**.

After you complete the setup program, the switch can run the default configuration that you created. If you want to change this configuration or want to perform other management tasks, use one of these tools:

- Command-line interface (CLI)

- Cisco Network Assistant (for one or more switches)

To use the CLI, enter commands at the *Switch>* prompt through the console port by using a terminal emulation program or through the network by using Telnet. For configuration information, see the switch *Cisco IE 4000 Switch Software Configuration Guide*.

To use the Cisco Network Assistant, see the *Getting Started with Cisco Network Assistant* guide on Cisco.com.

Entering the Initial Configuration Information

Troubleshooting

This chapter provides these topics for troubleshooting problems:

Diagnosing Problems

The switch LEDs provide troubleshooting information about the switch. They show boot fast failures, port-connectivity problems, and overall switch performance. You can also get statistics from Device Manager, the CLI, or an SNMP workstation. See the *Cisco IE 4000 Switch Software Configuration Guide*, or the documentation that came with your SNMP application for details.

Switch Boot Fast

See Verifying Switch Operation, page 38 for information on boot fast.

Note: Boot fast failures are usually fatal. Contact your Cisco TAC representative if your switch does not successfully complete boot fast.

Note: You can disable the boot fast and run POST by using the Cisco IOS CLI, see the *Cisco IE 4000 Switch Software Configuration Guide* for more information.

Switch LEDs

Look at the port LEDs information when troubleshooting the switch. See LEDs, page 6 for a description of the LED colors and their meanings.

Switch Connections

Bad or Damaged Cable

Always examine the cable for marginal damage or failure. A cable might be just good enough to connect at the physical layer, but it could corrupt packets as a result of subtle damage to the wiring or connectors. You can identify this problem because the port has many packet errors or it constantly flaps (loses and regains link).

- Exchange the copper or fiber-optic cable with a known good cable.

- Look for broken or missing pins on cable connectors.

- Rule out any bad patch panel connections or media convertors between the source and the destination. If possible, bypass the patch panel, or eliminate media convertors (fiber-optic-to-copper).

- Try the cable in another port to see if the problem follows the cable.

Ethernet and Fiber-Optic Cables

Make sure that you have the correct cable:

- For Ethernet, use Category 3 copper cable for 10 Mb/s UTP connections. Use either Category 5, Category 5e, or Category 6 UTP for 10/100, 10/100/1000 Mb/s, and PoE connections.

- Verify that you have the correct fiber-optic cable for the distance and port type. Make sure that the connected device ports match and use the same type encoding, optical frequency, and fiber type.

- Determine if a copper crossover cable was used when a straight-through was required or the reverse. Enable auto-MDIX on the switch, or replace the cable.

Link Status

Verify that both sides have a link. A broken wire or a shutdown port can cause one side to show a link even though the other side does not have a link.

A port LED that is on does not guarantee that the cable is functional. It might have encountered physical stress, causing it to function at a marginal level. If the port LED does not turn on:

- Connect the cable from the switch to a known good device.

- Make sure that both ends of the cable are connected to the correct ports.

- Verify that both devices have power.

- Verify that you are using the correct cable type. See Cables and Adapters, page 65 for information.

- Look for loose connections. Sometimes a cable appears to be seated but is not. Disconnect the cable, and then reconnect it.

10/100/1000 Port Connections

If a port appears to malfunction:

- Verify the status of all ports by checking the LEDs. For more information, see Switch LEDs, page 53.

- Use the **show interfaces** privileged EXEC command to see if the port is error-disabled, disabled, or shut down. Reenable the port if necessary.

- Verify the cable type. See Cable and Connectors, page 63.

SFP Module

Use only Cisco SFP modules. Each Cisco module has an internal serial EEPROM that is encoded with security information. This encoding verifies that the module meets the requirements for the switch.

- Inspect the SFP module. Exchange the suspect module with a known good module.

- Verify that the module is supported on this platform. (The switch release notes on Cisco.com list the SFP modules that the switch supports.)

- Use the **show interfaces** privileged EXEC command to see if the port or module is error-disabled, disabled, or shutdown. Reenable the port if needed.

- Make sure that all fiber-optic connections are clean and securely connected.

Interface Settings

Verify that the interface is not disabled or powered off. If an interface is manually shut down on either side of the link, it does not come up until you reenable the interface. Use the **show interfaces** privileged EXEC command to see if the interface is error-disabled, disabled, or shut down on either side of the connection. If needed, reenable the interface.

Ping End Device

Ping from the directly connected switch first, and then work your way back port by port, interface by interface, trunk by trunk, until you find the source of the connectivity issue. Make sure that each switch can identify the end device MAC address in its Content-Addressable Memory (CAM) table.

Spanning Tree Loops

STP loops can cause serious performance issues that look like port or interface problems.

A unidirectional link can cause loops. It occurs when the traffic sent by the switch is received by the neighbor, but the traffic from the neighbor is not received by the switch. A broken cable, other cabling problems, or a port issue can cause this one-way communication.

You can enable UniDirectional Link Detection (UDLD) on the switch to help identify unidirectional link problems. For information about enabling UDLD on the switch, see the "Understanding UDLD" section in the switch software configuration guide on Cisco.com.

Switch Performance

Speed, Duplex, and Autonegotiation

Port statistics that show a large amount of alignment errors, frame check sequence (FCS), or late-collisions errors, might mean a speed or duplex mismatch.

A common issue occurs when duplex and speed settings are mismatched between two switches, between a switch and a router, or between the switch and a workstation or server. Mismatches can happen when manually setting the speed and duplex or from autonegotiation issues between the two devices.

To maximize switch performance and to ensure a link, follow one of these guidelines when changing the duplex or the speed settings.

- Let both ports autonegotiate both speed and duplex.

- Manually set the speed and duplex parameters for the interfaces on both ends of the connection.

- If a remote device does not autonegotiate, use the same duplex settings on the two ports. The speed parameter adjusts itself even if the connected port does not autonegotiate.

Autonegotiation and Network Interface Cards

Problems sometimes occur between the switch and third-party network interface cards (NICs). By default, the switch ports and interfaces autonegotiate. Laptops or other devices are commonly set to autonegotiate, yet sometimes issues occur.

To troubleshoot autonegotiation problems, try manually setting both sides of the connection. If this does not solve the problem, there could be a problem with the firmware or software on the NIC. You can resolve this by upgrading the NIC driver to the latest version.

Cabling Distance

If the port statistics show excessive FCS, late-collision, or alignment errors, verify that the cable distance from the switch to the connected device meets the recommended guidelines. See Cables and Adapters, page 65.

Resetting the Switch

These are reasons why you might want to reset the switch to the factory default settings:

■ You installed the switch in your network and cannot connect to it because you assigned the wrong IP address.

■ You want to reset the password on the switch.

Note: Resetting the switch deletes the configuration and reboots the switch.

Caution: If you press the Express Setup button when you power on, the automatic boot sequence stops, and the switch enters bootloader mode.

To reset the switch:

1. Press and hold the Express Setup button (recessed behind a small hole in the faceplate) for about 10 seconds with a paper clip or similar object. The switch reboots. The system LED turns green after the switch completes rebooting.

2. Press the Express Setup button again for 3 seconds. A switch 10/100 Ethernet port blinks green.

The switch now behaves like an unconfigured switch. You can configure the switch by using the CLI setup procedure described in Configuring the Switch with the CLI-Based Setup Program, page 45

How to Recover Passwords

Password recovery is a feature that a system administrator can enable or disable. If password recovery is disabled, the only way to recover from a lost or forgotten password is to clear the switch configuration entirely. For this procedure, see How to Recover Passwords, page 56.

The *Cisco IE 4000 Switch Software Configuration Guide* provides details about enabling and disabling the password recovery feature and the procedure for recovering passwords.

Finding the Switch Serial Number

If you contact Cisco Technical Assistance, you need to know the serial number of your switch. The serial number is on the compliance label on the right-hand side of the switch. See Figure 23 on page 57. You can also use the **show version** privileged EXEC command to obtain the switch serial number.

Finding the Switch Serial Number

Figure 23   Serial Number Location for the Cisco IE 4000 Switches

| 1 | Compliance Label |

Finding the Switch Serial Number

Cable and Connectors
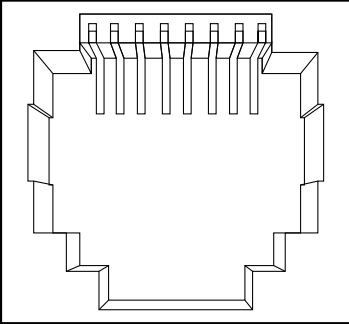
Connector Specifications

10/100/1000 Ports

The 10/100/1000 Ethernet ports on the switches use RJ-45 connectors. Figure 24 10/100 Port Pinouts, page 63 shows the pinouts.

Figure 24   10/100 Port Pinouts

Pin	Label	1 2 3 4 5 6 7 8
1	RD+	
2	RD-	
3	TD+	
4	NC	
5	NC	
6	TD-	
7	NC	
8	NC	

Note: For the three models of IE 4000 switch that support PoE, connector pins 4 and 5 supply +48 VDC and pins 7 and 8 are the DC voltage return lines.

SFP Module Connectors

Figure 25 Fiber-Optic SFP Module LC Connector, page 64 shows a MT-RJ style connector that is used with the SFP Module slots. It is a fiber-optic cable connector.

Connector Specifications

Figure 25   Fiber-Optic SFP Module LC Connector
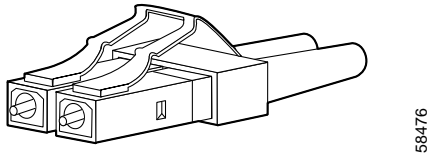
Warning: Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051

Dual-Purpose Ports

The 10/100/1000 Ethernet ports on the dual-purpose ports use RJ-45 connectors. Figure 2610/100/1000 Port Pinouts, page 64 shows the pinouts.

Figure 26   10/100/1000 Port Pinouts

Pin	Label
1	TP0+
2	TP0-
3	TP1+
4	TP2+
5	TP2-
6	TP1-
7	TP3+
8	TP3-

Console Port

The switch has two console ports: a USB 5-pin mini-Type B port on the front panel (see Figure 27 on page 64) and an RJ-45 console port on the rear panel.

Figure 27   USB Mini-Type B Port
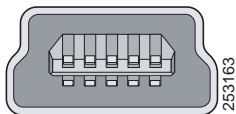
The USB console port uses a USB Type A to 5-pin mini-Type B cable, shown in Figure 28USB Type A-to-USB 5-Pin Mini-Type B Cable, page 65. The USB Type A-to-USB mini-Type B cable is not supplied. You can order an accessory kit (part number 800-33434) that contains this cable.

Note: When running Linux, access the USB Console using **Minicom** instead of **Screen**.

Cables and Adapters

Figure 28   USB Type A-to-USB 5-Pin Mini-Type B Cable
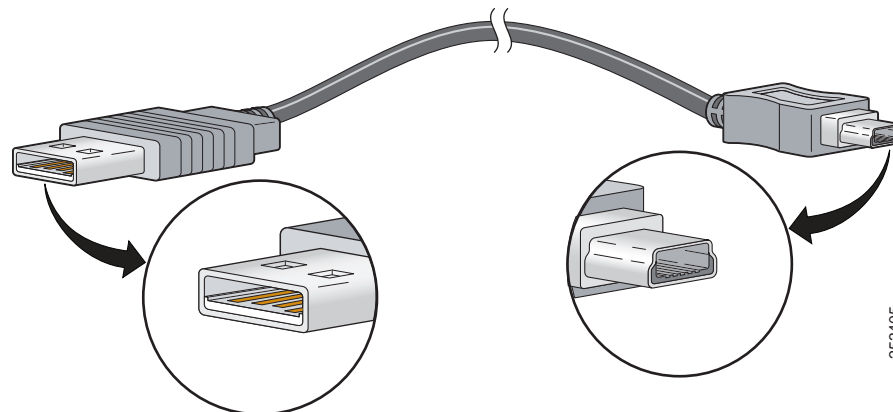
The RJ-45 console port uses an 8-pin RJ-45 connector The supplied RJ-45-to-DB-9 adapter cable is used to connect the console port of the switch to a console PC. You need to provide a RJ-45-to-DB-25 female DTE adapter if you want to connect the switch console port to a terminal. You can order a kit (part number ACS-DSBUASYN=) containing that adapter.

Alarm Port

The labels for the alarm connector pin-outs are on the switch panel and are displayed below.

Label	Connection
NO	Alarm Output Normally Open (NO) connection
COM	Alarm Output Common connection
NC	Alarm Output Normally Closed (NC) connection
IN2	Alarm Input 2
REF	Alarm Input Reference Ground connection
IN1	Alarm Input 1

Cables and Adapters

SFP Module Cables

Each port must match the wave-length specifications on each end of the cable, and for reliable communications, the cable must not exceed the allowable length.

Notes

- The maximum operating temperature of the switch varies depending on the type of SFP module that you use.

- Modal bandwidth applies only to multimode fiber.

- A mode-field diameter/cladding diameter = 9 micrometers/125 micrometers.

- A mode-conditioning patch cord is required when using 1000BASE-LX/LH SFP modules, MMF, and a short link distance . Using an ordinary patch cord can cause transceiver saturation, resulting in an elevated bit error rate (BER). When using the LX/LH SFP module with 62.5-micron diameter MMF, you must also install a mode-conditioning patch cord between the SFP module and the MMF cable on both the sending and receiving ends of the link. The mode-conditioning patch cord is required for link distances greater than 984 feet (300 m).

- 1000BASE-ZX SFP modules can send data up to 62 miles (100 km) by using dispersion-shifted SMF or low-attenuation SMF. The distance depends on the fiber quality, the number of splices, and the connectors.

- When the fiber-optic cable span is less than 15.43 miles (25 km), insert a 5-decibel (dB) or 10-dB inline optical attenuator between the fiber-optic cable plant and the receiving port on the 1000BASE-ZX SFP module.

Table 6   Commercial SFPs—Fiber-Optic SFP Module Port Cabling Specifications

Type of SFP Module	Model	Wavelength (nanometers)	Fiber Type	Core Size/Cladding Size (micron)	Modal Bandwidth (MHz/km)	Cable Distance
1000BASE-BX10-D	GLC-BX-D	1490 TX 1310 RX	SMF	G.652	—	6.2 miles (10 km)
1000BASE-BX10-U	GLC-BX-U	1490 TX 1310 RX	SMF	G.652	—	6.2 miles (10 km)
1000BASE-LX/LH	GLC-LH-SM	1310	MMF	62.5/125 50/125 50/125	500 400 500	1804 feet (550 m) 1804 feet (550 m) 1804 feet (550 m)
			SMF	G.652	—	6.2 miles (10 km)
1000BASE-SX	GLC-SX-MM	850	MMF	62.5/125 62.5/125 50/125 50/125	160 200 400 500	722 feet (220 m) 902 feet (275 m) 1640 feet (500 m) 1804 feet (550 m)
1000BASE-SX	GLC-SX-MMD	850	MMF	62.5/125	160	722 feet (220 m)
				62.5/125	200	902 feet (275 m)
				50/125	400	1640 feet (500 m)
				50/125	500	1804 feet (550 m)
100BASE-BX10-D	GLC-FE-100BX-D	1310 TX 1550 RX	SMF	G.652	—	6.2 miles (10 km)
100BASE-EX	GLC-FE-100EX	1310	SMF	G.652	—	24.9 miles (40 km)
100BASE-FX SFP	GLC-FE-100FX	1310	MMF	50/125 62.5/125	500	6562 feet (2 km)
100BASE-LX10	GLC-FE-100LX	1310	SMF	G.652	—	6.2 miles (10 km)

Table 6   Commercial SFPs—Fiber-Optic SFP Module Port Cabling Specifications (continued)

Type of SFP Module	Model	Wavelength (nanometers)	Fiber Type	Core Size/Cladding Size (micron)	Modal Bandwidth (MHz/km)	Cable Distance
100BASE-ZX	GLC-FE-100ZX	1550	SMF	G.652	—	49.7 miles (80 km)
100BASE-ZX	GLC-LH-SMD	1310	MMF	62.5	500	1804 feet (550 m)
				50.0	400	1804 feet (550 m)
				50.0	500	1804 feet (550 m)
			SMF	G.652	—	6.2 miles (10 km)
100BASE-ZX	SFP-GE-Z	1550	SMF	9/10	—	43.5 miles (70 km)
			SMF	8		62 miles (100 km)

Table 7   Industrial & Rugged SFPs—Fiber-Optic SFP Module Port Cabling Specifications

Type of SFP Module	Model	Wavelength (nanometers)	Fiber Type	Core Size/Cladding Size (micron)	Modal Bandwidth (MHz/km)	Cable Distance
1000BASE-LX/LH	GLC-LX-SM-RGD	1310	MMF	62.5	500	1804 feet (550 m)
				50.0	400	1804 feet (550 m)
				50.0	500	1804 feet (550 m)
			SMF	G.652	—	6.2 miles (10 km)
1000BASE-SX	GLC-SX-MM-RGD	850	MMF	62.5/125	160	722 feet (220 m)
				62.5/125	200	902 feet (275 m)
				50/125	400	1640 feet (500 m)
				50/125	500	1804 feet (550 m)
1000BASE-ZX	GLC-ZX-SM-RGD	1550	SMF	G.652	—	43.4 to 62 miles (70 to 100 km)
100BASE-FX	GLC-FE-100FX-RGD	1310	MMF	62.5/125	160	1.24 miles (2 km)
				62.5/125	200	
				50/125	400	
				50/125	500	
100BASE-LX10	GLC-FE-100LX-RGD	1310	SMF	G.652	—	6.2 miles (10 km)

Table 8   Extended Temperature SFPs—Fiber-Optic SFP Module Port Cabling Specifications

Type of SFP Module	Model	Wavelength (nanometers)	Fiber Type	Core Size/Cladding Size (micron)	Modal Bandwidth (MHz/km)	Cable Distance
100BASE-BX10-U	GLC-FE-100BX-U	1310 TX	SMF	G.652	—	6.2 miles (10 km)
100BASE-EX	GLC-EX-SMD	1310	SMF	G.652	—	24.9 miles (40 km)
100BASE-LX/LH	SFP-GE-L	1300	MMF or SMF	62.2	500	1804 feet (550 m) 1804 feet (550 m) 1804 feet (550 m)
				50	400	
				50	500	
				9/10	—	6.2 miles (10 km)

Table 8   Extended Temperature SFPs—Fiber-Optic SFP Module Port Cabling Specifications (continued)

| Type of SFP Module	Model	Wavelength (nanometers)	Fiber Type	Core Size/Cladding Size (micron)	Modal Bandwidth (MHz/km)	Cable Distance
100BASE-SX	SFP-GE-S	850	MMF	62.5 62.5 50.0 50.0	160 200 400 500	722 feet (220 m) 902 feet (275 m) 1640 feet (500 m) 1804 feet (550 m)
100BASE-ZX	GLC- SX-SMD	850	MMF	62.5 62.5 50.0 50.0 50.0	160 200 400 500 2000	722 feet (220 m) 902 feet (275 m) 1640 feet (500 m) 1804 feet (550 m) 3281 feet (1 km)
100BASE-ZX	GLC-LH-SMD	1310	MMF SMF	62.5 50.0 50.0 G.652	500 400 500 —	1804 feet (550 m) 1804 feet (550 m) 1804 feet (550 m) 6.2 miles (10 km)
100BASE-ZX	SFP-GE-Z	1550	SMF SMF	9/10 8	— 	43.5 miles (70 km) 62 miles (100 km)

Cable Pinouts

Figure 29   Two Twisted-Pair Straight-Through Cable Schematic for 10/100 Ports
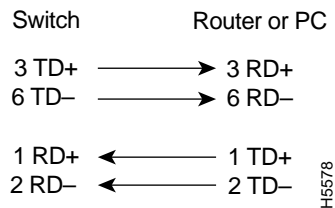
Figure 30   Two Twisted-Pair Crossover Cable Schematic for 10/100 Ports

Cables and Adapters
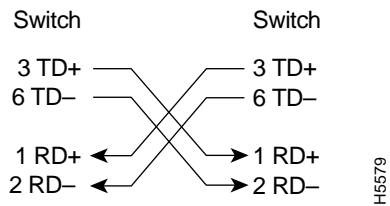
Figure 31   Four Twisted-Pair Straight-Through Cable Schematic for 1000BASE-T Ports

Switch   Router or PC

1 TP0+ ←——————→ 1 TP0+
2 TP0- ←——————→ 2 TP0-
3 TP1+ ←——————→ 3 TP1+
6 TP1- ←——————→ 6 TP1-

4 TP2+ ←——————→ 4 TP2+
5 TP2- ←——————→ 5 TP2-
7 TP3+ ←——————→ 7 TP3+
8 TP3- ←——————→ 8 TP3-

65271
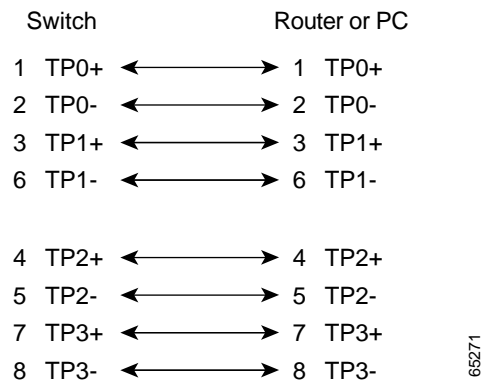
Figure 32   Four Twisted-Pair Crossover Cable Schematics for 1000BASE-T Ports

Switch   Switch

1 TP0+ ←⟍   ⟋→ 1 TP0+
2 TP0- ← ⟍   ⟋   → 2 TP0-
3 TP1+ ←   ⟋⟍   → 3 TP1+
6 TP1- ←⟋   ⟍→ 6 TP1-

4 TP2+ ←——————→ 4 TP2+
5 TP2- ←——————→ 5 TP2-
7 TP3+ ←——————→ 7 TP3+
8 TP3- ←——————→ 8 TP3-

65274
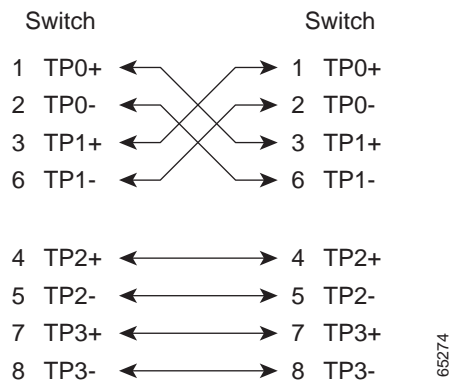
To identify a crossover cable, hold the cable ends side-by-side, with the tab at the back. The wire connected to pin 1 on the left end should be the same color as the wire connected to pin 3 on the right end. The wire connected to pin 2 on the left end should be the same color as the wire connected to pin 6 on the right end.

Figure 33   Identifying a Crossover Cable

Pin 1

Pin 2

Pin 3

Pin 6

273807
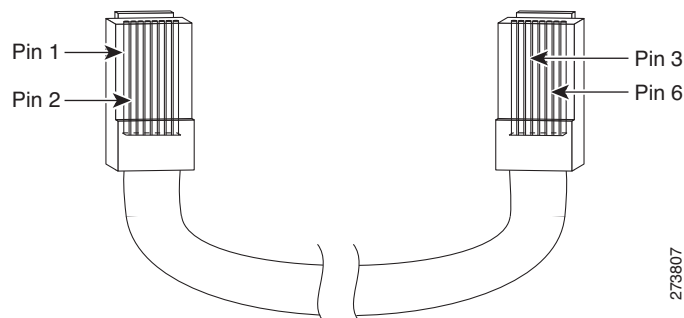
Console Port Adapter Pinouts

The console port uses an 8-pin RJ-45 connector. If you did not order a console cable, you need to provide an RJ-45-to-DB-9 adapter cable to connect the switch console port to a PC console port. You need to provide an RJ-45-to-DB-25 female DTE adapter if you want to connect the switch console port to a terminal. You can order an adapter (part number ACS-DSBUASYN=).

Switch Console Port (DTE)	RJ-45-to-DB-9 Terminal Adapter	Console Device
Signal	DB-9 Pin	Signal
RTS	8	CTS
DTR	6	DSR
TxD	2	RxD
GND	5	GND
RxD	3	TxD
DSR	4	DTR
CTS	7	RTS

Note: The RJ-45-to-DB-25 female DTE adapter is not supplied with the switch. You can order this adapter from Cisco (part number ACS-DSBUASYN=).

Switch Console Port (DTE)	RJ-45-to-DB-25 Adapter	Console Device
Signal	DB-25 Pin	Signal
RTS	5	CTS
DTR	6	DSR
TxD	3	RxD
GND	7	GND
RxD	2	TxD
DSR	20	DTR
CTS	4	RTS

Technical Specifications

The most current technical specifications for the IE 4000 series switches can be found in the **IE 4000 Data Sheet**. Additional specs and detail not in the Data Sheet, are found in this section.

Enclosure Specifications

Table 3 on page 59 lists the enclosure specifications for the Industrial Ethernet 4000 series switches.

Table 3   Enclosure specifications for the Cisco IE 4000 Switches

	Industrial Automation and Hazardous Locations	Substation	Traffic Signal
Enclosure types	Sealed enclosures For example: NEMA4, NEMA4X, NEMA12, NEMA13, IP54, and IP66.	Vented enclosures For example: NEMA1, IP20, and IP21.	Fan or blower-equipped enclosures For example: NEMA TS-2. **Note:** The minimum airflow is 150 lfm[1].

1. lfm = linear feet per minute.

Note: The safety certifications apply only to ambient temperatures under 158 F (70 C). For IE-4000-8GT8GP4G maximum recommend ambient is 131 F (55 C) at max POE budget of 240W. However, the Cisco IE 4000 switch can function in the substation and traffic signal installations under the environmental conditions shown in Table 3 on page 59.

Alarm Ratings

The alarm ratings for the Cisco IE 4000 switches are below.

Table 4   Cisco IE 4000 Alarm Ratings

Alarm Ratings	Specification
Alarm input electrical specification	No power required—open or closed state detected.
Alarm output electrical specification	1.0 A @ 24 VDC or 0.5 A @ 48 VDC

Alarm Ratings

Hazardous Location Installation Information

This appendix provides hazardous location installation information for the Cisco IE 4000 switches.

Hazardous Area Installation Warnings

Warning: **Exposure to some chemicals could degrade the sealing properties of materials used in the sealed relay device. Statement 381**

Warning: **Failure to securely tighten the captive screws can result in an electrical arc if the connector is accidentally removed. Statement 397**

Warning: **When you connect or disconnect the power and/or alarm connector with power applied, an electrical arc can occur. This could cause an explosion in hazardous area installations. Be sure that all power is removed from the switch and any other circuits. Be sure that power cannot be accidentally turned on or verify that the area is nonhazardous before proceeding. Statement 1058**

Warning: **In switch installations in a hazardous location, the DC power source could be located away from the vicinity of the switch. Before performing any of the following procedures, locate the DC circuit to ensure that the power is removed and cannot be turned on accidentally, or verify that the area is nonhazardous before proceeding. Statement 1059**

Warning: **This equipment is supplied as "open type" equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The interior of the enclosure must be accessible only by the use of a tool.**

The enclosure must meet IP 54 or NEMA type 4 minimum enclosure rating standards. Statement 1063

Warning: **When used in a Class I, Division 2, hazardous location, this equipment must be mounted in a suitable enclosure with proper wiring method, for all power, input and output wiring, that complies with the governing electrical codes and in accordance with the authority having jurisdiction over Class I, Division 2 installations. Statement 1066**

Warning: **Use twisted-pair supply wires suitable for 86°F (30°C) above surrounding ambient temperature outside the enclosure. Statement 1067**

Warning: **This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC publication 60664-1), and at altitudes up to 2000 meters without derating. Statement 1068**

Warning: **Do not connect or disconnect cables to the ports while power is applied to the switch or any device on the network because an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed from the switch and cannot be accidentally be turned on, or verify that the area is nonhazardous before proceeding. Statement 1070**

Warning: **If you connect or disconnect the console cable with power applied to the switch or any device on the network, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding. Statement 1080**

Warning: **Explosion Hazard—Do not connect or disconnect wiring while the field-side power is on; an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or that the area is nonhazardous before proceeding. Statement 1081**

Warning: **Explosion Hazard—The area must be known to be nonhazardous before installing, servicing, or replacing the unit. Statement 1082**

Warning: Explosion Hazard—Substitution of components may impair suitability for Class I, Division 2/Zone 2. Statement 1083

Warning: Do not insert and remove SFP modules while power is on; an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding. Statement 1087

Caution: This equipment is only suitable for use in Class I, Division 2, Groups A, B, C, D, or nonhazardous locations.

North American Hazardous Location Approval

The following information applies when operating this equipment in hazardous locations:

English: Products marked "Class I, Div 2, GP A, B, C, D" are suitable for use in Class I Division 2 Groups A, B, C, D, Hazardous Locations and nonhazardous locations only. Each product is supplied with markings on the rating nameplate indicating the hazardous location temperature code. When combining products within a system, the most adverse temperature code (lowest "T" number) may be used to help determine the overall temperature code of the system. Combinations of equipment in your system are subject to investigation by the local Authority Having Jurisdiction at the time of installation.

Français: Informations sur l'utilisation de cet équipement en environnements dangereux:

Les produits marqués "Class I, Div 2, GP A, B, C, D" ne conviennent qu'à une utilisation en environnements de Classe I Division 2 Groupes A, B, C, D dangereux et non dangereux. Chaque produit est livré avec des marquages sur sa plaque d'identification qui indiquent le code de température pour les environnements dangereux. Lorsque plusieurs produits sont combinés dans un système, le code de température le plus défavorable (code de température le plus faible) peut être utilisé pour déterminer le code de température global du système. Les combinaisons d'équipements dans le système sont sujettes à inspection par les autorités locales qualifiées au moment de l'installation.

EMC Environmental Conditions for Products Installed in the European Union

This section applies to products to be installed in the European Union.

The equipment is intended to operate under the following environmental conditions with respect to EMC:

- A separate defined location under the user's control.

- Earthing and bonding shall meet the requirements of ETS 300 253 or CCITT K27.

- AC-power distribution shall be one of the following types, where applicable: TN-S and TN-C as defined in IEC 364-3.

In addition, if equipment is operated in a domestic environment, interference could occur.

Hazardous Locations Standards

Hazardous Locations Standards

Hazardous location standards for the Cisco IE 4000 switches:

Environmental Ranges	
Operating temperature	–29 to 165°F (–34 to 74°C)
Storage temperature	–40 to 185°F (–40 to 85°C)
Operating altitude	Up to 13,000 ft (3962 m)
Storage altitude	Up to 40,000 ft (12,192 m)
Thermal spacing	3.54 in. (90 mm) exposed side 4.13 in. (105 mm) top and bottom
Power Requirements	
AC input voltages	Range: 85–264 VAC at 47–63 Hz Nominal: 115 VAC at 60 Hz or 230 VAC at 50 Hz
Maximum AC power input current	0.75 A @ 230 VAC and 50 Hz or 1.3 A @ 115 VAC and 60 Hz
DC input voltages	Range: 88–375 VDC Nominal: 125 VDC or 250 VDC
Maximum DC input current	0.75 A at 220 VDC or 1.25 A at 150 VDC
Physical Dimensions	
Weight	1.4 lb (0.63 kg)
Dimensions (W x D x H)	2 x 4.62 x 5.81 in. (50.8 x 117.5 x 147.6 mm) **Note:** Width includes the cosmetic end-caps. Height does not include the panel mount brackets. Depth is the distance from the rail.

The following standards were used for the hazardous locations approvals and certifications:	Les normes suivantes ont été appliquées pour les approbations et les certifications dans le cadre d'environnements dangereux :
ANSI/ASA 12.12.01-2013	ANSI/ASA 12.12.01-2013
CAN/CSA C22.2 No. 60079-0: 11	CAN/CSA C22.2 n° 60079-0 : 11
CAN/CSA C22.2 No. 60079-15:12	CAN/CSA C22.2 n° 60079-15 :12
CSA C22.2 No. 213-M1987	CSA C22.2 n° 213-M1987
EN 60079-0:2012+A11:2013	EN 60079-0:2012+A11:2013
EN 60079-15:2010	EN 60079-15:2010
IEC 60079-0 6th Edition	IEC 60079-0, 6e édition
IEC 60079-15 4th Edition	IEC 60079-15, 4e édition
UL 60079-0, 5th Ed, 2009-10-21	UL 60079-0, 5e éd., 21-10-2009
UL 60079-15, 3rd Ed, 2009-7-17	UL 60079-15, 3e éd., 17-07-2009

Hazardous Locations Standards