Switch Installation

Switch Installation

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

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

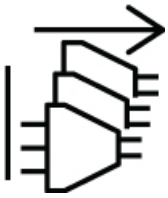
This unit is intended for installation in restricted access areas. Only skilled, instructed, or qualified personnel can access a restricted access area.

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 28.
- 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.

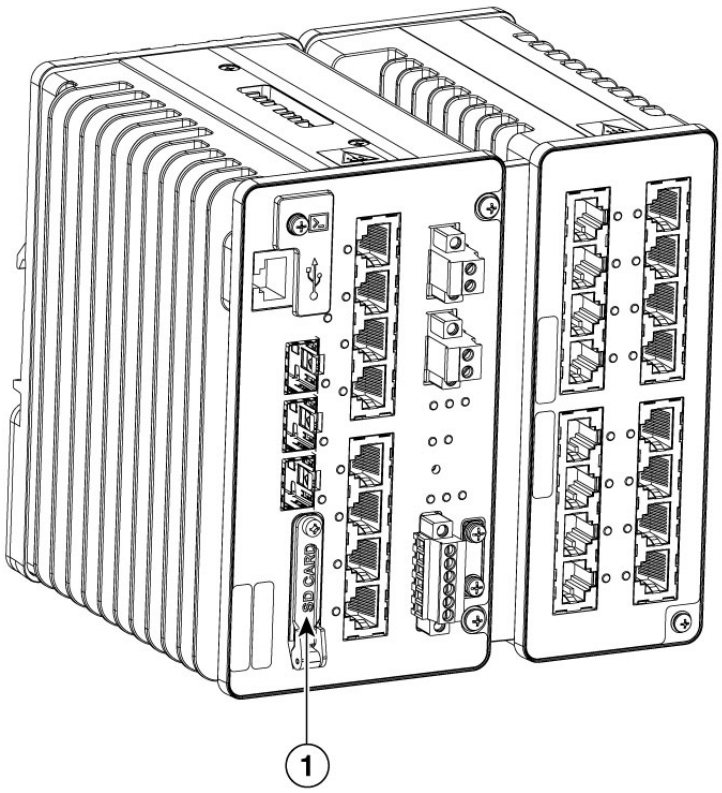
It is strongly recommended that you use the SD card to boot or store the config for future easy replacement, in case of a hardware failure.

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 1: 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 Console Port CLI access.

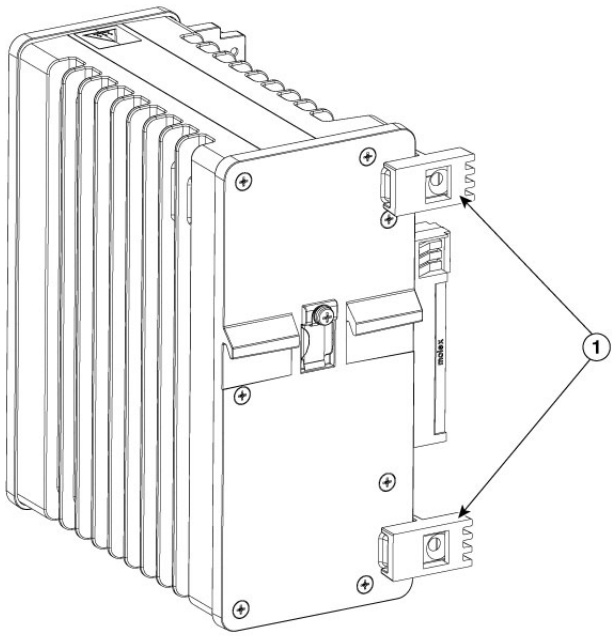
Attach an Expansion Module (Optional)

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:

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

Procedure

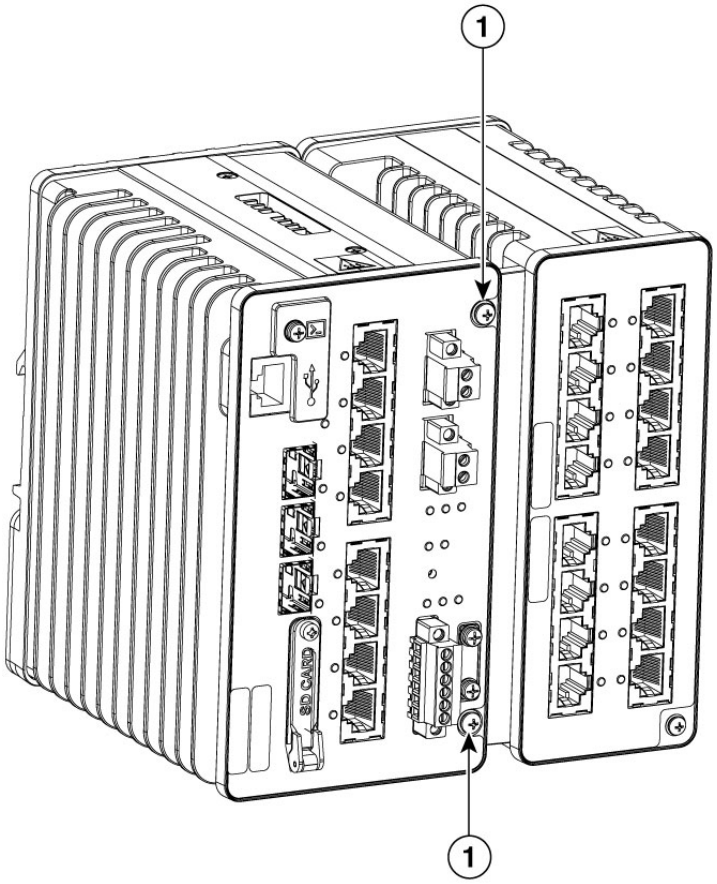
Step 1 Remove the two rubber bumpers (#1) covering the tabs.

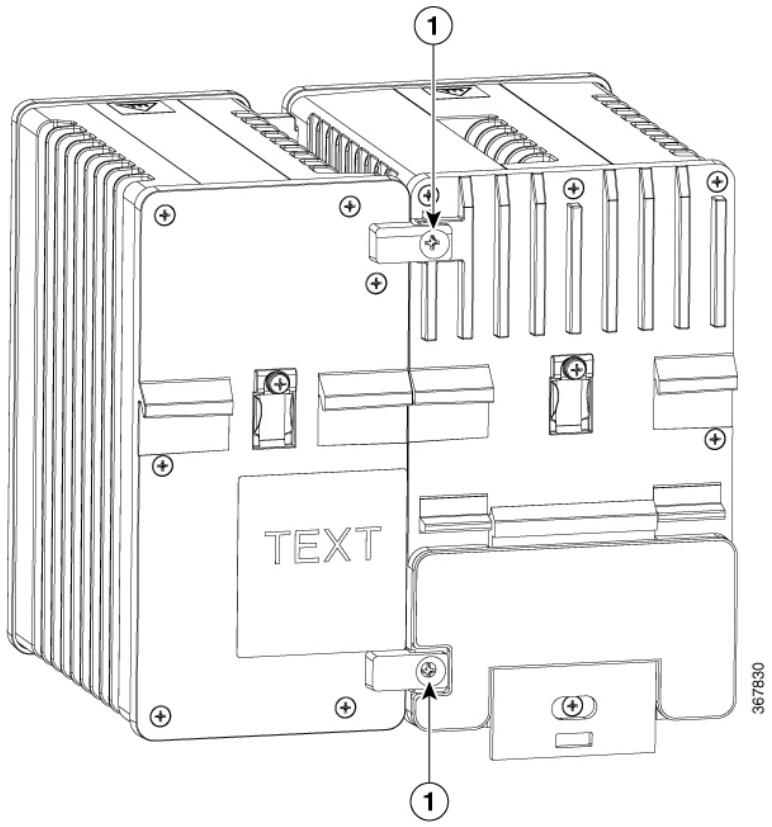


1	Rubber bumpers

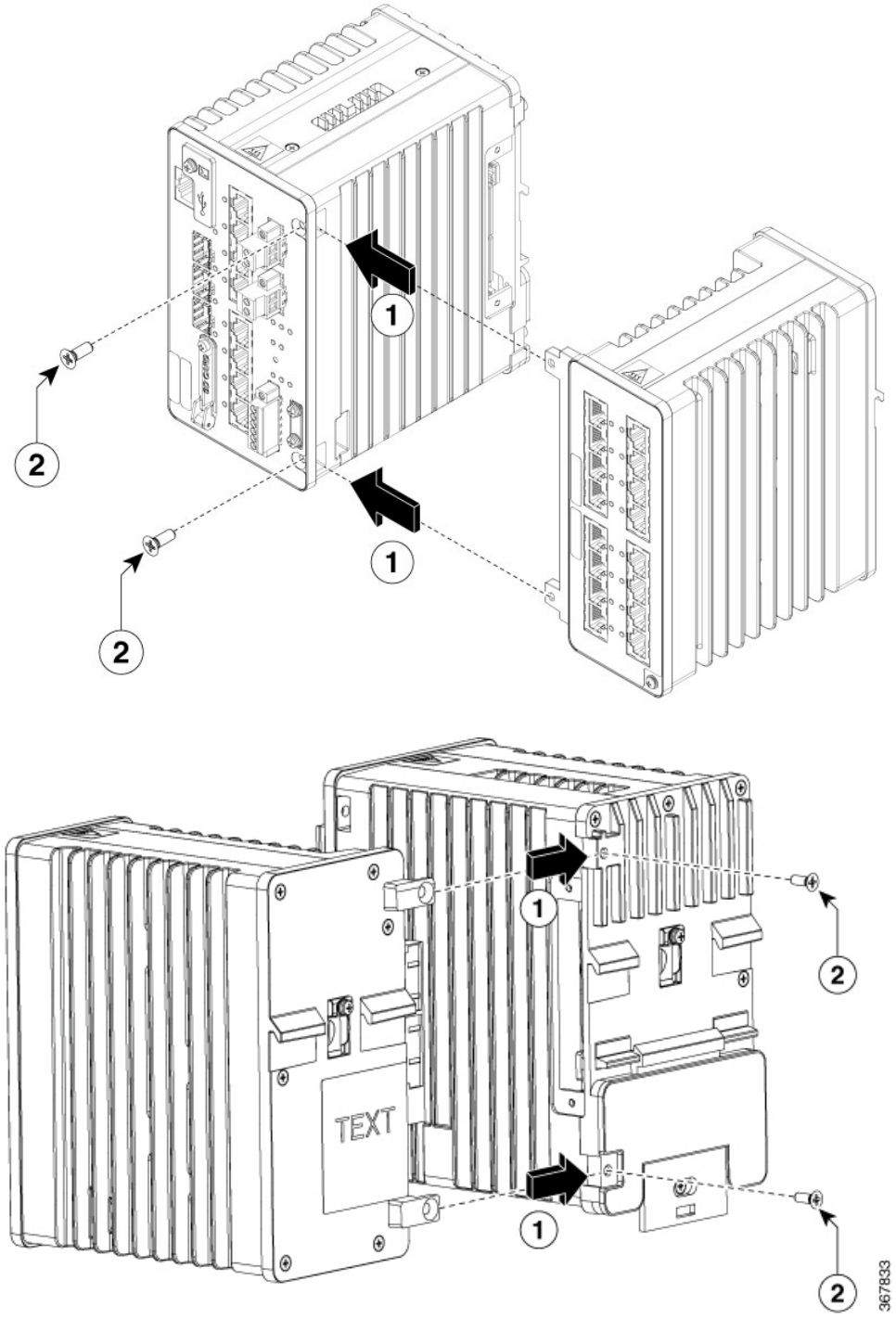
Step 2 Remove the 2 screws securing the side cover plate to the switch.

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:

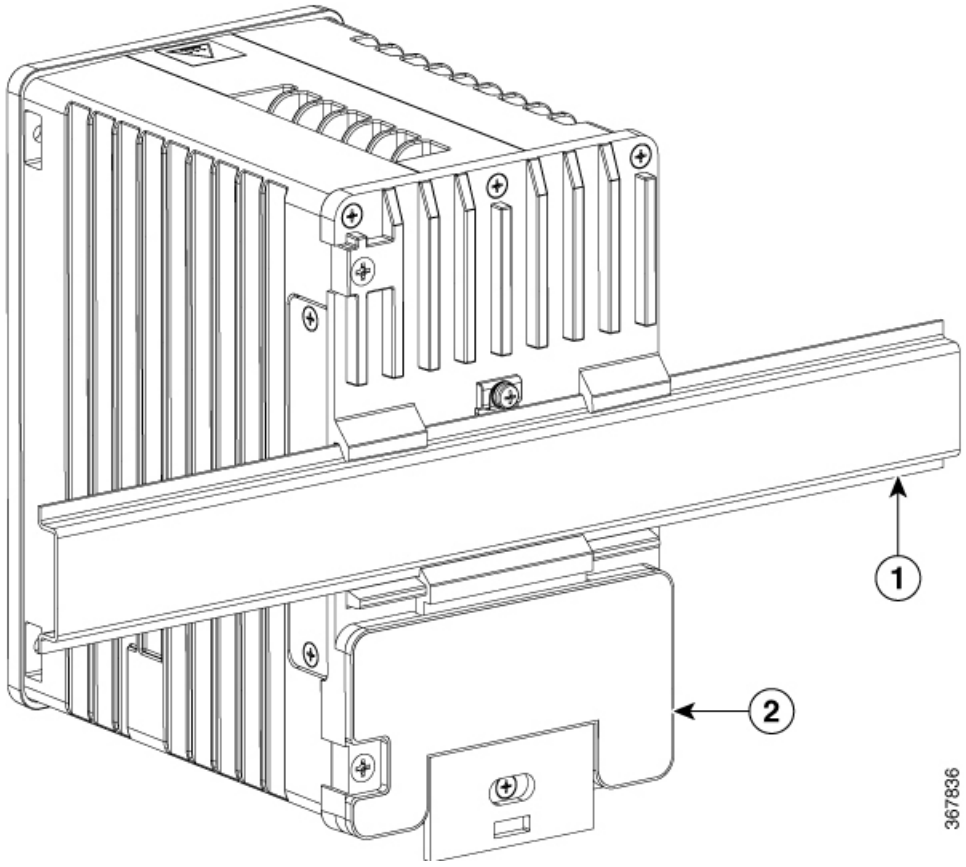
Procedure

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 2: 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 21.

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:

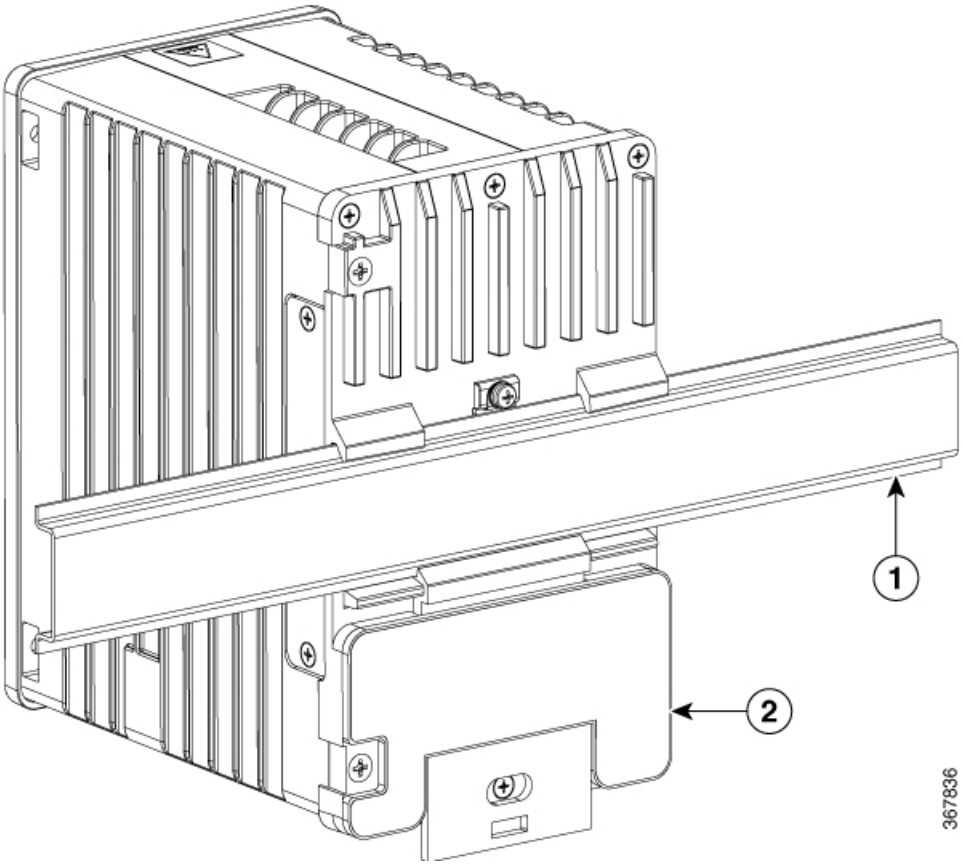
Procedure

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 3: 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.

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 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:

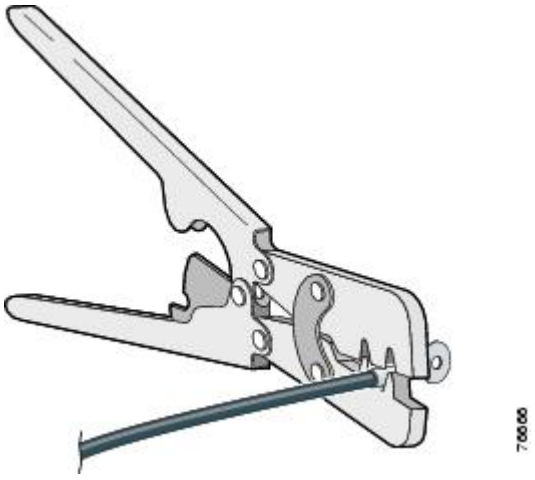
Procedure

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 4: Crimping the Ring Terminal



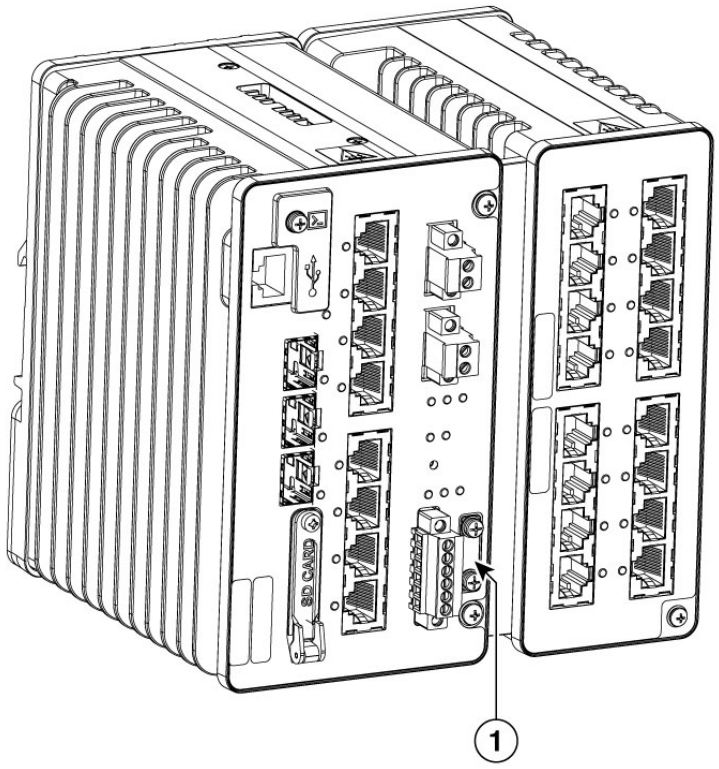
Step 4 Slide the ground screw through the terminal.

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 5: 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.

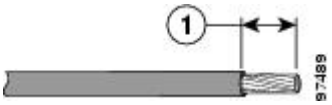
The 5mm pitch "Euroblock" style power connectors supplied with the switch accept conductors between 14 and 26 AWG.

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 6: Stripping the Power Connection Wire

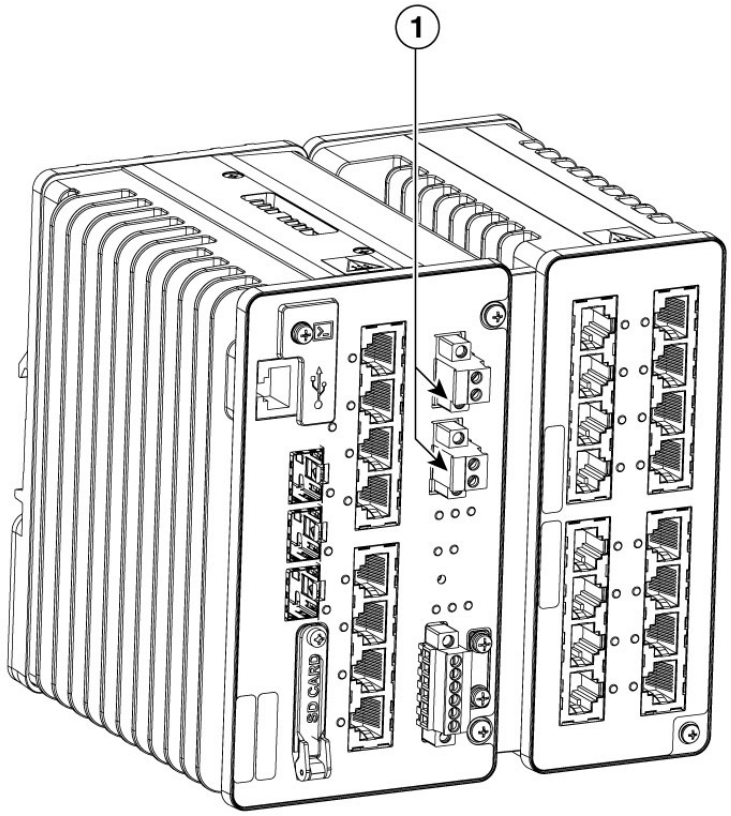


1	0.25 in. (6.3 mm) ± 0.02 in. (0.5 mm)

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 7: 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.

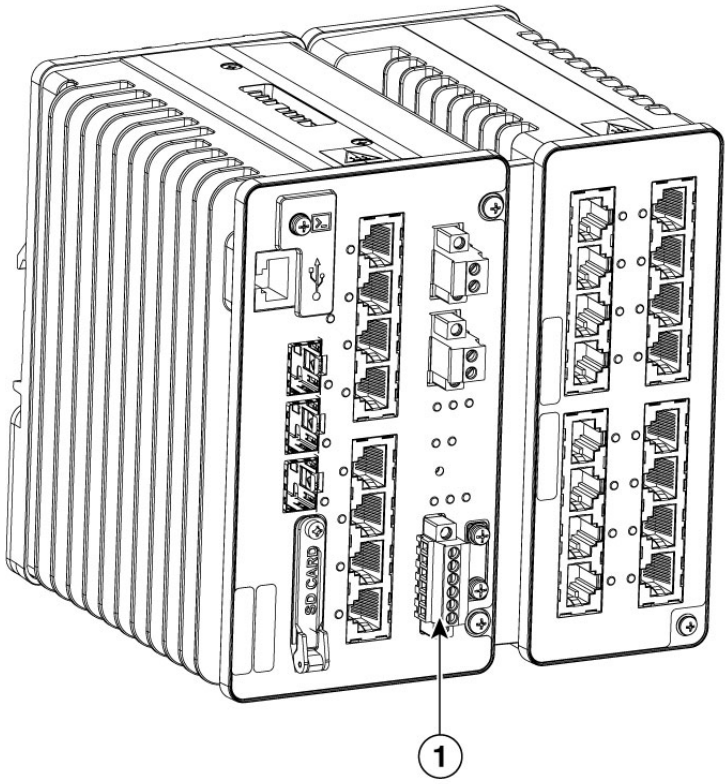
Note Wire connections to the power and alarm connectors must use copper wire that is appropriately-rated for the installation environment.

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 8: 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.

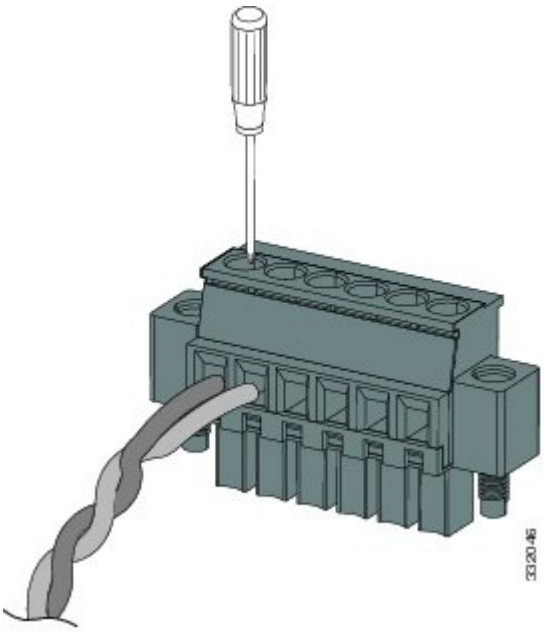
Stripping more than the recommended amount of wire can leave exposed wire from the alarm connector after installation.

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 9: 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 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.

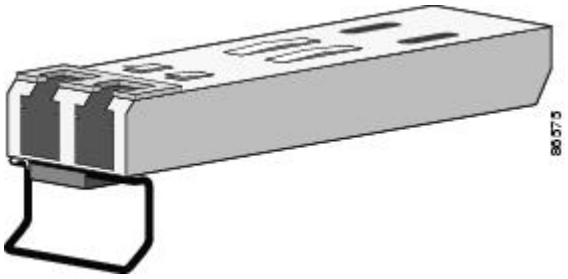
Install SFP Modules into SFP Module Ports

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 10: 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 25.

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 1.

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 Troubleshooting 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.