Cisco IE3500, IE3505 Rugged Series Switches Hardware Installation Guide

First Published: 2025-08-06

C O N T E N T S

Preface

Preface

Audience

This guide is for the qualified person responsible for installing Cisco switches. The reader should be familiar with Ethernet and local area networking.

Purpose

This guide provides an overview of the hardware features of the Cisco IE3500, IE3505 Rugged Series Switchs. It includes:

- A description of the physical and performance characteristics of each switch.

- Step-by-step instructions for installation.

- Troubleshooting guidance to address common issues.

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   **Statement 1071**—Warning Definition

IMPORTANT SAFETY INSTRUCTIONS

Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Read the installation instructions before using, installing, or connecting the system to the power source. Use the statement number at the beginning of each warning statement to locate its translation in the translated safety warnings for this device.

SAVE THESE INSTRUCTIONS

The safety warnings for this product are translated into several languages in the *Regulatory Compliance and Safety Information for the Cisco IE3500/IE3505 switch Switch* that ships with the product. The EMC regulatory statements are also included in that guide.

Bias-free Doc Disclaimer

The documentation set for this product strives to use bias-free language. For purposes of this documentation set, bias-free is defined as language that does not imply discrimination based on age, disability, gender, racial identity, ethnic identity, sexual orientation, socioeconomic status, and intersectionality. Exceptions may be present in the documentation due to language that is hardcoded in the user interfaces of the product software, language used based on standards documentation, or language that is used by a referenced third-party product.

Cisco IE3500, IE3505 Rugged Series Switches

Product Overview

Cisco IE3500, IE3505 Rugged Series Switches are ruggedized Ethernet switching platforms that provide superior high-bandwidth, secure switching and industry-leading redundancy features for industrial environments, all built on the proven Cisco IOS XE Software.

These DIN-rail Industrial Ethernet switches are designed for deployments requiring hardened products, such as factory automation, smart cities, energy and process control, intelligent transportation systems (ITS), energy production sites, smart city programs, and mining. They offer high performance, high bandwidth, a rich feature set, rugged hardware, and class-leading security features. Built to withstand extreme environments, they adhere to IT network design, compliance, and performance requirements.

Security features include:

- Cisco Trusted Platform Module (TPM)—serves as a hardware root-of-trust.

- Secure Boot—uses a public key to validate each subsequent booting stage.

- Chip guard—Security feature that records unique ID of critical system components to detect hardware tampering.

Switch Models

	License Level	Description
IE-3500-8T3S-E	Network Essentials	8x Ethernet 10/100/1000 RJ45 ports, 3x fiber 100/1000 SFP ports, non-PoE
IE-3500-8P3S-E	Network Essentials	8x Ethernet 10/100/1000 PoE/PoE+ ports, 3x fiber 100/1000 SFP ports; PoE power budget of 360 W (including expansion module)
IE-3505-8T3S-E	Network Essentials	8x Ethernet 10/100/1000 RJ45 ports, 3x fiber 100/1000 SFP ports, non-PoE
IE-3505-8P3S-E	Network Essentials	8x Ethernet 10/100/1000 PoE/PoE+ ports, 3x fiber 100/1000 SFP ports PoE power budget of 480 W (including expansion module)
IE-3500-8T3X-E	Network Essentials	8x Ethernet 10/100/1000 ports, 3x 1G/10G fiber SFP+ ports, non-PoE
IE-3500-8U3X-E	Network Essentials	8x Ethernet 10/100/1000 4PPoE ports, 3x 1G/10G fiber SFP+ ports PoE power budget of 480 W (including expansion module)
IE-3500-8T3S-A	Network Advantage	8x Ethernet 10/100/1000 RJ45 ports, 3x fiber 100/1000 SFP ports, non-PoE
IE-3500-8P3S-A	Network Advantage	8x Ethernet 10/100/1000 PoE/PoE+ ports, 3x fiber 100/1000 SFP ports PoE power budget of 360 W (including expansion module)
IE-3505-8T3S-A	Network Advantage	8x Ethernet 10/100/1000 RJ45 ports, 3x fiber 100/1000 SFP ports, non-PoE
IE-3505-8P3S-A	Network Advantage	8x Ethernet 10/100/1000 PoE/PoE+ ports, 3x fiber 100/1000 SFP ports PoE power budget of 480 W (including expansion module)
IE-3500-8T3X-A	Network Advantage	8x Ethernet 10/100/1000 ports, 3x 1G/10G fiber SFP+ ports, non-PoE

	License Level	Description
IE-3500-8U3X-A	Network Advantage	8x Ethernet 10/100/1000 4PPoE ports, 3x 1G/10G fiber SFP+ ports PoE power budget of 480 W (including expansion module)

Note The primary switch's power ratings account for the power supplied to the supported expansion modules. Since the expansion modules cannot function as standalone devices, they do not have independent power ratings. The installer must configure the PoE power budget to match the installed power supply(s).

Front Panel

The illustration below provides an overview of an Cisco IE3500-family switch. Not all models are illustrated.

Figure 1: Cisco IE3500/IE3505 switch with expansion module
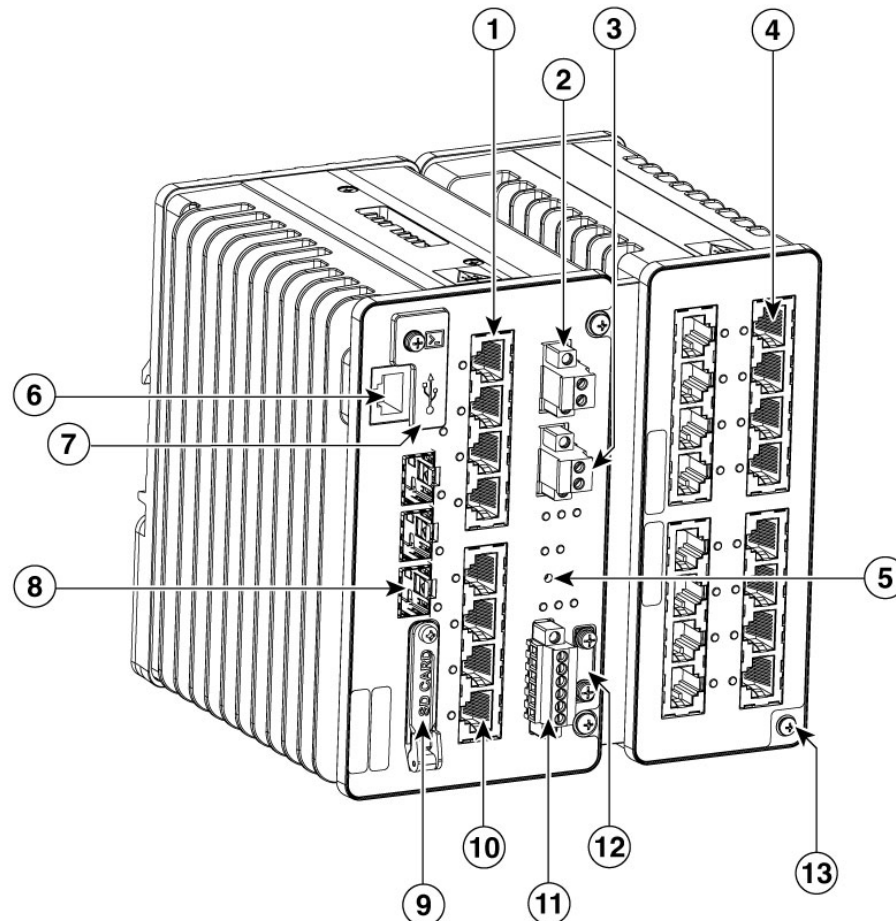
1	10/100/1G Copper Ethernet ports (downlink ports)	8	SFP module slots (uplink ports)
2	Power connector DC-A	9	Flash memory card slot
3	Power connector DC-B	10	10/100/1G Copper Ethernet ports (downlink ports)
4	Expansion Module (Port types vary)	11	Alarm connector
5	Express Setup Button (recessed)	12	Protective ground connection
6	RJ-45 console port	13	EMC Ground
7	USB C Console Port and USB A host port (behind cover) [1]		

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

Note The USB ports are intended only for service operation and not for continuous use.

Ports

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

Uplink SFP/SFP+ Ports

Depending on the switch model, the uplink ports either support 1G/100M optics or 1G/10G optics.

The 1G/100M SFP Uplink slots provide full duplex 1G, half-duplex 100M, and full duplex 100M Optical connectivity.

The 1G/10G SFP+ Uplink slots provide full duplex 1G, and full duplex 10G Optical Connectivity.

Check the SFP datasheets for the fiber type and length. For more information about SFP/SFP+ modules and cables, see Transceiver Modules.

Gigabit Copper Downlink Ports

The 10/100/1G Copper ports can be configured to the to operate in:

- 10 Mb/s Half or Full Duplex
- 100 Mb/s Half or Full Duplex
- 1000 Mb/s Full Duplex

The default setting is autonegotiate. When enabled, the port detects the speed and duplex settings of the connected device and advertises its capabilities. If the device also supports autonegotiation, the port negotiates

the best connection (that is, highest supported speed and full-duplex if available) and configures itself accordingly.

The automatic medium-dependent interface crossover (auto-MDIX) feature is enabled by default. 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.

2500 BASE-T Downlink Ports

The 2500 base-T ports operate in:

- 100 Mb/s Full Duplex

- 1000 Mb/s Full Duplex

- 2500 Mb/s Full Duplex

The ports can be set for speed and duplex autonegotiation in compliance with IEEE 802.3 standards (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.

The automatic medium-dependent interface crossover (auto-MDIX) feature is enabled by default. 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.

100/1000 Mb/s SFP Module Downlink Ports (on expansion modules only)

Expansion modules that support SFP interfaces support 100Mb/s and 1G SFP speeds.

The 1G/100M SFP Downlink slots provide full duplex 1G, half-duplex 100M, and full duplex 100M Optical connectivity.

Console Ports

You can connect the switch to a computer or to a terminal server through either the RJ-45 console port or the USB-C console port.

The switch includes two console ports for management and configuration.

- RS-232 Console Port: Features an RJ-45 connector and supports connections to a terminal server or an RS-232 port

- USB-C Console Port: For use with a computer running a terminal emulator application

  The USB-C console port is a standard Communication Device Class (CDC) device. It is compatible with the CDC driver included in most operating systems. This port functions exclusively as a USB device and does not operate as a host port. It cannot be used to power the switch

The USB-C console and RJ-45 console operate at the same configured baud rate interface speeds.

Power Connectors

DC Power Connector

Connect DC power to the switch through the front panel connectors. The switch has two DC power input connectors (DC-A and DC-B). 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 secured to the switch front panel with the provided captive screws.

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.

When using two power supplies that support PoE, set the system PoE Power Budget to match the smaller capacity supply.

Cisco provides a range of DIN-rail DC power supplies suitable for many applications. Installers may also use third-party power supplies, provided they meet the switch's specifications.

Cisco will support the switch when powered by a third-party power supply, however, it does not provide support for the third-party power supply itself. Customers with questions about installing or troubleshooting a third-party power supply should contact the power supply vendor directly.

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 has six terminals. The connector is secured to the switch front panel with the provided captive screws.

Figure 2: Alarm Connector
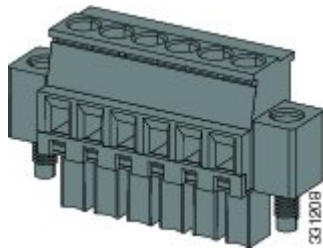
The two alarm input circuits can sense if an external contact is open or closed. From the CLI, you can configure each alarm input as normally open or normally closed.

The alarm output can be activated for environmental, power supply, and port status alarm conditions. 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 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 relay.

SFP Modules Supported

Refer to the switch datasheet for details about the supported SFP Modules. Support for additional SFPs may be added over time. See the Cisco IOS-XE Release notes for latest supported modules list.

LEDs

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

Figure 3: LEDs on the IE3500/IE3505 switch
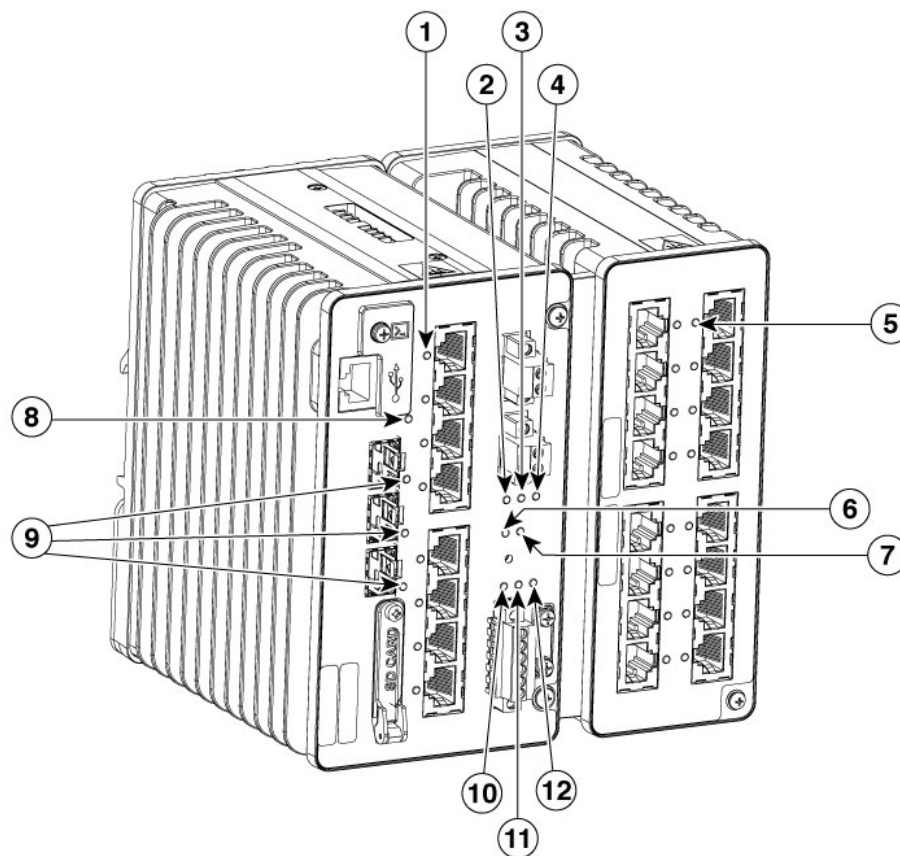
1	Copper Downlink Port LEDs on Base Chassis Ports 4-11	7	System Status LED
2	DC Input A Status LED	8	USB Console LED
3	DC Input B Status LED	9	SFP uplink LEDs
4	POE Operation LED (On systems that support PoE)	10	Alarm Input 1 LED
5	Copper Downlink Port LEDs on Expansion Module	11	Alarm Input 2 LED
6	Express Setup LED	12	Alarm Output LED

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 or is operating normally.
Solid green	The switch has successfully connected with a computer after the Express Setup button is pressed.
Blinking green	The switch has completed its power-on sequence. If the Express Setup button is pressed within 5 minutes after the power-on sequence is complete, the Setup status indicator turns off.
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 is in progress.
Green	System is operating normally.
Red	Switch is not functioning properly.

USB-C Console LED

The USB-C console LED shows which console port is in use. See LEDs, on page 7 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-C console port has priority.

Color	Description
Green	USB-C console port is connected and is active.
Off	USB-C Console port is not corrected or media type is set to RJ45.

Alarm LEDs

Alarm OUT

Alarm Output LED is set based on severity of input/facility Alarm

Color	System Status
Green	Alarm is not present.
Red	Minor alarm condition is present.
Blinking red	Major alarm condition is present.
Off	Alarm Out is not configured.

Alarm IN1 and IN2

Color	System Status
Off	When Alarm is not configured (severity is configured to none) the state of the LED will be green.
Green	Alarm is configured but no alarm detected.
Red	Minor alarm is present.
Blinking red	Major alarm is present.

Power Status LEDs

The switch can operate with one or two DC power sources. If the switch has dual power sources, it draws power from the source with the higher voltage. In the event of a failure of one DC source, the alternate DC source powers the switch, and the corresponding power status LED for the active source remains green. The power status LED for the failed source is either off or red, depending on the alarm configuration.

Table 1: Power LED Status

Color	System Status
Green	Power is present on the associated input.
Off	Power is not present on the associated input, or is outside the operating range.
Red	Power is not present in the associated input, and the system is configured to expect dual power inputs.

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 .

Port Status LEDs

Each port and SFP uplink slot has a status LED, as shown in and described below.

Color	System Status
Off	No link.
Solid green	Link present, no activity.
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. **Note** After a port is reconfigured, the port LED can remain amber for up to 30 seconds while STP checks the switch for possible loops.
Blinking amber	System is sending Spanning Tree BPDUs on an STP blocked port Disabled.

PoE Status LED

The PoE LED shows the status of the PoE subsystem. This LED is only present on models that support PoE.

Color	PoE Status
Off	PoE is not enabled.
Solid green	PoE function is enabled and all of the PoE-enabled ports are functioning correctly.
Blinking red	PoE function is enabled, but one of the PoE port's power is disconnected or has failed.
Solid red	PoE function is enabled, but all of the PoE ports have failed.

Internal Flash Memory

The internal flash memory can be used to store Cisco IOS XE Software, configuration data, and other files.

It is designed to support up to 1 gigabyte of writes per day. Long-term write-intensive operations, such as sustained packet capture, may cause the flash media to exceed its write life. To mitigate this, write-intensive operations should utilize the SD flash, which is removable and replaceable in case of media wear.

Flash Memory Card

The Switch has a secure digital (SD) card socket. The card can be use for the swap drive feature and to copy files on and off the system. 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 • The SD-card is an optional orderable accessory. It is not shipped as part of the standard package.

• For more information on inserting and removing the flash memory card, see Install or Remove the Flash Memory Card (Optional), on page 16

⚠

Caution Do not install or remove the SD card in an explosive environment.

Rear Panel

The rear panel of the switch has a latch for installation on a DIN rail. The latch is spring-loaded to secure the switch to a DIN rail.

Note The switch should only be installed in the vertical orientation shown in this document.

Figure 4: IE3500/IE3505 switch Rear Panel
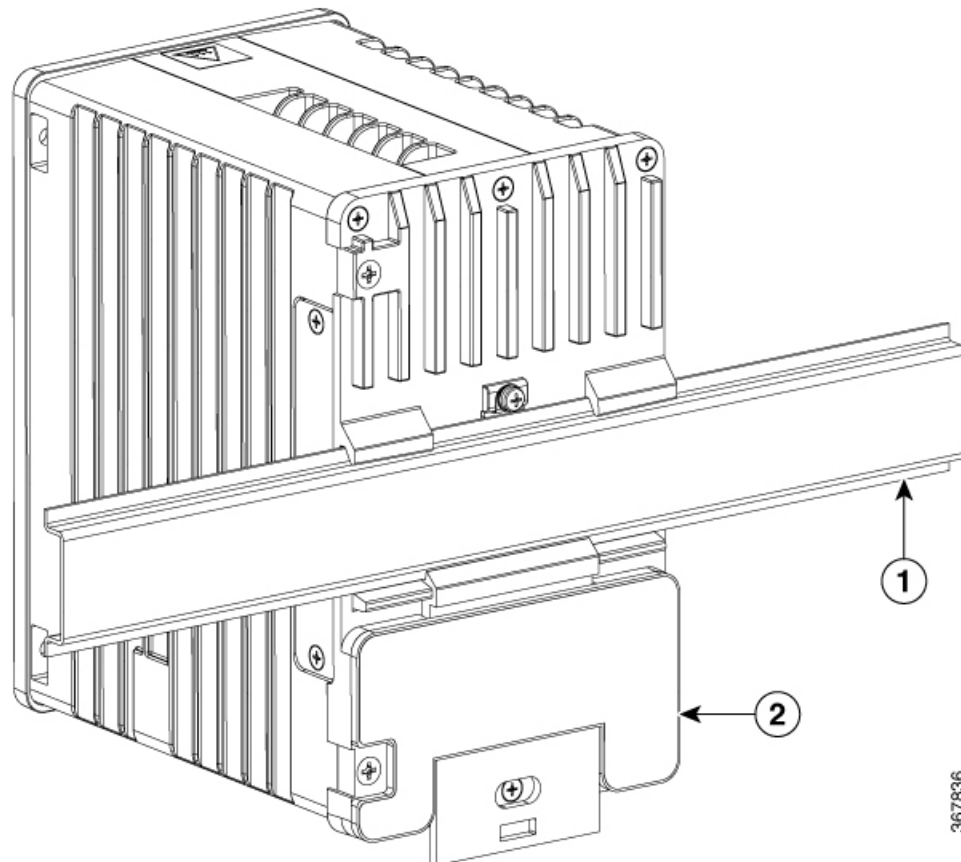
1	DIN rail
2	Switch

Switch Installation

Switch Installation

This chapter describes how to install the switch. It also includes information specifically for installations in hazardous environments.

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Note   Please refer to the Product Documentation of Compliance for certified installation procedures in Hazardous Locations.

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

Prepare 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　**Statement 1003**—DC Power Disconnection

To reduce risk of electric shock or personal injury, disconnect DC power before removing or replacing components or performing upgrades.

Warning　**Statement 1017**—Restricted Area

This unit is intended for installation in restricted access areas. Only skilled, instructed, or qualified personnel can access a restricted access area.

Warning　**Statement 1024**—Ground Conductor

This equipment must be grounded. To reduce the risk of electric shock, 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.

Warning　**Statement 1028**—More Than One Power Supply

This unit might have more than one power supply connection. To reduce risk of electric shock, remove all connections to de-energize the unit.

Warning　**Statement 1074**—Comply with Local and National Electrical Codes

To reduce risk of electric shock or fire, installation of the equipment must comply with local and national electrical codes.

Caution　Airflow around the switch must be unrestricted. To prevent the switch from overheating, there must be the following

minimum clearances:

- Top and bottom: 1.0 in. (25 mm)
- Sides: 1.0 in. (25 mm)
- Front: 1.0 in. (25 mm)

Installation Guidelines

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

Note The switch should only be installed in the vertical orientation shown in this document.

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 15,000 ft (4.57 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 meets the voltage dips and interruptions requirements of IEC 61850-3 only 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.

- For better EMC performance, it is suggested to use S/UTP or SF/UTP cables for copper Ethernet ports. Refer ISO/IEC11801 standard for details on S/UTP and SF/UTP.

⚠️

Caution   The device is designed to mount on a DIN rail that conforms to standard IEC/EN60715, top hat rails TH 35-7.5 OR TH 35-15.

✏️

Note   In order to prevent excessive side to side movement of the unit it is advised to install DIN rail stop plates. These end stops can be installed on one or both sides or the unit to limit side to side movement that can occur in high vibration environments.

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 Verify Switch Operation, on page 40.

- Clearance to front and rear panels meets these conditions:

  - Front-panel LEDs can be easily read.

  - 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: 1.0 in. (25 mm)

  - Sides: 1.0 in. (25 mm)

  - Front: 1.0 in. (25 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 the Data Sheet.

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

Install or Remove the Flash Memory Card (Optional)

Optionally, you can execute the sync command to copy Flash to SDFlash.

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.

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

Procedure

Step 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.

Figure 5: Installing the Flash Memory Card in the Switch
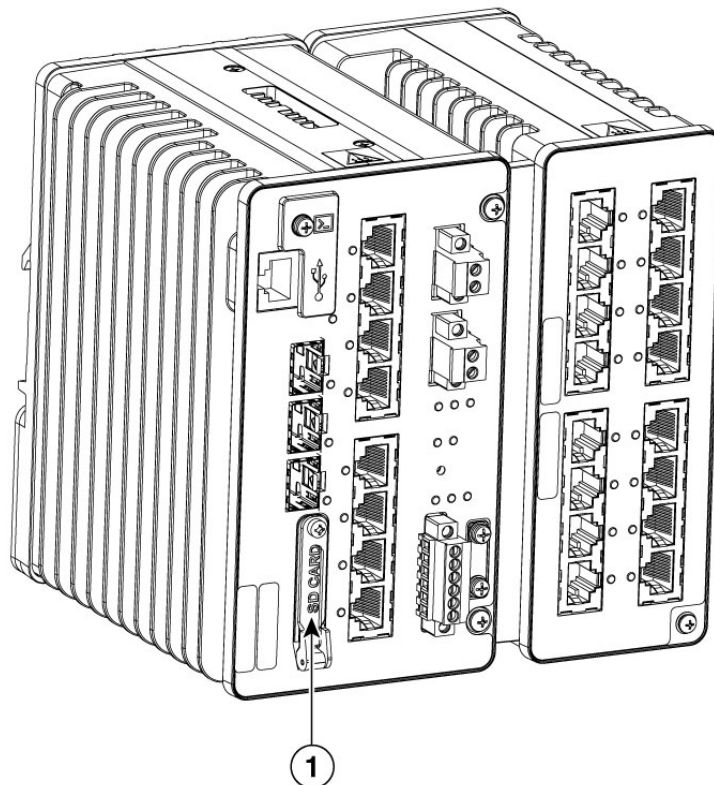
| 1 | SD Card cover and slot |

Step 2 Install or remove the card:

   a. 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.

   b. 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.

Step 3 Close the guard door, and fasten the captive screw using a Phillips screwdriver with 4.0–5.0 in-lbs (0.45–0.55 Nm) torque to keep the door in place.

Note

Ensure not to cross thread the screw by using a manual drive to start the process.

Connect to the Console Port (Optional)

You can also enter CLI commands through the console port. For more information about this process see .

Attach an Expansion Module (Optional)

If your installation calls for use of one of the expansion modules listed in Switch Models, use the following procedure to attach the module to the switch:

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Danger   Do not attach or remove an expansion module while the switch is energized.

Procedure

Step 1   Remove the two rubber bumpers (#1) covering the tabs.

1	Rubber bumpers

Step 2   Remove the 2 screws securing the side cover plate to the switch.

Step 3   Remove the screws (#1) from the Expansion chassis, and rear of the switch base.

Step 4 Align tabs on top and bottom left front of expansion module with slots on top and bottom right side of switch along with tabs on top and bottom left rear of module and holes at top and bottom right rear of switch, and press module and switch together so that the electrical connections engage and the screw holes.
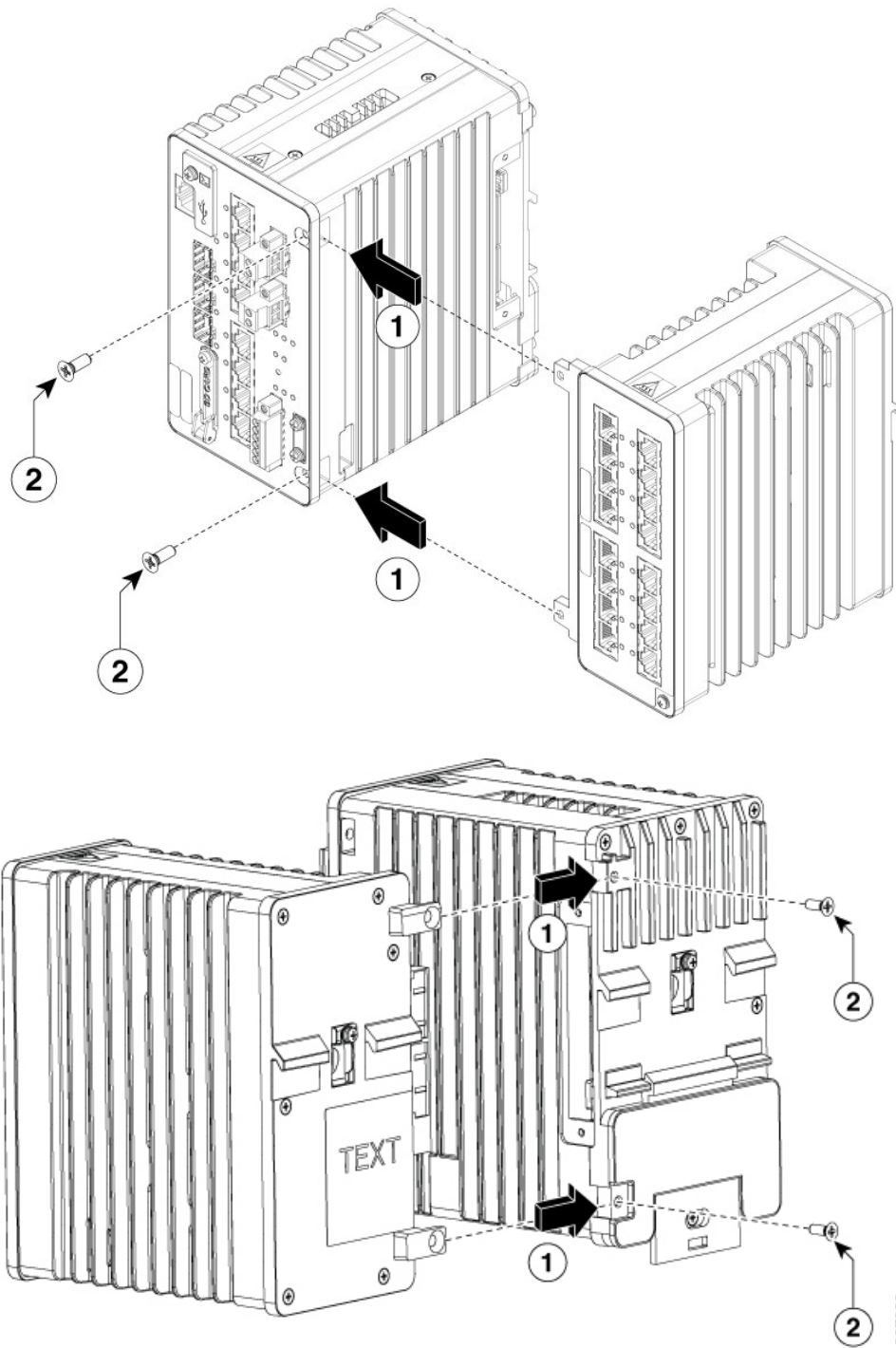
Step 5   Secure the 4 flathead phillips screws with 5-6 in-lbs torque

Switch Installation

This section describes how to install the switch:

Install Switch on 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:

Procedure

Step 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.

Step 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.

Figure 6: Position the Hooks Over the DIN Rail
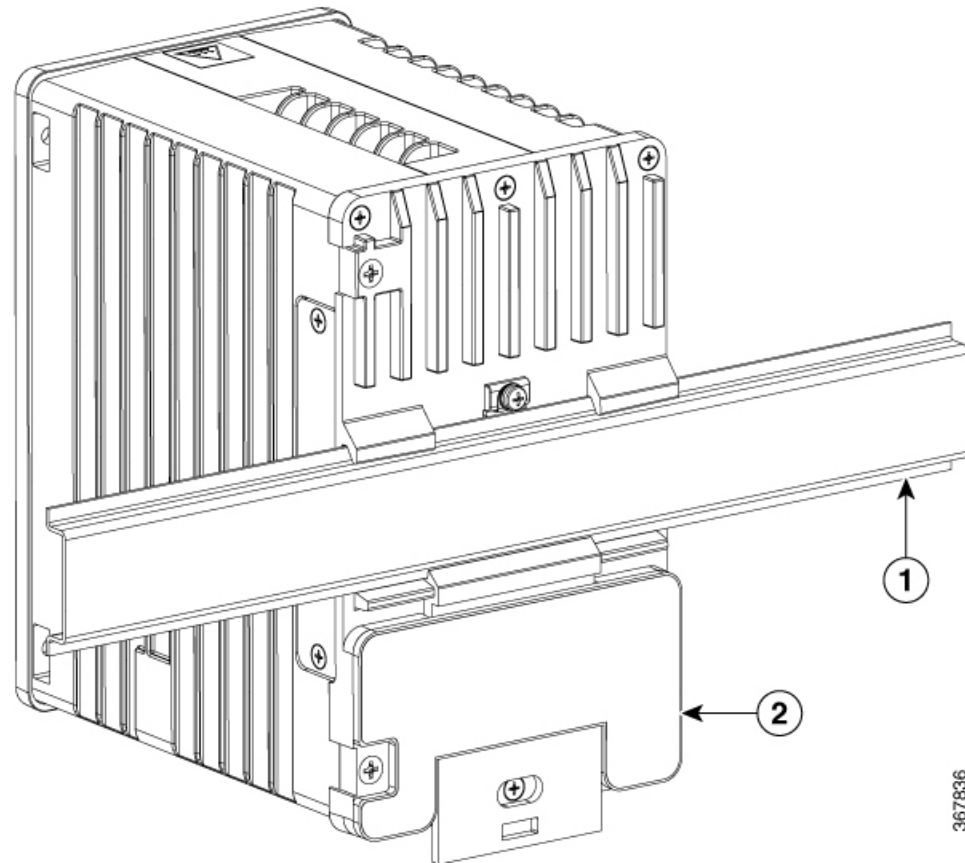
1	DIN Rail
2	Switch

Step 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 Connect Alarm Circuits, on page 33.

Note
For instructions on how to remove the switch from a DIN rail, see #unique_51.

Remove Switch from DIN Rail

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

Procedure

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

Step 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.

Step 3   Pull the bottom of the switch away from the DIN rail, and lift the hooks off the top of the DIN rail.

Figure 7: Releasing the Spring-Loaded Latch from the DIN Rail
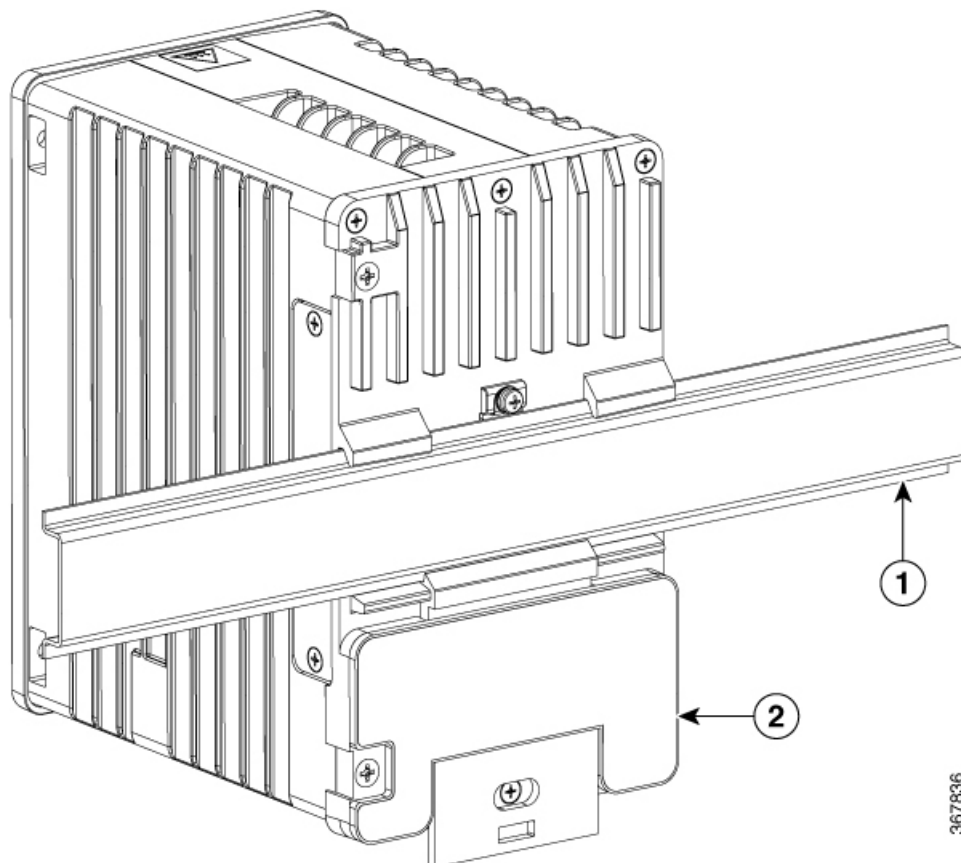
Step 4   Remove the switch from the DIN rail.

Power Connections

Tools and Equipment

Obtain these necessary tools and equipment:

- Torque driver(s) capable of 18 in-lb (2.03 N-m) of torque.

- 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 copper wire that is appropriately-rated for the installation environment.

- Wire-stripping tool(s).

- A number-2 Phillips screwdriver.

- A flat-blade screwdriver.

Supported Power Supplies

Cisco is constantly updating the IoT Power Supply portfolio. Please refer to the Cisco IE3500 Rugged Series Data Sheet for a comprehensive list of supported power supplies and their capabilities.

Install 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.

⚠

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

Ground the Switch

Ensure to follow any grounding requirements at your site.

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Warning   **Statement 1024**—Ground Conductor

This equipment must be grounded. To reduce the risk of electric shock, 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.

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Warning   **Statement 1046**—Installing or Replacing the Unit

To reduce risk of electric shock, when installing or replacing the unit, the ground connection must always be made first and disconnected last.

If your unit has modules, secure them with the provided screws.

⚠️

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 AWG wire, such as Hollingsworth part number R3456B or equivalent)

✎

Note Use at least an 10 AWG (5.26 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:

Procedure

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

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

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

Figure 8: Crimping the Ring Terminal
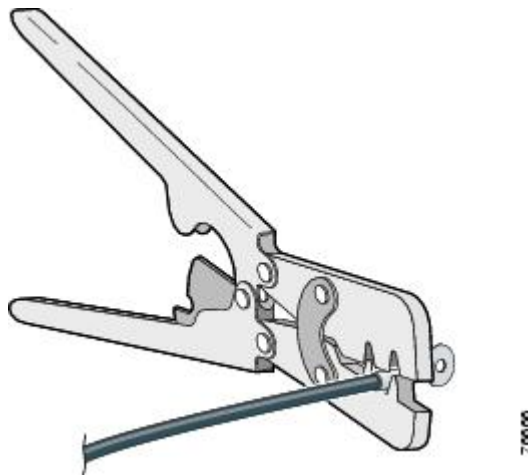
Step 4 Slide the ground screw through the terminal.

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

Step 6 Use a 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).

Figure 9: Ground-Lug Screw
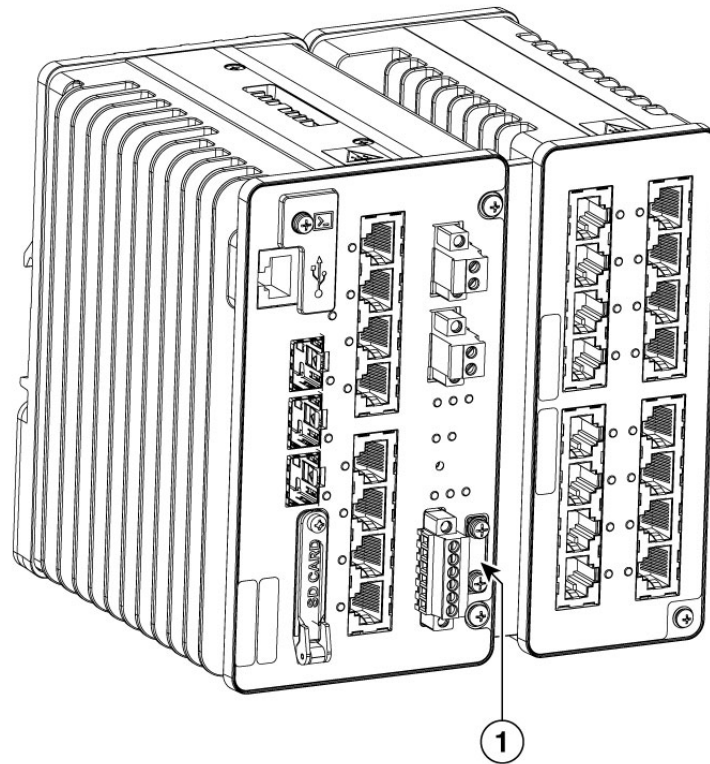
1	Grounding Lug

Step 7 Attach the other end of the ground wire to an appropriate ground.

Caution
The expansion module must be grounded separately. Note that the expansion module ground connector is an EMC ground not a safety ground, unlike the one on the main chassis.

Warning
Statement 1024—Ground Conductor

This equipment must be grounded. To reduce the risk of electric shock, 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.

Connect Power Converter to an AC Power Source

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

Prepare the AC Power Connection

Power wiring and installation methods, including color codes, vary by country. A qualified professional must select, prepare, and install the appropriate power cord for the power supply.

Note   Use copper conductors only, for at least 54°F (30°C) above the enclosure's maximum internal ambient temperature.

Note   This section does not apply to power supplies such as PWR-IE50W-AC-IEC which have a pluggable IEC connector.

Connect AC Power Source to the Power Converter

Caution   AC power wiring must include a disconnect, and must incorporate overcurrent protection for all ungrounded conductors.

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

Procedure

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

Step 2   Insert the exposed ground wire lead (10 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.

Step 3   Tighten the ground wire terminal block screw.

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

Step 4   Insert the line and neutral wire leads into the terminal block line and neutral connections.

Ensure that you cannot see any wire lead. Only wire with insulation extends from the connectors.

Step 5   Tighten the line and neutral terminal block screws.

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

Step 6   Replace the plastic cover over the terminal block.

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

Connect Power Converter to DC Power Source

You can also connect the power converter to a DC power source. Several power supplies can be used. Refer to the data sheet for the appropriate DC input ratings.

✎

Note   Use copper conductors only, for at least 54°F (30°C) above the enclosure's maximum internal ambient temperature.

Procedure

Step 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 10-AWG stranded copper wire.

Step 2   Measure two lengths of appropriate gauge copper wire long enough to connect the power converter to the DC power source.

It is recommended to twist the supply wires together to reduce electrical interference.

Step 3   Using a wire-stripping tool, strip the ground wire and both ends of the twisted 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.

Step 4   Connect one end of the stranded copper wire to a appropriate ground.

Step 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.

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

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

Step 7   Insert the wire leads into the terminal block Positive and Negative connections. Insert the wire lead into the Negative wire connection and the wire lead into the Positive wire connection. Ensure that only wire *with insulation* extends from the connectors.

Step 8   Tighten the Positive and Negaive terminal block screws.

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

Step 9   Connect the Positive wire to the positive pole of the DC power source, and connect the Negative wire to the Negative pole. Ensure that each pole has a current-limiting-type fuse with an appropriate current rating.

Connect DC Power Source to the Switch

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

Warning   **Statement 1003**—DC Power Disconnection

To reduce risk of electric shock or personal injury, disconnect DC power before removing or replacing components or performing upgrades.

Warning   **Statement 1005**—Circuit Breaker

This product relies on the building's installation for short-circuit (overcurrent) protection. To reduce risk of electric shock or fire, ensure that the protective device is rated not greater than: **20 A**

Warning   **Statement 1022**—Disconnect Device

To reduce the risk of electric shock and fire, a readily accessible disconnect device must be incorporated in the fixed wiring.

Warning   **Statement 1033**—Safety Extra-Low Voltage (SELV)—IEC 60950/ES1–IEC 62368 DC Power Supply

To reduce the risk of electric shock, connect the unit *only* to a DC power source that complies with the SELV requirements in the IEC 60950-based safety standards or the ES1 requirements in the IEC 62368-based safety standards.

Warning   **Statement 1074**—Comply with Local and National Electrical Codes

To reduce risk of electric shock or fire, installation of the equipment must comply with local and national electrical codes.

Caution   PoE output power is not isolated from the switch's power input. Connecting PoE ports between two IE3500/IE3505 switch systems may create a power loop. The energy from an external surge can pass through the switch and among the PoE ports.

⚠️

Caution   The two power inputs are not isolated from each other. Under normal circumstances, there is no electrical conduction path between the DC-A and DC-B power inputs on each switch. However, the two power inputs are not galvanically isolated from each other.

⚠️

Caution   If an internal fault occurs, switches with PoE-capable Ethernet ports may apply PoE power to a port even when it is not connected to a PoE powered device.

You must use appropriate protection to ensure that such events do not create a hazard.

⚠️

Caution   On switches that support PoE, do not connect either positive or negative terminal of the DC power source to earth ground.

⚠️

Caution   For wire connections to the power and alarm connectors, you must use use copper wire that is appropriately-rated for the installation environment.

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

Procedure

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

Step 2   Identify the connector positive and negative 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
−	Negative DC power connection

Step 3   Measure two lengths of appropriate gauge copper wire long enough to connect to the DC power source.

The 5mm pitch "Euroblock" style power connectors supplied with the switch accept conductors between 14 and 26 AWG.

Note
The installer is responsible for selecting an appropriate wire type and gauge based on the connected load current (including the load from PoE-powered devices connected to the switch).

Step 4   Using a wire-stripping tool, strip each of the two 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 10: Stripping the Power Connection Wire
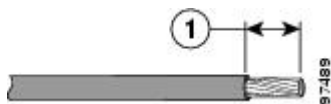
| 1 | 0.25 in. (6.3 mm) ± 0.02 in. (0.5 mm) |

Step 5 Loosen 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.

Figure 11: Removing the Power Connectors from the Switch
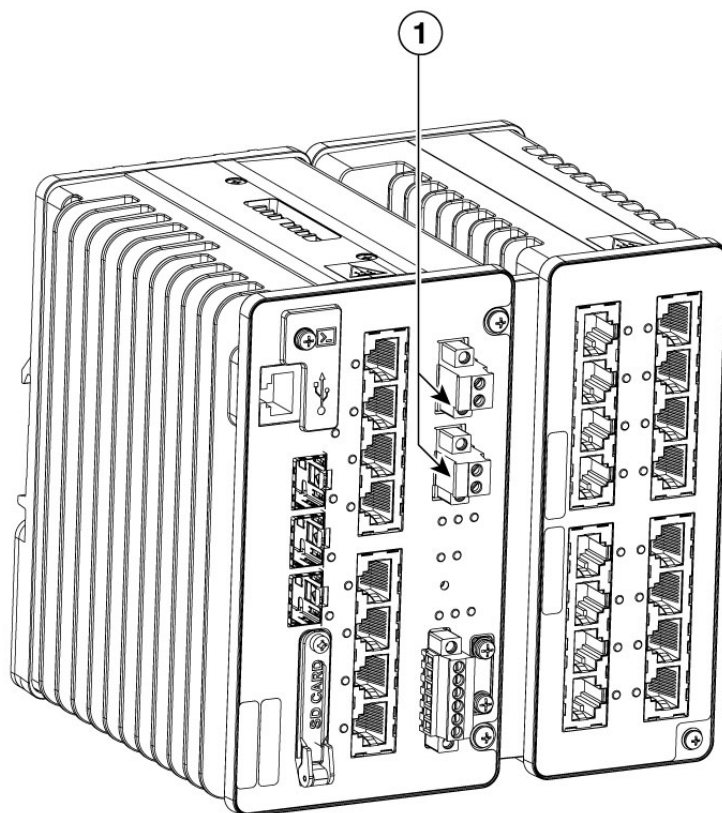
| 1 | Power Connectors |

Step 6 On the power connector, insert the exposed part of the positive wire into the connection labeled "+" and the exposed part of the negative wire into the connection labeled "–".

Make sure that you cannot see any wire lead. Only wire with insulation should extend from the connector.

Step 7 Use a torque flathead screwdriver to torque the power connector captive screws (above the installed wire leads) to 5in-lb (0.565 Nm).

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

Step 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 negative wire to the negative 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.

Attach Power Connectors to the Switch

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

Procedure

Step 1   Insert one power connector into the DC-A receptacle on the switch front panel, and the other into the DC-B receptacle.

Warning
Statement 1074—Comply with Local and National Electrical Codes

To reduce risk of electric shock or fire, installation of the equipment must comply with local and national electrical codes.

Step 2   Use a 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 and cable dressing to secure the wires.

Apply Power to the Power Converter

Apply AC or DC power to the DC power converter.

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 booting.

Connect Alarm Circuits

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

Connect 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 an external dry contact 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.

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 and alarm input reference. An alarm input and the reference 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

⚠️

Caution   The voltage applied to 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.

⚠️

Caution   To reduce risk of electric shock and fire, the alarm output relay must be connected to an IEC60950/IEC 62368 compliant limited power source.

✎

Note   Wire connections to the power and alarm connectors must use copper wire that is appropriately-rated for the installation environment.

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

Procedure

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

Figure 12: Alarm Connector
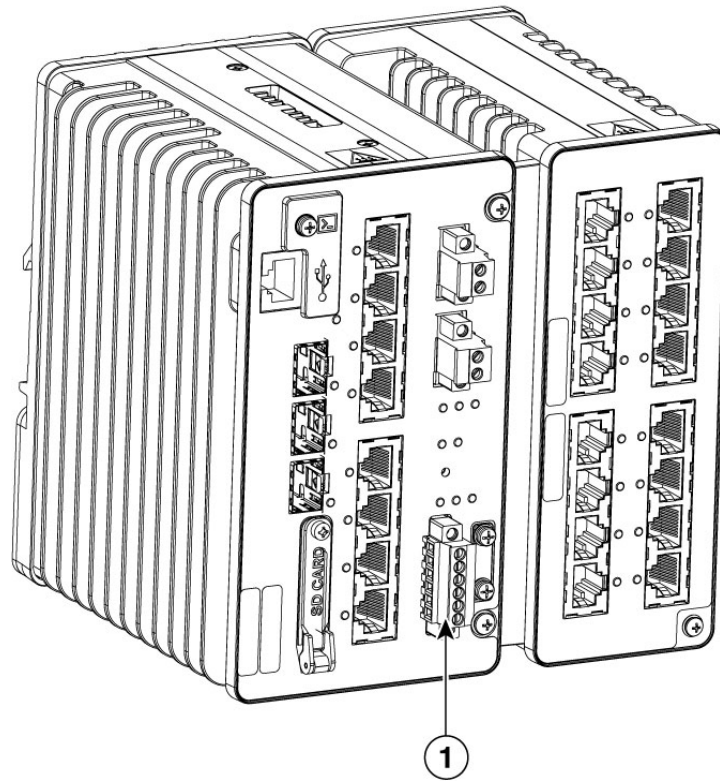
1	Alarm connector

Step 2   Measure two lengths of appropriate gauge copper wire long enough to connect to the external alarm device.

Choose between setting up an external alarm input or output circuit. The 3.81mm pitch "Euroblock" style alarm connector supplied with the switch accept conductors between 16 and 28 AWG.

Note
The installer is responsible for selecting an appropriate wire type and gauge.

Step 3   Use a wire stripper to to strip 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.

Step 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.

Step 5   Use a torque flathead screwdriver to tighten the alarm connector captive screw (above the installed wire leads) to 2 in-lb (0.23 N-m).

Figure 13: Securing the Alarm Connector Captive Screws
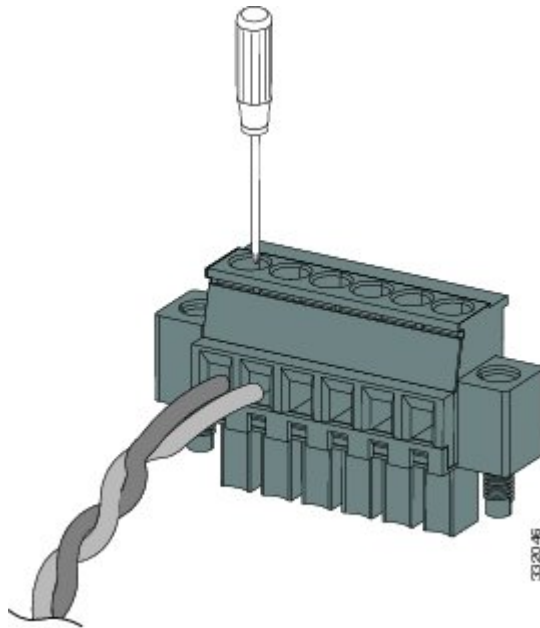
Caution
Do not over-torque the power and alarm connectors' captive screws. The torque should not exceed 2in-lb (0.23N-m).

Step 6   Repeat Step 2 through Step 5.

To insert the input and output wires of each additional external alarm device into the alarm connector.

Attach Alarm Connector to the Switch

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 torque flathead screwdriver to tighten the captive screws on the sides of the alarm connector.

Connect Network Ports

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

Connect to 10/100/1G Ports

The switch 10/100/1G 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 communication.

Note   For Rail and Smart Grid compliance, SF/UTP cables must be used for Ethernet ports.

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.

Procedure

Step 1   To connect to 10BASE-T, 100BASE-TX or 1000BASE-T devices, follow these steps:

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

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

   c.   The auto-MDIX feature is enabled by default. For configuration information for this feature, see the Cisco IE3500/IE3505 switch Software Configuration Guide for the appropreate software release.

Step 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.

What to do next

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 Troubleshooting, on page 55 for solutions to cabling problems.

• Reconfigure and reboot the connected device if necessary.

• Repeat Steps 1 through 3 to connect each device.

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

Caution When you use commercial-temperature SFP modules reduce the maximum operating temperature by 27° F. The minimum operating temperature for commercial-temperatre modules is 32°F (0°C).

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

Install SFP Modules into SFP Module Ports

Caution 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.

The following illustration shows an SFP module that has a bale-clasp latch.

Figure 14: SFP Module with a Bale-Clasp Latch
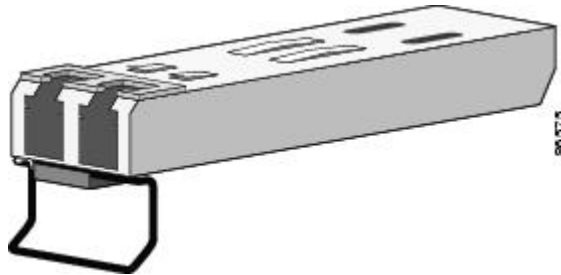
To insert an SFP module into the SFP module slot:

Procedure

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

Step 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).

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

Step 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.

Step 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.

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

Remove SFP Modules from SFP Module Slots

To remove an SFP module from a module receptacle:

Procedure

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

Step 2   Disconnect the LC from the SFP module.

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

Step 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.

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

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

Connect the SFP Modules

This section describes how to connect to a fiber-optic SFP port. For instructions on how to install or remove an SFP module, see Install and Remove SFP Modules, on page 37.

Warning   **Statement 1008**—Class 1 Laser Product

This product is a Class 1 laser product.

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 Prepare for Installation, on page 13.

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

Procedure

Step 1	Insert one end of the fiber-optic cable into the SFP module port.
Step 2	Insert the other cable end into a fiber-optic receptacle on a target device.
Step 3	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 for solutions to cabling problems.

Step 4	If necessary, reconfigure and restart the switch or the target device.

Verify Switch Operation

Before installing the switch in its final location, power on the switch, and verify that the switch powers up and boots.

Where to Go Next

Even if the default configuration is satisfactory, you must set a new password before connecting the switch to a network. You can use any of these management options to to configure the switch.

- Start the Web UI. This is an easy-to-use web interface that offers quick configuration and monitoring. You can access the Web UI from anywhere in your network through a web browser. For more information, see the Software Configuration Guide and the Web UI online help.

- Use the CLI to configure the switch as an individual switch from the console.

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

Express Setup

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 running Windows or a 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 any of the Console ports for Express Setup.

• A small paper clip to reach the 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.

Run Express Setup

Complete the steps in this section to use Express Setup to enter the initial IP information.

Before you begin

Perform the following checks before you use Express Setup.

- Make sure that the switch is in default factory mode.

- Make sure that nothing is connected to the switch.

  During Express Setup, the switch acts as a DHCP server. Ensure that the computer that is connected to the switch is configured with DHCP.

Note Exception: You can add a serial console cable to monitor the booting sequence. *Do not press [return key] on the console screen*.

Procedure

Step 1 Complete one of the following actions:

If the switch...	Then...
Is fresh out of the box	Go to Step 2.
Is not fresh out of the box	Use a paper clip to reset the switch for 15-20 seconds untill the express setup LED turns alternating Red and Green, then release the paper clip The switch automatically reboots once the express setup LED blinks alternating red and green.

Note
The Express setup long press (press the button for 15 seconds to reset the switch to use factory default settings) deletes the configurations (nvram_config and vlan.dat) from the flash and removable media (SD card or USB flash drive). Remove any removable media if you do not want any files to be deleted from the SD card or USB flash drive.

Step 2 On the computer that is connected to the switch, disable web browser pop-up blockers and proxy settings.

Step 3 Connect power to the switch.

See the wiring instructions in Ground the Switch, on page 25 and Connect DC Power Source to the Switch, on page 30.

Step 4 Power on or reset the switch.

Use LEDs to monitor boot progress:

- Blinking Express Setup LED: Ready for express setup process

Step 5 Insert paper clip into Express Setup button for 3–5 seconds.

When released, the lowest free copper port will start flashing green.

Step 6 Connect the computer to port blinking green.

The LED continues to blink.

Step 7 After the computer has the IP Address 192.168.1.x, point the browser to http://192.168.1.254.

The setup using a wizard screen appears.

Step 8 Select **Classic Day 0 Wizard**

The Login page appears.

Step 9 Enter the Username and Password.

The username is admin, and the password is the system serial number. To find the serial number of the device, see Locate the Switch Serial Number, on page 60.

The **Account Settings** window appears.

Step 10 In the **Account Settings** window, complete the following tasks:

a) Fill out the fields in the **Account Settings** window as follows:

- *Login Name:* admin

  You can change the login name here, if you like.

- *Login User Password*: By default, the login user password is the serial number of the switch.

  You can change the login user password here if you like.

- *Confirm Login User Password*: Retype the password that you used earlier.

- *Command-Line Password* (Optional): This defaults to Sync to Login Password.

  You can change the command login password here by using the drop-down menu.

- *Device Name*: Create an identifier for the device in the network.

- *NTP Server* (Optional): You may identify an NTP server for the device here.

- *Date & Time Mode* (Optional): Identify the mode here, through the drop-down.

  Trouble
  If the account settings window does not appear, make sure that any pop-up blockers or proxy settings on your browser are disabled. Also make sure that any wireless client is disabled on your computer.

b) After you finish filling in the fields in the **Account Settings** window, click **Basic Settings**.

Step 11 In the **Basic Settings** window, complete the following tasks:

a) Fill out the fields as follows, using English letters and Arabic numbers:

- *IP Address*: Choose Static or DHCP.

- *VLAN ID*: Enter a valid VLAN ID.

  This is the management VLAN for the switch.

- *IP Address*: Enter a valid IP Address.

- *Subnet Mask*: Enter a valid subnet mask.

- *Default Gateway*: Enter the IP address of the router (not optional if IP is static).

  You must enter the router IP address if the IP address is static.

(Optional) On this screen you can also enable or disable Telnet and SSH and configure CIP settings.

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. 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.

For more information about the CIP VLAN settings, click Help on the toolbar.

b) After you finish filling in the fields in the **Basic Settings** window, click **Switch Wide Settings**.

Step 12   In the **Switch Wide Settings** window, complete the following tasks:

a) Fill out the fields as follows:

- *Data VLAN*: You can enable or disable the data VLAN with the button here.

- *Voice VLAN*: You can enable/disable Voice VLAN here.

- *STP Mode* (Optional): Select an STP Mode from the drop-down

- *Bridge Priority*: You can update, enable, or disable Bridge Priority here.

- *Domain Name* (Optional): Enter a valid Domain Name.

b) After you finish filling in the fields in the **Switch Wide Settings** window, click **Day 0 Config Summary**.

The **Summary** window displays the configuration settings that you made.

Step 13   In the **Summary** window, confirm that the settings are accurate and complete one of the following actions:

If the settings...	Then...
Are correct	Click **Submit** to complete the initial setup.
Are not correct	a. Click the back button and make the required changes.
	b. Navigate back to the **Summary** window.
	c. Click **Submit** to complete the initial setup.

After you click **Submit**, the following 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. Success dialogue appears. Click **OK**.

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.

Step 14   Turn off DC power at the source, disconnect all cables to the switch, and install the switch in your network.

Step 15   If you changed the static IP address on your computer, change it to the previously configured static IP address.

What to do next

You can display Web UI by following these steps:

1. Start a web browser on your computer.

2. Enter the switch IP address, username, and password in the web browser, and press Enter. The WebUI page appears.

⚠️

Trouble   If the WebUI 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.

- Ping the Switch IP Address and confirm IP reachability.

- 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 that is connected to the computer is green, reenter the switch IP address in a web browser to display the Web UI. When Web UI appears, you can continue with the switch configuration.

Configure Switch using CLI

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

Before connecting the switch to a power source, review the Warnings, on page 13 section of the **Switch Installation** chapter.

Console Port CLI access

You can enter Cisco IOS commands and parameters through the CLI. The IE3500/IE3505 switch switch has two console options: RJ45 8 pin, or USB-C. Use one of these options to access the CLI:

RJ-45 Console Port

Procedure

Step 1   Connect one end of the console cable to your PC.

To connect, a USB to RS232 adapter may be required.

Step 2   Connect the other end of the cable or adapter to the switch console port.

Step 3   Start a terminal-emulation program on the PC.

Figure 15: Connecting the Console Cable
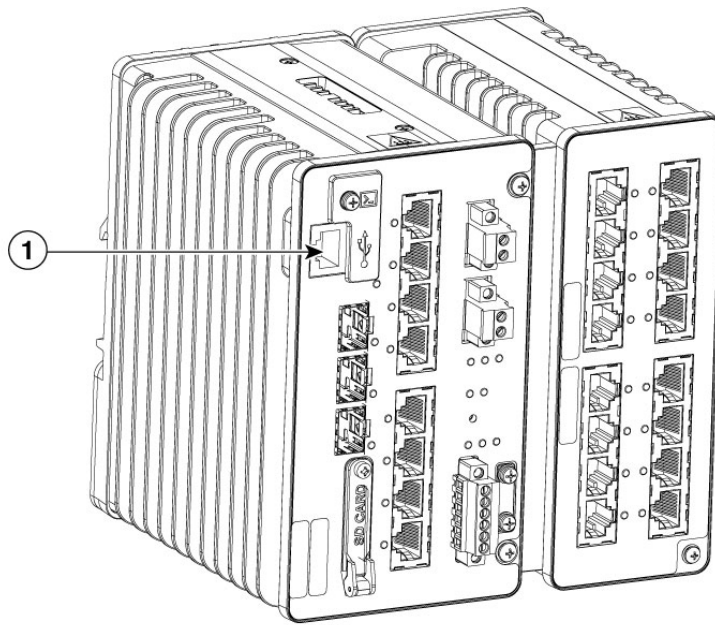
| 1 | RJ-45 Console Port |

Step 4 Configure the baud rate and character format of the PC or terminal to match the console port characteristics:

The default characteristics are:

  • 9600 baud

  • 8 data bits

  • 1 stop bit

  • No parity

  • None (flow control)

Step 5 Connect power to the switch as described in Connecting to Power.

Step 6 The PC or terminal displays the bootloader sequence.

After the switch has finished booting press **Enter** to display the setup prompt.

USB-C Console Port

Before you begin

Note The USB Console port is intended only for service operation and not for continuous use.

Procedure

Step 1 Use a Phillips screwdriver to loosen the screw on the USB type C console port cover.

Remove the screw and take off the cover.

Figure 16: USB-C Console Port, Cover
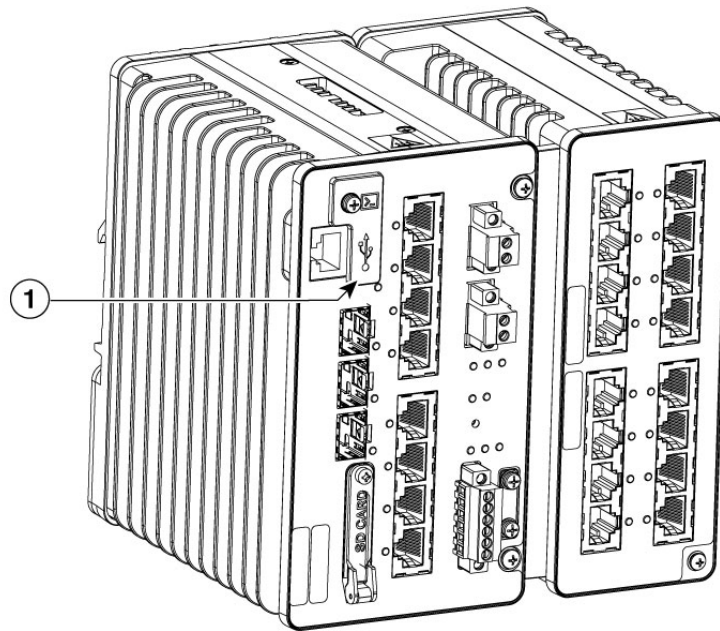
1	USB-C Console Port, Cover

Step 2 Connect a USB cable to the PC USB port.

Connect the other end of the cable to the switch USB-C console port.

Step 3 Identify the COM port assigned to the USB-C console port.

Step 4 Start the terminal-emulation program on the PC.

Step 5 Configure the COM port.

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

The default characteristics are:

- 9600 baud

- 8 data bits

- 1 stop bit

- No parity

- None (flow control)

Step 7   Apply power to the switch as described in Connecting to Power.

Step 8   The PC or terminal displays the bootloader sequence.

Press **Enter** to display the setup prompt.

See Initial System Configuration, on page 50 to configure the switch using the Setup program.

Step 9   Place the console port cover back, hand tighten the screw.

Initial System Configuration

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 WebUI to configure and manage the switch.

IP and Password Settings

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

- Encryption level and Master key

- Switch IP address

- Subnet mask (IP netmask)

- Default gateway (router)

- Enable secret password

- Enable password

Initial Configuration

Complete the following steps to create an initial configuration for the switch with the setup program:

Procedure

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

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

Step 2   Enter a hostname for the switch.

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.

Configuring global parameters:

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

Step 3   Enter an enable secret password.

The password can be of minimum 10 to maximum 25 alphanumeric characters, and must contain atleast one uppercase, one lower case, and a digit.

Note
The password should not contain the word `cisco` in it.

```
Enter enable secret: secret_password
Confirm enable secret: secret_password
```

Step 4   Enter an enable password.

```
Enter enable password: enable_password
```

Step 5   Enter a virtual terminal password.

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
```

Step 6   Enter the interface name (physical interface or VLAN name) of the interface that connects to the management network.

For this release, always use **vlan1** as the interface connecting to the management network.

Note
The switch will transmit a DHCP discover message on the **vlan1** interface. If the switch is connected to the network before the CLI initial setup process is started, the interface may have been assigned a dynamic IP address. If you do not see an IP address on the **vlan1** interface, this process allows you set a static IP address for management. This will over write the dynamically assigned IP address.

```
Current interface summary

Interface               IP-Address      OK? Method Status                Protocol
Vlan1                   10.0.113.39     YES DHCP   up                    up
GigabitEthernet1/1      unassigned      YES unset  down                  down
GigabitEthernet1/2      unassigned      YES unset  down                  down
GigabitEthernet1/3      unassigned      YES unset  down                  down
```

```
GigabitEthernet1/4        unassigned    YES unset  down                    down
GigabitEthernet1/5        unassigned    YES unset  down                    down
GigabitEthernet1/6        unassigned    YES unset  down                    down
GigabitEthernet1/7        unassigned    YES unset  down                    down
GigabitEthernet1/8        unassigned    YES unset  down                    down
GigabitEthernet1/9        unassigned    YES unset  down                    down
GigabitEthernet1/10       unassigned    YES unset  down                    down
GigabitEthernet1/11       unassigned    YES unset   up                      up
AppGigabitEthernet1/1     unassigned    YES unset   up                      up

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

Step 7   Configure the interface by entering the switch IP address and subnet mask.

The configuration summary is displayed.

Step 8   Select option 2 to save the configuration and exit the configuration menu.

The switch can run on the default configuration. However, you can use the CLI, enter commands at the **Switch>** prompt to change the configuration or perform other management tasks.

Example

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

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
Configuring global parameters:

  Enter host name [Switch]: Switch

  The enable secret is a password used to protect
  access to privileged EXEC and configuration modes.
  This password, after entered, becomes encrypted in
  the configuration.
  -------------------------------------------------
  secret should be of minimum 10 characters and maximum 32 characters with
  at least 1 upper case, 1 lower case, 1 digit and
  should not contain [cisco]
  -------------------------------------------------
  Enter enable secret: **********
  Confirm enable secret: **********
Netconf SSH RSA key generated
Key Name: NETCONF_SSH_RSA_KEY
Key Type: ssh-rsa
Modulus Size: 2048
Public Key: ssh-rsa AAAAB3AAAADAQABAAABAQC46E6OfS9Tl6bHuxJkyrCy9JDwgkE9tK
XJcgD2Mu26NTCGpIDRyGAjaj9+gc04Gc/TOHruWEt/XTZu9hWK1dN+rZytJMNw3nEavFcsm+d
```

```
gDzYwh3BAi16edDil97YzlNr5bsisrgehSqKoq7Srj8fW3SyPNRU2WNdbeLkwjLtZQSgA7hBL
x1r9V+wS9+hk8SQJsMRBhMSLMo7Mo/XZ22risylZPeWvypmip6zGakKm14K8TbgnKmTbgZscp
hn/qJ9ag+tzuDQug+ZLWw/QE3MJHZmcbXdt1gcE8b0lTRT
```

```
  The enable password is used when you do not specify an
  enable secret password, with some older software versions, and
  some boot images.
  Enter enable password: **********

  The virtual terminal password is used to protect
  access to the router over a network interface.
  Enter virtual terminal password: *********

Current interface summary

Interface                 IP-Address      OK? Method Status            Protocol
Vlan1                     10.0.113.39     YES DHCP   up                      up
GigabitEthernet1/1        unassigned      YES unset  down                  down
GigabitEthernet1/2        unassigned      YES unset  down                  down
GigabitEthernet1/3        unassigned      YES unset  down                  down
GigabitEthernet1/4        unassigned      YES unset  down                  down
GigabitEthernet1/5        unassigned      YES unset  down                  down
GigabitEthernet1/6        unassigned      YES unset  down                  down
GigabitEthernet1/7        unassigned      YES unset  down                  down
GigabitEthernet1/8        unassigned      YES unset  down                  down
GigabitEthernet1/9        unassigned      YES unset  down                  down
GigabitEthernet1/10       unassigned      YES unset  down                  down
GigabitEthernet1/11       unassigned      YES unset  up                      up
AppGigabitEthernet1/1     unassigned      YES unset  up                      up

Enter interface name used to connect to the
management network from the above interface summary: Vlan1

Configuring interface Vlan1:
    IP address for this interface [10.0.113.39]:
    Subnet mask for this interface [255.0.0.0] :
    Class A network is 10.0.0.0, 8 subnet bits; mask is /8

The following configuration command script was created:

hostname Switch
enable secret 9 $9$IjMTkpAcbKRIK.$W27WanN6KUn4NnrjTTJteGEox1u.
enable password enable_password
line vty 0 15
password teminal_password
no snmp-server
!
no ip routing

!
interface Vlan1
no shutdown
ip address 22.1.1.39 255.0.0.0
!
interface GigabitEthernet1/1
!
interface GigabitEthernet1/2
!
interface GigabitEthernet1/3
!
interface GigabitEthernet1/4
!
interface GigabitEthernet1/5
```

```
!
interface GigabitEthernet1/6
!
interface GigabitEthernet1/7
!
interface GigabitEthernet1/8
!
interface GigabitEthernet1/9
!
interface GigabitEthernet1/10
!
interface GigabitEthernet1/11
!
interface AppGigabitEthernet1/1
!
end


[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.

Enter your selection [2]: 2
Building configuration...
[OK]
Use the enabled mode 'configure' command to modify this configuration.



Press RETURN to get started!
```

Configure System Security

The device is configured with Type-6 encryption by default. To change the encryption type, see Controlling Switch Access with Passwords and Privilege Levels.

Troubleshooting

Diagnosing Issues

The switch LEDs provide troubleshooting information about the switch. They show boot failures, port-connectivity problems, and overall switch performance. You can also get statistics from Web UI, the CLI, or an SNMP workstation. See the Cisco IE3500, IE3505 Rugged Series Switch Software Configuration Guide, or the documentation that came with your SNMP application for details.

Switch LEDs

Look at the port LEDs when troubleshooting the switch. See LEDs 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 Cable and Connectors for information.

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

10/100/1G Port Connections

If a port appears to malfunction:

- Verify the status of all ports by checking the LEDs. For more information, see Switch LEDs, on page 55.

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

- Verify the cable type.

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.

Reset the Switch

These are reasons why you might want to reset the switch startup configuration to factory defaults:

- 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. To securely erase all data, see Secure Data Wipe, on page 59.

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:

Procedure

Step 1 Press and hold the Express Setup button (recessed behind a small hole in the faceplate) for about 15 seconds with a paper clip or similar object.

The Express Setup LED will blink red/green when its recessed button has been held down long enough.

Step 2 The switch reboots. The system LED turns green after the switch completes rebooting.

Step 3 Press the Express Setup button again for 3 seconds. A switch 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 Configure Switch using CLI, on page 47.

Emergency Recovery Installation

⚠️

Attention   Emergency Recovery image is installed at manufacturing and is not updateable in the field. It may contain security vulnerabilities, and may not support features that were added in subsequent IOS images.

The Emergency Recovery image is a version of IOS that is always present on the system. It is installed in the **emgy0:** partition, and is write-protected to prevent accidental deletion.

Use the **dir emgy0:** command to see the Emergency Recovery image, and then "**boot emgy0:***<image name>* to boot.

When using the Emergency Recovery image, it is recommended to isolate the switch by disconnecting external network interfaces, blocking remote access, and so on.

Secure Data Wipe

Secure data wipe is used to remove confidential information from the switch.

This feature is supported in all license levels:

- IE3500

- IE3505

When a secure data wipe is performed most user accessible flash memories are erased, including:

- User configuration and passwords

- Cisco IOS XE image

- Embedded MultiMediaCard (eMMC)

- rommon variables

- TPM Secure Storage

✏️

Note   The secure data wipe process clears contents from SD card and USB devices. Alternatively, you may manually erase or reformat external storage devices.

After a secure data wipe the switch will return to a rommon prompt with the factory-default settings.

✏️

Note   If an sdflash/usbflash with a valid image inserted, the device will boot with the image in the external media based on the boot precedence. The device will be in rommon only if no external media with an image is inserted in the device.

Perform Secure Data Wipe

To enable secure data wipe, enter the **factory-reset all secure** command in priviledged exec mode, as shown in the following example:

```
Switch#factory-reset ?
  all                  All factory reset operations
  keep-licensing-info  Keep license usage info
Switch#factory-reset all ?
secure  Securely reset all
Switch#factory-reset all secure
The factory reset operation is irreversible for securely reset all. Are you sure? [confirm]Y
```

factory-reset command options:

- **factory-reset all**—Remove everything from flash

- **factory-reset keep-licensing-info**—Keep the licensing information after factory reset and remove everything else from flash.

- **factory-reset all secure** —Remove everything from flash, and also unmount and sanitize the partitions before mounting back. This ensures that the data from those partitions cannot be recovered.

☞

Important   The **factory-reset all secure** operation may take hours. Please do not power cycle.

To check the log after the switch executes the command, boot up IOS XE and enter the following **show** command:

```
Switch#show platform software factory-reset secure log
Factory reset log:
#CISCO DATA SANITIZATION REPORT:# IE3200
Purge ACT2 chip at 12-08-2022, 15:17:28
ACT2 chip Purge done at 12-08-2022, 15:17:29
mtd and backup flash wipe start at 12-08-2022, 15:17:29
mtd and backup flash wipe done at 12-08-2022, 15:17:29.
```

Locate the Switch Serial Number

If you contact Cisco Technical Assistance, you must know the serial number of your switch. You can use the **show version** privileged EXEC command to obtain the switch serial number.

Also, the Serial Number for the switch is printed on the device label, on the device itself.

How to Recover Passwords

The default configuration for the switch allows an end user with physical access to the switch to recover from a lost password by interrupting the boot process during power-on and by entering a new password. These recovery procedures require that you have physical access to the switch.

Note   On these devices, a system administrator can disable some of the functionality of this feature by allowing an end user to reset a password only by agreeing to return to the default configuration. If you are an end user trying to reset a password when password recovery has been disabled, a status message reminds you to return to the default configuration during the recovery process.

See Reset the Switch, on page 58 for the procedure to reset the switch and enter a new password.

Technical Specifications

- Technical Specifications, on page 63
- Installation Guidelines for Utility, Railway, and Marine Environments, on page 65

Technical Specifications

The most current technical specifications for the Cisco IE3500, IE3505 Rugged Series Switch can be found in Cisco IE3500 Rugged Series Data Sheet.

Enclosure Specifications

Table 2: Enclosure specifications for the Cisco IE 3X00 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[2].

[2] lfm = linear feet per minute.

Current and Input Voltage Ratings

Table 3: Current and Input Voltage Rating

Model	Voltage Range	@Max Amps	Maximum PoE Power Budget
IE-3500-8T3S-E IE-3500-8T3S-A	12–48 VDC	7.0 A	N/A

Model	Voltage Range	@Max Amps	Maximum PoE Power Budget
IE-3500-8P3S-E IE-3500-8P3S-A	12–54 VDC	11.0 A	360 W
IE-3505-8T3S-E IE-3505-8T3S-A	12–48 VDC	7.0 A	N/A
IE-3505-8P3S-E IE-3505-8P3S-A	12–54 VDC	11.0 A	360 W
IE-3500-8T3X-E IE-3500-8T3X-A	12–48 VDC	7.0 A	N/A
IE-3500-8U3X-E IE-3500-8U3X-A	12–54 VDC	11.5 A	480 W

Note The primary switch's power ratings account for the power supplied to the supported expansion modules. Since the expansion modules cannot function as standalone devices, they do not have independent power ratings. The installer must configure the PoE power budget to match the installed power supply(s).

Table 4: Required Input Voltage for PoE Class

PoE Class	Minimum Input Voltage
PoE Type 1 (PoE Classes 1 through 3)	46 VDC
PoE+ Type 2 (PoE Class 4) 4PPoE Type 3 (PoE Classes 5 and 6)	52 VDC
4PPoE Type 4 (PoE Classes 8 and 7)	54 VDC

Alarm Ratings

Table 5: Cisco IE3x00 Alarm Ratings

Alarm Ratings	Specification
Alarm input electrical specification	Senses an external dry contact. The open circuit voltage between any alarm input (1 or 2) and alarm input common is 3.3 VDC. The loop current is 3 mA max per input.
	When the external contact is closed it must have a low-enough resistance to ensure the voltage at the switch is below 1.9 VDC.
	When the external contact is open it must have a high-enough resistance to ensure the voltage at the switch is at least 2.9 VDC.
	Do not apply external power to the alarm input.
Alarm output electrical specification	1.0 A @ 24 VDC or 0.5 A @ 48 VDC (Resistive loads only)

Installation Guidelines for Utility, Railway, and Marine Environments

Follow the guidelines in this section when installing the switch in utility, railway, and marine environments,

- Use shielded Ethernet cables to comply with the EMC requirements for power utility, power stations, railways, and marine environments. These installations refer to DNVGL CG-0339, IACS UR E10, IEC 60945.

- Use industrial grade SFP modules rated for -40C to +85C operation.

- For marine installations, you must install the product inside a metal enclosure, preferably IP54 or better.

- Use DNVGL "Type Approved" power supply for marine installations that use DNVGL CG-0339 guidelines.

Cisco IE3500/IE3505 switch series switches require 54 V (typical) for PoE operation. Refer to the section for more details on the power input.

C H A P T E R **7**

Cable and Connectors

Cable and Connectors

Connector Specifications

10/100/1G Ports

The 10/100/1G Ethernet ports on the switches use RJ-45 connectors.

Figure 17: 10/100/1G Port Pinouts

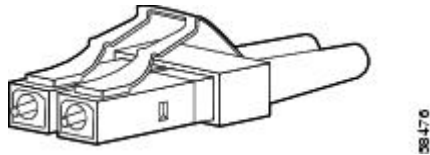| Pin	Label
1	TP0+
2	TP0-
3	TP1+
4	TP2+
5	TP2-
6	TP1-
7	TP3+
8	TP3-

Note Connector pins 1, 2, 3, and 6 are used for PoE.

SFP Module Connectors

The illustration below shows an LC style connector that is used with the SFP Module slots. It is a fiber-optic cable connector.

**Figure 18: Fiber-Optic SFP Module LC Connector**

⚠ **Warning**   **Statement 1051**—Laser Radiation

Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.
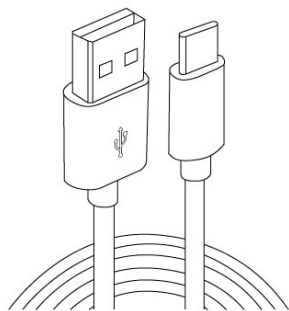
Console Port

The switch has two console ports: a USB-C port on the front panel (see image below) and an RJ-45 console port on the rear panel.

Figure 19: USB -C Port

Type - C
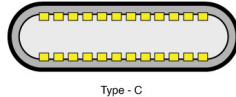
The USB console port uses a USB-C cable, shown in the illustration. The USB-C cable is not supplied.

Figure 20: USB-C Cable

The RJ-45 console port uses an 8-pin RJ-45 connector. A RJ45-to-DB-9 adapter cable is used to connect the console port of the switch to a console PC.

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. Refer to the Data Sheets for the complete list of supported SFP Modules and cables.

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

  Note When using modules SFP-10G-ER-I & ONS-SI+-10G-ER, we require 5°C temperature derating.

- 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.
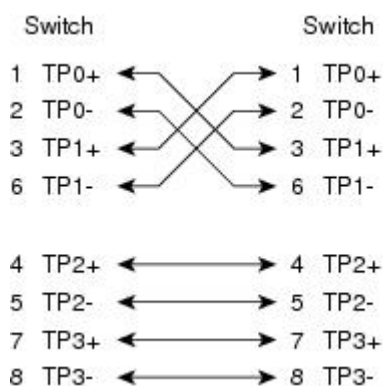
Cable Pinouts

Figure 21: Four Twisted-Pair Straight-Through Cable Schematic for 1000BASE-T Ports
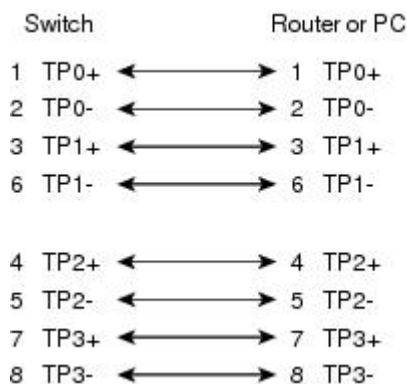
*Figure 22: Four Twisted-Pair Crossover Cable Schematics for 1000BASE-T Ports*

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 23: Identifying a Crossover Cable
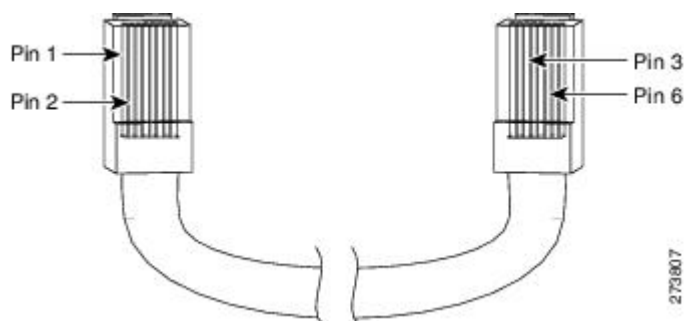
Console Port Adapter Pinouts

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.

Switch ConsolePort (DTE)	RJ-45-to-DB-9Terminal Adapter	ConsoleDevice
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.

SwitchConsolePort (DTE)	RJ-45-to-DB-25Adapter	ConsoleDevice
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