Installing the S50 System

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FORCE10™

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Preface About this Guide

This guide provides site preparation recommendations, step-by-step procedures for rack mounting and desk mounting, inserting optional modules, and connecting to a power source.

After you have completed the hardware installation and power-up of the S50, refer to the *SFTOS™ Configuration Guide* for software configuration information and the *SFTOS™ Command Reference* for detailed Command Line Interface (CLI) information.

Information Symbols

The following graphic symbols are used in this document to bring attention to hazards that exist when handling the S50 and its components. Please read these alerts and heed their warnings and cautions.

Table 1 describes symbols contained in this guide.

Table 1 Information Symbols

Symbol	Warning	Description
	Danger	This symbol warns that improper handling and installation could result in bodily injury. Before you begin work on this equipment, be aware of hazards involving electrical circuitry, networking environments, and instigate accident prevention procedures.
	Caution	This symbol informs you that improper handling and installation could result in equipment damage or loss of data.
	Warning	This symbol informs you that improper handling may reduce your component or system performance.
	Note	This symbol informs you of important operational information.

Related Publications

For more information about the S50, refer to the following documents:

- *SFTOS™ Configuration Guide*
- *SFTOS Command Reference*
- *S50 Quick Reference*
- *S-Series and SFTOS Release Note*s

Each of these documents are available on the product CD-ROM and on the iSupport website (registration for access to some sections is required):
https://www.force10networks.com/csportal20/KnowledgeBase/Documentation.aspx

The iSupport website also has a section for S-Series techtips and FAQs.

The CD-ROM also has:

- **MIBs**: Files for all SNMP MIBs supported by SFTOS
- **Data sheets**: Links to Force10 product data sheets
- **Security**: Description and supporting files for setting up SSH, SSL, and HTTPS access to the switch
- **Software**: SFTOS Layer 2 software
- **Training**: PDF files of the slide shows used in training

Chapter 1 The S50 System

The Force10 Networks S50 is a high performance, low cost, stackable, Layer 2 switch/Layer 3 router that supports 48 built-in 10/100/1000 Base-T ports, four SFP (small form-factor pluggable) ports, and two optional 10-Gigabit XFP or CX4 ports. For stacking details, see Chapter 3, Installing the S50, on page 22.

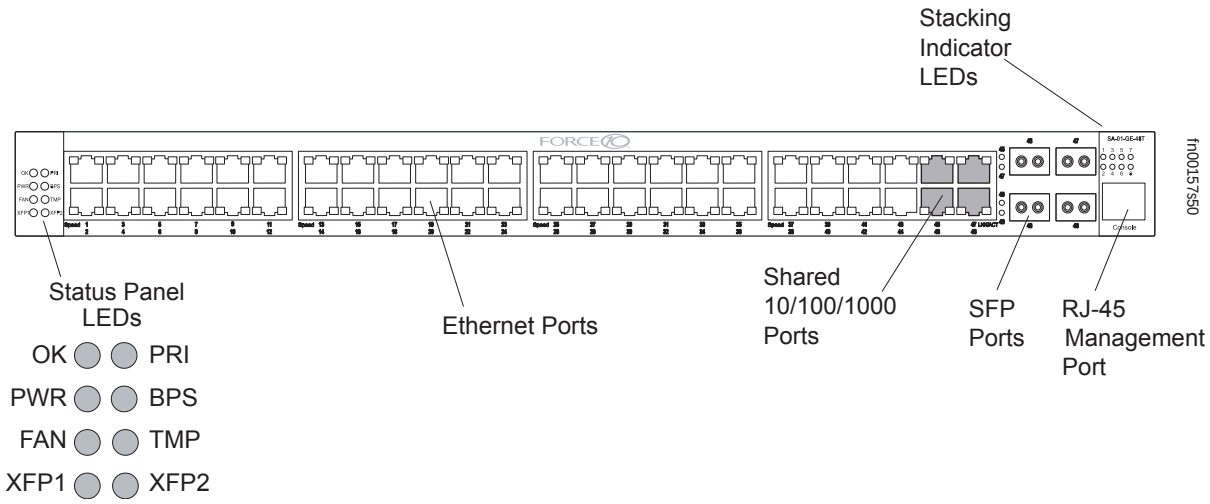


Figure 1 The S50 (Front View)

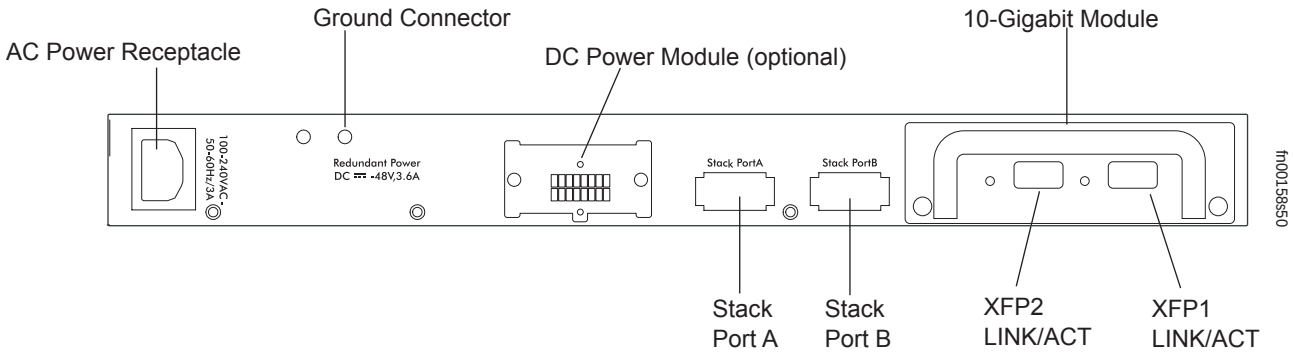


Figure 2 The S50 (Rear View)

Equipment

The following items are necessary to install the S50 system:

- The switch
- One grounded AC power source per S50
- Cable to connect the AC power source to the S50 chassis (included)
- Brackets for rack installation (supplied)
- Screws for rack installation and #2 Phillips screwdriver (not supplied)

Other optional components are:

- Stacking cables for connecting S50s when stacked
- Backup DC Power Module (see Chapter 4, Installing Backup Power, on page 27)
- Power Supply Unit (AC-to-DC converter)
- External power shelf and cable to connect to the S50 chassis
- Optical networking components (see Chapter 5, Installing Ports, on page 31)

Features

- S50 CPU and switch processor
- S50 memory and MAC addresses
- Stackable switch features
- 19-inch rack-mountable
- Standard 1U chassis height
- Six built-in fans
- Internal power supply
- Up to 16K MAC address entries supported with hardware assisted aging
- Supports 9K jumbo frames
- Back-pressure support at half-duplex, IEEE 802.3x flow control at full duplex
- Extensive LED system with per-port LEDs

Ports

- Two optional XFP or CX4 10G ports
- 48 fixed 10/100/1000 Mbps auto-sensing and auto MDIX RJ45 ports
- Four ports capable of using 10/100/1000 Base-T or 1000 Base-X using auto-media detect
- Two 10G stacking ports
- Console port (see Accessing the Console Port on page 31): Supplied with console cable (straight-through Ethernet copper cable) and terminal adapter (DB-9 to RJ-45)

System Status

S50 status information can be derived in several ways, including physical LED displays and boot menu options, both discussed here, along with CLI “show” commands, SNMP traps, and the SFTOS Web User Interface. For details on those options, see the *SFTOS Command Reference* and the *SFTOS Configuration Guide*.

LED Displays

As shown in Figure 1 on page 7, the S50 front panel contains several sets of LEDs:

- Stacking LEDs at the top right of the front panel: Eight LEDs, numbered 1 through 8, indicate the number of this unit in the stack. For more on unit numbering, see Hot-swapping Units in a Stack on page 24.
- Status indicator LEDs on the left side of the front panel, explained in Table 3.
- Each port has status indicator LEDs, described in Table 2.

Table 2 Port LED Displays

Feature	Description
10/100/1000 Port LED*	Speed LED (left side of each port) Green — 1000M Amber — 100M Off — 10M Link/Active LED (right side of each port) Green — Link up on this port Blinking Green — Activity, transmitting or receiving packet at this port. Off — No Link detected at this port
SFP Port LED*	Link/Activity LED Green — Link up on this port Blinking Green — Activity, transmitting or receiving packet in link up state Off — No Link detected at this port
XFP Port LED	Link/Activity LED Green — Link up on this port Blinking Green — Activity, transmitting or receiving packet in link up state Off — No Link detected at this port

* The LEDs for a 10/100/1000 port numbered 45 through 48 are inactive if the shared SFP port (also labeled 45 through 48) is enabled.

Note: As suggested by the footnote above, the fiber SFP ports have priority over the four 10/100/1000 ports with the same number.

The following table describes the LED status indicators on the left side of the front panel.

Table 3 Status Panel LED Display

Label	LED Color	Description
OK	Green	Unit is operational.
	Off	Unit is powered off.
	Green Blinking	Unit is booting up.
	Amber Blinking	File download is in progress.
		Note: The blinking rate for the OK (green) LED is 1 Hz.
PWR	Green	Main power supply is OK.
	Amber	Main power supply is operating outside expected parameters.
FAN	Green	All Fans are OK.
	Amber	At least one fan is operating outside expected parameters.
XFP1	Green	10G1 link
	Blinking Green	10G1 active
	Off	10G1 no link
PRI	Green	This is the primary unit.
	OFF	This is *not* the primary unit.
BPS	Green	Redundant power supply is OK.
	Amber	Redundant power supply is operating outside expected parameters or is not installed.
TEMP	Green	Temperature is OK.
	Amber	Temperature is operating outside expected parameters.
XFP2	Green	10G2 link
	Blinking Green	10G2 active
	Off	10G2 no link

Chapter 2 Site Preparations

This chapter describes requirements and procedures to install your S50 system. This chapter covers the following topics:

- Site Selection
- Cabinet Placement
- Rack Mounting
- Fans and Airflow
- Power
- Storing Components

For detailed S50 specifications, refer to Chapter 6, S50 Specifications, on page 35.

Note: Install the S50 into a rack or cabinet before installing any optional components.

Site Selection

Make sure that the area where you install your S50 chassis meets the following safety requirements:

- Near an adequate power source. Connect the system to the appropriate branch circuit protection as defined by your local electrical codes.
- Environmental temperature between 32° – 122°F (0° – 40°C).
- Relative humidity that does not exceed 95% non-condensing.
- In a dry, clean, well-ventilated and temperature-controlled room, away from heat sources such as hot air vents or direct sunlight.
- Away from sources of severe electromagnetic noise.
- Positioned in a rack, cabinet, or on a desktop with adequate space in the front, rear, and sides of the unit for proper ventilation, and access.

Cabinet Placement

The cabinet must meet the following criteria:

- Minimum cabinet size and airflow are according to the EIA standard.
- Minimum of 5 inches (12.7 cm) between the side intake and exhaust vents and the cabinet wall.

Rack Mounting

When you prepare your equipment rack, ensure that the rack is earth ground. The equipment rack must be grounded to the same ground point used by the power service in your area. The ground path must be permanent.

Fans and Airflow

For proper ventilation, position the S50 chassis in an equipment rack (or cabinet) with a minimum of five inches (12.7 cm) of clearance around the side intake and exhaust vents. When two S50 systems are installed side by side, position the two S50 chassis at least 5 inches (12.7 cm) apart to permit proper airflow. The acceptable ambient temperature ranges are listed in Environmental Parameters on page 35.

As listed in Table 3, “Status Panel LED Display,” on page 10, the front panel of the S50 has both a fan status LED and a temperature LED. The fan status LED is green when all of the six fans are operating normally, amber when any are not operating normally. The fan speed increases when the temperature of either of the two sensors reaches 72 degrees C, and decreases to normal speed when the temperature falls to 57 degrees C. The switch never intentionally stops managing traffic.

The temperature status LED is also green when the switch is operating within required temperature parameters. The LED turns amber when either of the two temperature sensors indicates an out-of-range temperature, and returns to green when the temperature returns to normal. SFTOS logs a temperature warning message when a temperature of 77 degrees C is reached, and logs another message when the temperature returns to normal.

Use the **show logging buffered** command to see the log messages. For details, see the Syslog chapters of the *SFTOS Command Reference* or *SFTOS Configuration Guide*.

In a stack, each unit has its own temperature monitoring and control. Status logging is identified by unit in the system log.

Fan replacement is not offered as an option in the field.

Power

Use the power cord shipped with the S50 chassis to connect the chassis to the AC power outlet.

Caution: The power supply cord is used as the main disconnect device; ensure that the socket-outlet is located/installed near the equipment and is easily accessible.

Storing Components

If you do not install your system and components immediately, Force10 Networks recommends that you properly store the S50 and all optional components until you are ready to install them.

Warning: Electrostatic discharge (ESD) damage can occur when components are mishandled. Always wear an ESD-preventive wrist or heel ground strap when handling the S50 and its accessories. After you remove the original packaging, place the S50 and its components on an antistatic surface.

Follow these storage guidelines:

- Storage temperature should remain constant ranging from -4° to 158° F (-20°C to 70° C).
- Store on a dry surface or floor, away from direct sunlight, heat, and air conditioning ducts.
- Store in a dust-free environment.

Chapter 3 Installing the S50

To install the S50 system, Force10 Networks recommends that you complete the installation procedures in the order presented below.

- Inserting the 10-Gigabit Module (optional)
- Inserting Backup Power (optional)
- Tabletop Installation
- Rack or Cabinet Installation
- Connecting Stacking Ports (optional)
- Supplying Power

Warning: As with all electrical devices of this type, take all the necessary safety precautions to prevent injury when installing this system. Electrostatic discharge (ESD) damage can occur if components are mishandled. Always wear an ESD-preventive wrist or heel ground strap when handling the S50 and its components.

Inserting the 10-Gigabit Module (optional)

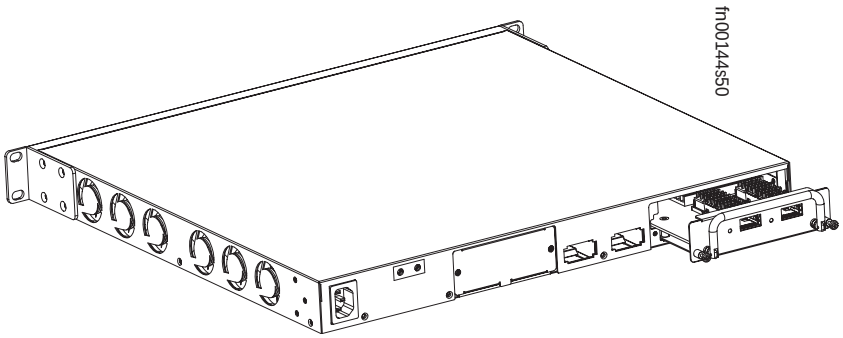
The S50 has a slot at the right rear of the chassis, for which there are two types of 10-Gigabit module available (see Figure 2)—fiber (optical) and copper (10GBase-CX4). Both have two ports (the system numbers them 49 and 50). The fiber module requires additional XFP inserts (see Installing XFPs on page 33). The ports in the copper CX4 module use the same kind of stacking cable that you use for the stacking ports.

Note: Before installing the CX4 card, contact Force10 TAC for instructions on connectors and on configuration.

To install a 10-Gigabit module, follow the steps below:

Step	Task
1.	Power down the S50; unplug the S50 from its power source.
2.	Remove the 10-Gigabit module faceplate located at the far right rear of the S50.

Step	Task
3.	Remove the 10-Gigabit module from its packaging and slide the module into the 10-Gigabit slot.



4.	Secure the captive screws on either side of the module.
5.	Connect the S50 to its power source and power up the S50.

Inserting Backup Power (optional)

The S50 switch has an optional DC power module that you install in the rear of the S50 chassis (see Figure 2). If you have purchased the backup power option, Force10 recommends that you install the DC power module before installing the unit in a rack, and that you connect the module to its AC-to-DC converter before powering up the S50. See Installing Backup Power on page 27.

Tabletop Installation

The S50 can be positioned on a stable tabletop. Keep the following in mind when using a tabletop for your S50:

- Ensure that your tabletop is stable and can handle the weight of the S50 or a stack of S50s, along with any added backup power supplies.
- Position the table so that there is proper ventilation and easy access to power outlets.

Rack or Cabinet Installation

The S50 provides three rack-mounting methods:

- Two-Post Rack Mounting
- Four-Post Rack-mounting with Threaded Rails
- Four-Post Rack-mounting with Cage Nuts

Two-Post Rack Mounting

The S50 is shipped with the universal front-mounting brackets (rack ears) attached. Ensure that there is adequate clearance surrounding the rack to permit access and airflow. If you are installing two S50 systems side-by-side, position the two S50 chassis at least 5 inches (12.7 cm) apart to permit proper airflow.

Position the S50 chassis in the rack. Secure the chassis with two screws through each bracket and onto the rack post.

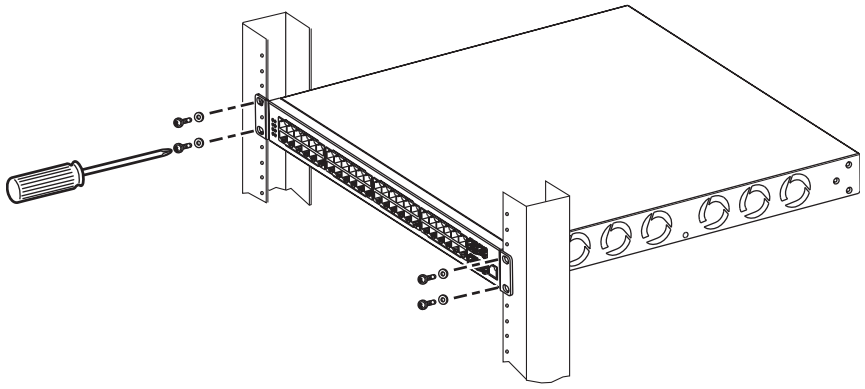
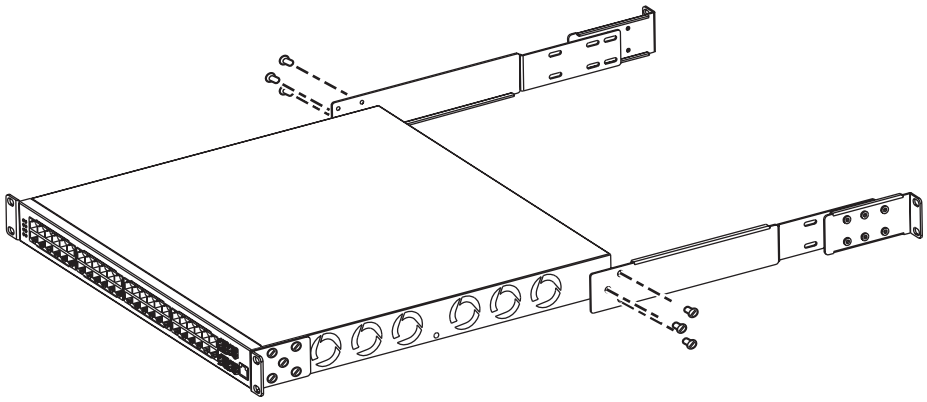


Figure 3 S50 Two-post (Front-mounted) Rack-mounting

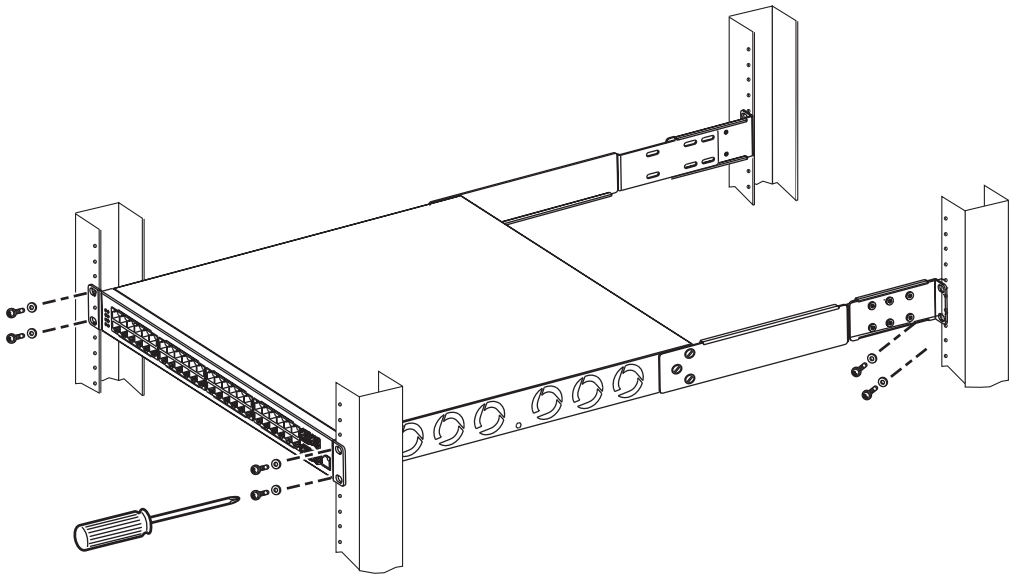
Four-Post Rack-mounting with Threaded Rails

Ensure that there is adequate clearance surrounding the cabinet or rack to permit access and airflow. If you are installing two S50 systems side-by-side, position the two S50 chassis at least 5 inches (12.7 cm) apart to permit proper airflow. Follow the steps below to install the S50 chassis into a four-post 19-inch equipment rack, using the attached front mounting brackets and the optional adjustable rear-mounting brackets.

Step	Task
1.	Align the three screw holes of the adjustable rear mounting bracket with the three holes in the S50 chassis, and secure the mounting bracket with three screws.



2.	Insert the S50 into the rack, and secure the chassis to the front post with two screws. Then secure the chassis to the rear posts with two screws.



Step	Task
3.	Set the adjustable rear mounting bracket to the length (one of three lengths) for your bracket. Secure the length with the four screws.

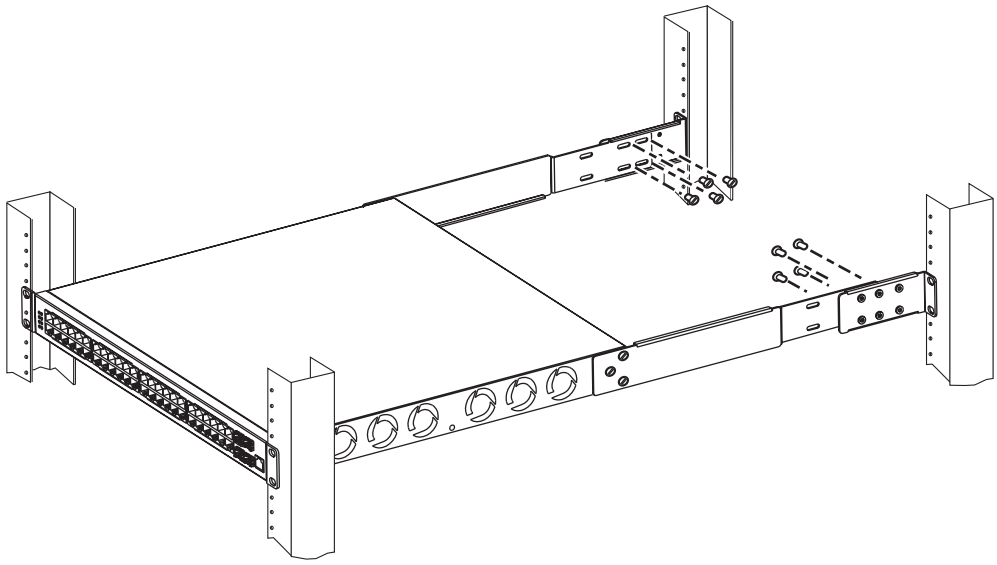
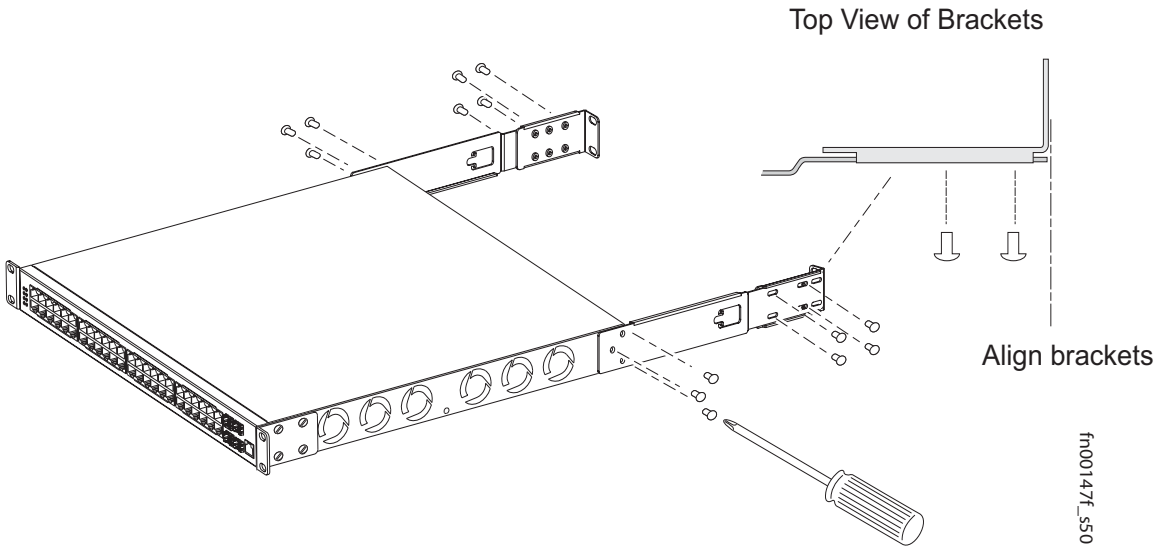


Figure 4 Four-post Rack-mounting with Adjustable Rear-mounting Brackets

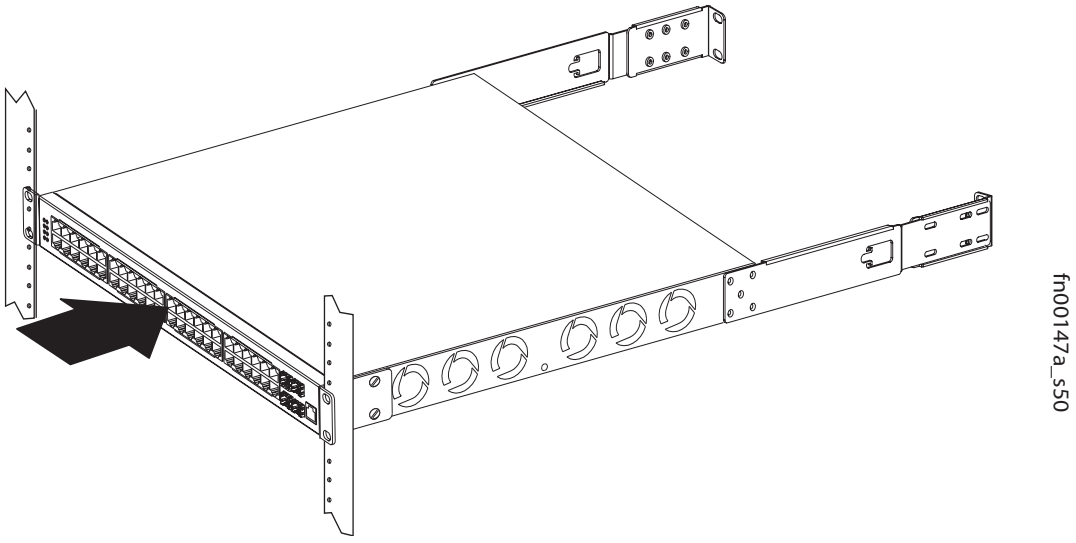
Four-Post Rack-mounting with Cage Nuts

Ensure that there is adequate clearance surrounding the cabinet or rack to permit access and airflow. If you are installing two S50 systems side-by-side, position them at least 5 inches (12.7 cm) apart. Follow the steps below to install the S50 chassis into a four-post rack mounting with cage nuts.

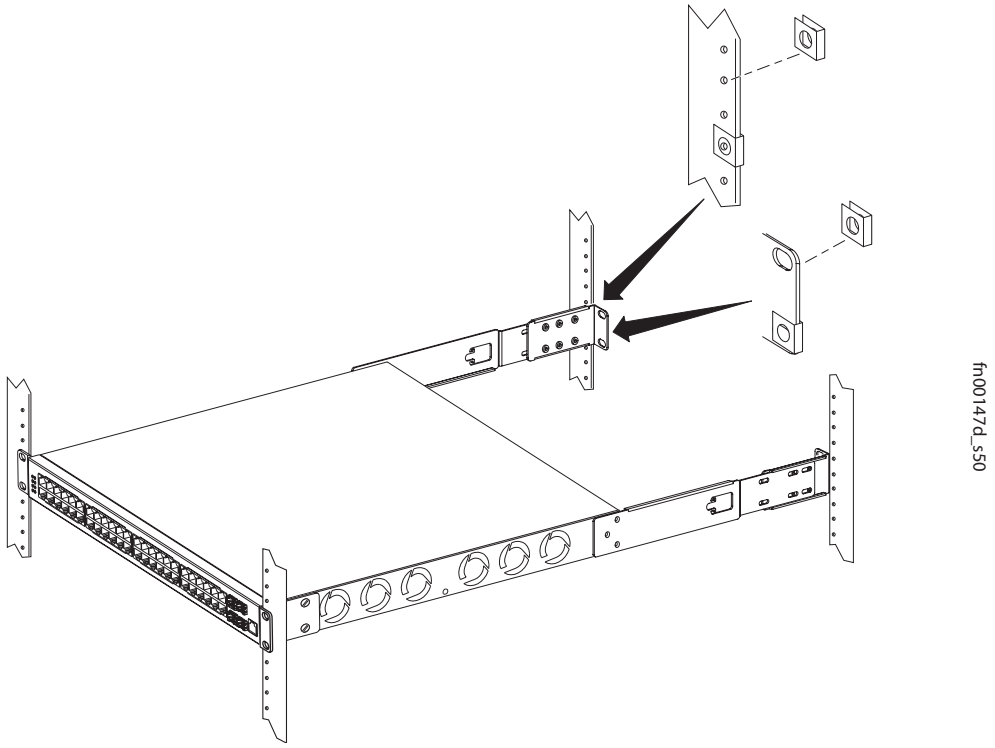
Step	Task
1.	Attach the two rear brackets to the side panels. Align the three holes in the bracket with the three holes on the S50 chassis, and secure the brackets to the chassis using the screws.



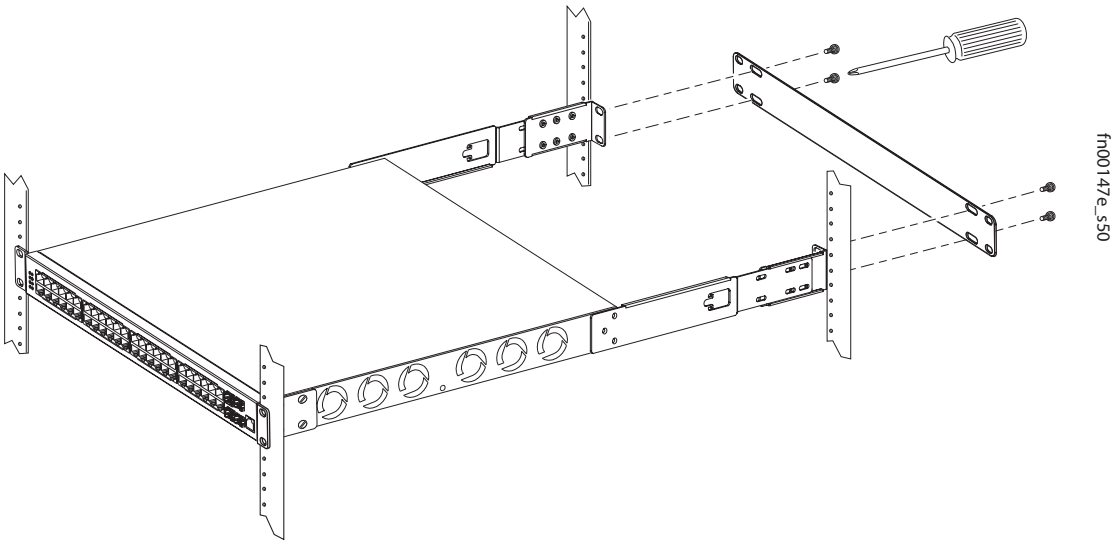
2.	Align and secure the adjustable bracket onto the rear bracket.
3.	Insert the S50 chassis into the rear of the rack. Position and secure the chassis with two screws into each front bracket flange and into the rack post.



Step	Task
4.	Position the cage nuts over the holes on each bracket flange and each rack post.



5.	Align the rack filler panel to the rear bracket and rack posts. Secure by inserting two screws into the hole in the filler panel through to the holes in the rack post.



Connecting Stacking Ports (optional)

You can connect up to eight S50s together through their stacking ports to have the units act as virtual slots in a single virtual system. The number of S50s in a stack is limited by the number of S50s with 10Gb modules:

- If zero or one S50 has a 10Gb module, the stack is limited to seven S50s.
- If three S50s have a 10Gb module, the stack is limited to six S50s.
- If four or more S50s have 10Gb modules, only five S50s are allowed in the stack.

You can connect the S50s while the units are powered down or up. You can use either a ring topology or cascade topology connection (see Figure 5). Use the special stacking cables to connect them through Stack Ports A and B, located at the rear of each S50.

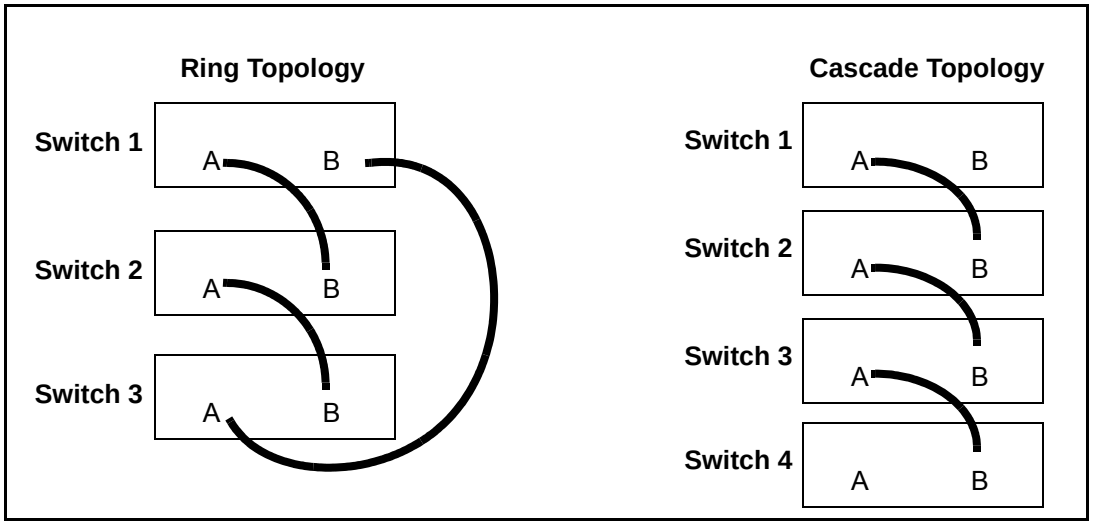


Figure 5 S50 Stacking Topologies

While the diagram shows A-to-B connections, the ports are bi-directional, so you can connect A-to-A or B-to-B, as shown below in examples of two-switch (Figure 6 on page 23) and three-switch (Figure 7 on page 23) ring topologies.

Connecting Two S50s

Rack-mount the S50s or insert them into a cabinet before you make your stacking port connections. Insert one end of the special stacking cable into a stacking port, and insert the other end into a stacking port of the adjacent S50. Hand-tighten all captive screws to ensure that the cable is secure in the connector. Optionally, insert another cable into the other open Stack Ports, as shown in Figure 6. The second cable provides both backup connectivity and increased data transfer between the units.

:

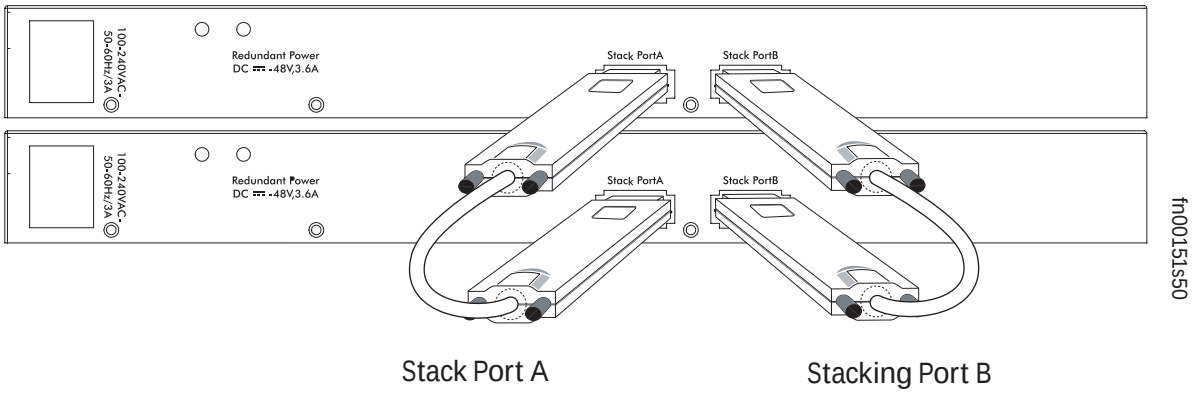


Figure 6 Stacking Ports of Two S50s Connected in Ring

Connecting Three S50 Switches

Force10 recommends the ring topology, as outlined above (Figure 5 on page 22), for stacking S50 switches, which provides redundant connectivity. Using the example of three switches in the stack (Figure 7), and starting with the S50 at the bottom of the stack:

- Insert one end of the first cable into Stack Port A.
- Insert the other end of the cable into Stack Port A of the middle S50.
- Insert the second cable into Stack Port B of the middle and top S50s.
- Use the remaining cable to connect the top and bottom S50s by inserting one end of the cable into the open Stack Port B of the bottom S50 and the other end of the cable into Stack Port A of the top S50.

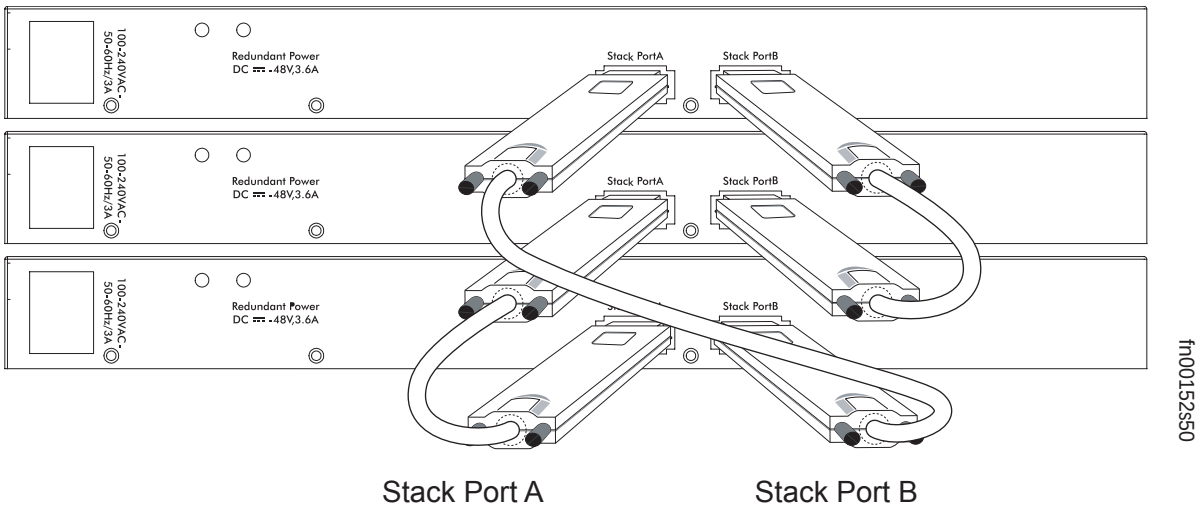


Figure 7 S50 Rear View Showing Ring Topology Stacking

Supplying Power

Supply power to each S50 in the stack after they are mounted and the stack is connected. Use the supplied AC power cord to connect the S50 to the power source (see AC Power Requirements on page 36). If you are connecting an S50 to a backup power supply, refer to Chapter 4, Installing Backup Power, on page 27.

Connect the plug to the AC receptacle at the rear of the S50 (see Figure 8), making sure that the power cord is secure (there is no on/off switch).

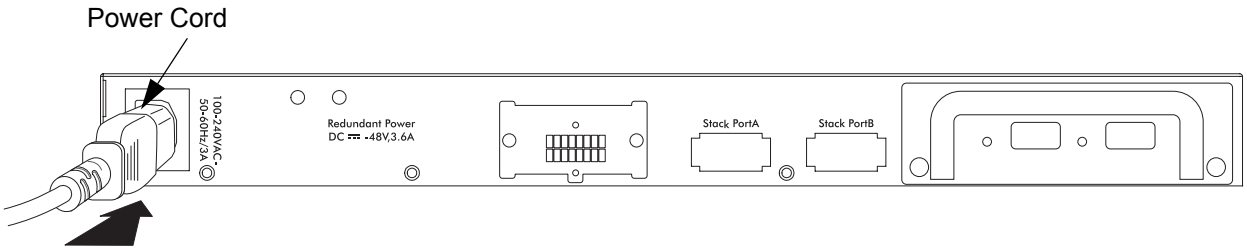


Figure 8 S50 Rear View Showing Power Cord Connection

Hot-swapping Units in a Stack

You can add, remove, or swap units in an existing stack. The units in the stack and the new units can be already powered up or they can be powered down.

All units in a stack must run the same version of the operating system. If you attempt to attach a unit with a different version of the operating system to an existing stack, the CLI will display an error, and the unit will not be added until you install compatible software.

The order in which the units come on-line or are added to or removed from the stack can affect how the stack identifies them, and how the units identify themselves, influencing unit numbers, management addresses, and other elements of the configuration file.

How units are identified within the stack is determined by the selected identification algorithm. The default algorithm has the units self-identify as Unit 1 through Unit [last] based on the order in which they come on-line. So, when setting up a new set of switches in a stack, you should have no trouble forcing the identification of the management unit and unit IDs by methodically supplying power to the units in your preferred sequence.

Similarly, when you add a brand new unit to the stack, the unit will be gracefully added as Unit [last] (the lowest unused number) with the current configuration. Attaching the unit causes each unit in the stack to reload, and the subsequent configuration file in each unit includes the awareness of the new unit.

If you have a pre-configured unit that you want to add to the stack, but you want to make sure that the configuration does not override the configuration of the stack, it is best to add the unit while it is powered down, in order to avoid stack management conflicts.

You can use the CLI to make stack identification changes on the fly, such as renumbering units (**switch renumber**), assigning a new management unit (**movemanagement** command), or removing a unit from stack membership (**no member**). You can also use commands such as **switch priority** and **member** that override the default unit identification algorithms.

Use the **show switch** command to see the current assignment of the management unit.
Use the **show switch** *unit* command to see the serial number of the designated unit.

For details on using stack management commands, such as to remove a unit from a stack, see Chapter 6, Stacking Switches, in the *SFTOS Configuration Guide*, or see the Stacking Commands chapter in the *SFTOS Command Reference.*

Chapter 4 Installing Backup Power

The S50 comes with an AC power connection. A slot in the back of the switch provides for an optional backup DC power module (DPM). The DPM ensures continuous power, and eliminates power interruptions of a single AC circuit, providing backup power to the S50 on a 1:1 basis. The DPM powers the S50 if there is no AC input. The AC input is preferred over the DPM, and does not share the load between the two power sources.

The DC power module connects to an AC-to-DC converter. When you deploy a stack of S50s, the optional rack-mountable backup power shelf is useful for containing up to eight AC-to-DC converters, one for each of the switches.

Danger: To prevent electrical shock, make sure the S50 is grounded properly. If you do not ground your equipment correctly, excessive emissions may result. Use a qualified electrician to ensure that the power cables meet your local electrical requirements.

Components

- Backup power shelf (optional)
- DC power module
- AC-to-DC converter
- DC-to-DC cable

Installation

This section covers the following topics:

- Installing the Backup Power Shelf (optional) on page 28
- Inserting the AC-to-DC Converter into the Shelf on page 28
- Installing the DC Power Module on page 29
- Connecting the AC-to-DC Converter to the DC Power Module on page 29

Installing the Backup Power Shelf (optional)

An optional power shelf can be installed to house AC-to- DC converters. To install the power shelf in a rack, complete the steps below.

Step	Task
1.	Insert the power shelf into the rack: a. Slide the backup power shelf into the rack until the brackets are flush with the rack posts. b. Secure the power shelf by tightening the screws located on the left and right sides of the power shelf.

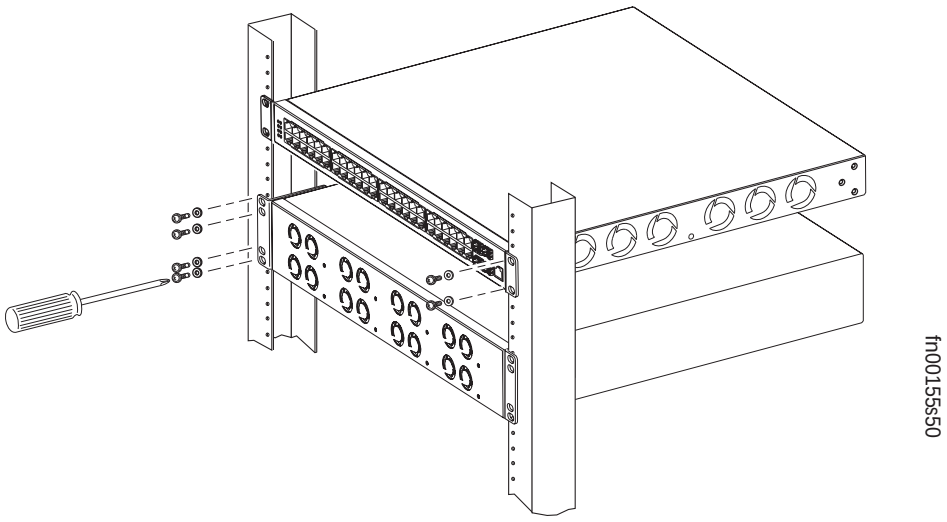


Figure 9 S50 with Power Shelf

Inserting the AC-to-DC Converter into the Shelf

The power shelf can house up to eight AC-to- DC converters, one for each possible S50 in a stack. To install a converter into the power shelf, follow these steps:

Step	Task
1..	Grip the converter by the attached handle (at the top of the module).
2.	Slide the module into the bay until the panel is flush with the shelf.
3.	Secure by tightening the screws on the left and right sides of the module.

Installing the DC Power Module

The DC power module is installed in the rear of the S50 chassis (see the figure in Step 3). To install this component, follow the steps below:

Step	Task
1.	Power down the S50.
2.	Remove the screws that secure the DC power module cover panel and then remove the cover panel.
3.	Slide the DC power module into the bay until the module reaches the connector in the bay and the back panel is flush with the S50 chassis.
4.	Tighten the captive screws on the module with a screwdriver. Ensure the module is secure.

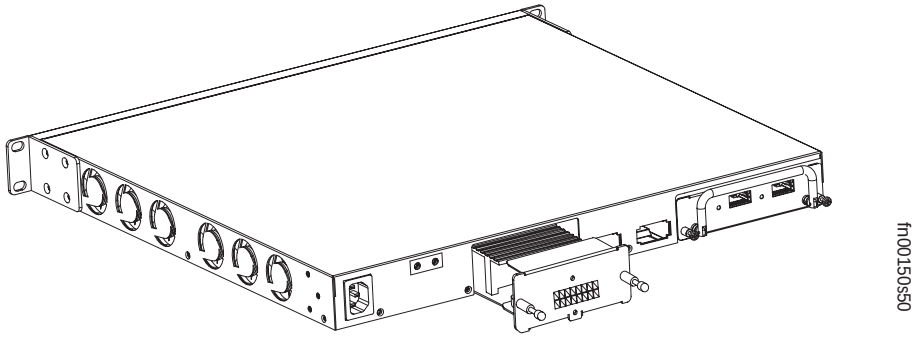


Figure 10 S50 Rear View Showing DC Power Module

Connecting the AC-to-DC Converter to the DC Power Module

To connect the AC-to-DC converter to the DC power module, a special DC-to-DC cable is used. Follow the steps below to correctly connect the AC-to-DC converter to the DC power module.

Note: A backup power shelf is not required as long as the DC power module is located within cable range of the AC-to-DC converter.

Step	Task
1.	Insert the DC-to-DC cable from the converter to the DC power module in the S50, as shown below:

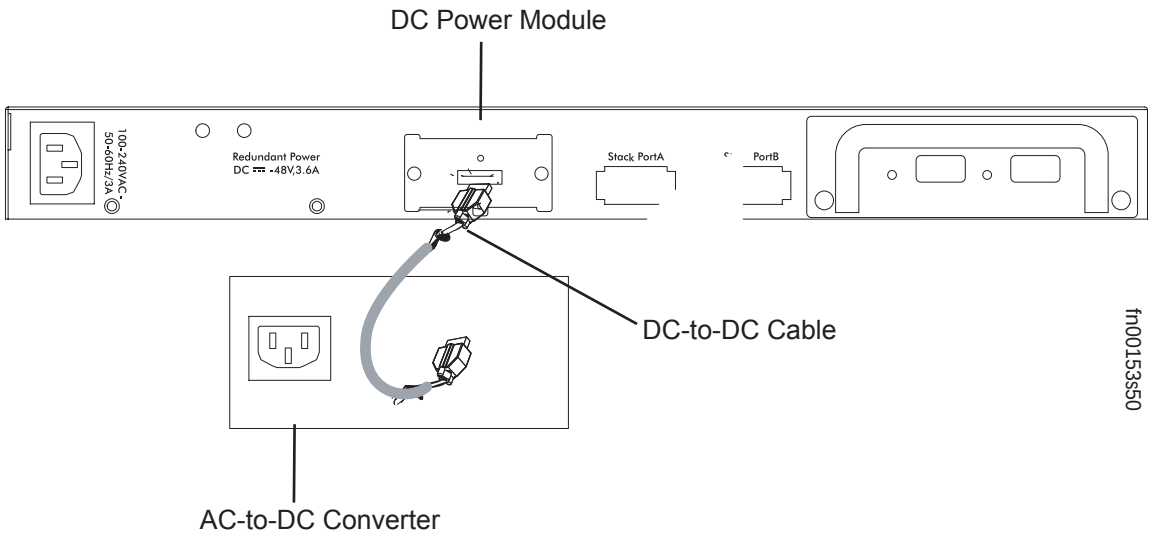


Figure 11 AC-DC Converter Connected to DC Power Module

2.	Tighten the captive screws on the sides of the connector cable by turning them clockwise.
3.	Connect the other end of the cable to the connector on the DC-DC converter.

Figure 12 DC-DC Cable

Chapter 5 Installing Ports

Accessing the Console Port

To access the console port, follow the procedures below. The console port pinout is:

Pin 1 = NC
Pin 2 = NC
Pin 3 = RXD
Pin 4 = GND
Pin 5 = GND
Pin 6 = TXD
Pin 7 = NC
Pin 8 = NC

Step	Task
1	Install the RJ-45 copper cable that is shipped with the S50 system into the console port.
	Caution: You must install a straight-through RJ-45 copper cable (a standard Ethernet cable) into the console port. This is different from many other implementations that require a crossover (rollover) cable. If connecting to a terminal server and using an Ethernet crossover cable, daisychain another crossover cable to effectively get a straight-through cable connection. Many console terminal servers use octopus cables that are crossover cables. To accommodate the octopus cable, connect an additional crossover cable, as above, to effectively install a straight-through cable.

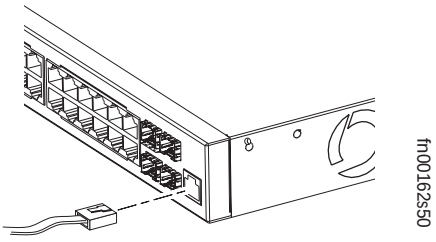


Figure 13 Front View of S50 Showing Console Port

2	If necessary, connect the RJ-45/DB-9 adapter that is shipped with the S50 system to the end of the RJ-45 cable that will connect to your terminal.

Step	Task (Continued)
3	Verify your terminal default settings match the default settings on the console port: • 9600 baud rate • No parity • 8 data bits • 1 stop bit • No flow control (console port only)
4	If you use the console port to download software to the switch, you will probably want to raise the console baud rate. Execute the **lineconfig** command to access the Line Config mode, and then use the **serial baudrate** command to raise the baud rate on the console port. (You must match the settings in your terminal access program.)

Installing SFPs

To install SFPs into an open optical port at the right front of the switch, follow the steps below:

Warning: Electrostatic discharge (ESD) damage can occur if components are mishandled. Always wear an ESD-preventive wrist or heel ground strap when handling the S50 and its components.

Step	Task
1	Position the SFP so it is in the upright position. (The SFP has a key that prevents it from being inserted incorrectly.)
2	Insert the SFP into the port until it gently snaps into place.

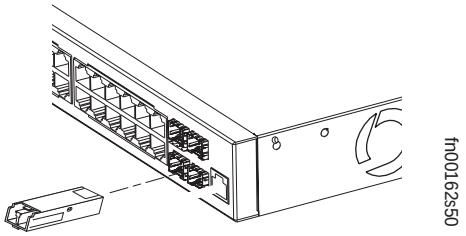


Figure 14 Front View of S50 with SFP

Installing XFPs

To install an XFP into one of the two ports in the optional 10GbE optical module (see Inserting the 10-Gigabit Module (optional) on page 15) on the back of the switch, follow the procedure below:

Warning: Electrostatic discharge (ESD) damage can occur if components are mishandled. Always wear an ESD-preventive wrist or heel ground strap when handling the S50 and its components.

Warning: Do not look directly into any optical port. Failure to follow this warning could result in physical harm.

Step	Task
1	Position the XFP so it is in the upright position. (The XFP has a key that prevents it from being inserted incorrectly.)
2	Insert the XFP into the port until it gently snaps into place.

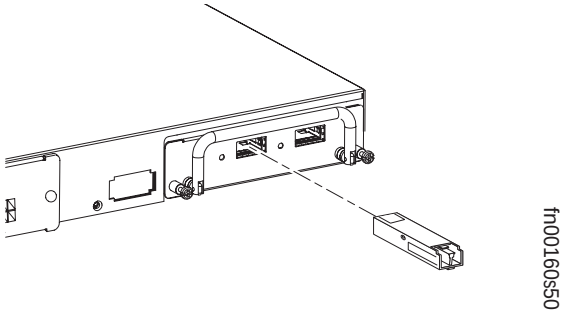


Figure 15 Rear View of S50 with XFP

Chapter 6 S50 Specifications

Chassis Physical Design

Parameter	Specifications
Height	1.73 inches (4.4 cm)
Width	17.32 inches (44 cm)
Depth	16.73 inches (42.5 cm)
Chassis weight with factory-installed components	14.41 pounds (approx.) (6.54 kg)
Rack clearance required	Front: 5-inches (12.7 cm) Rear: 5-inches (12.7 cm)
Thermal Dissipation	44.782 BTU/hr
Power Consumption	150 Watts

Environmental Parameters

Parameter	Specifications
Temperature	• 32° to 104°F (0° to 40°C) • -4° to 158°F (-20° to 70°C) non-operating
Maximum altitude	No performance degradation to 10,000 feet (3,048 meters)
Relative humidity	10 to 95% non-condensing
Shock	MIL-STD-810
Vibration	Bellcore GR-63

AC Power Requirements

Parameter	Specifications
Nominal Input Voltage	100 - 240 VAC, 50/60 Hz
Maximum AC Power Supply Input Current	1.2 A @ 110 VAC per AC Power Supply 0.6 A @ 240 VAC per AC Power Supply
Maximum System Power Input	3000W

Redundant AC Power

Parameter	Specifications
Nominal Input Voltage	100 - 240 VAC, 50/60 Hz
Maximum AC Power Supply Input Current	1.2 A @ 100 VAC per AC Power Supply 0.6 A @ 240 VAC per AC Power Supply
Maximum System Power Input	3000W

AC-to-DC Converter Module

Parameter	Specifications
Nominal Input Voltage	100 - 240 VAC, 50/60 Hz
Maximum AC Power Supply Input Current	10 A @ 100 VAC per AC Power Supply
Maximum System Power Input	3000W

IEEE Standards

The S50 complies with the following IEEE standards:

- 802.3ae 10 Gigabit Ethernet
- 802.3ab 1000Base-T
- 802.1p L2 Prioritization
- 802.1Q VLAN Tagging, Double VLAN Tagging (Q in Q), GVRP
- 802.1s Multiple Spanning Tree Protocol
- 802.1w Rapid Spanning Tree Protocol
- 802.3ad Link Aggregation with LACP
- 802.1D Bridging, GARP, GMRP
- 802.3x Flow Control
- 802.1ac Frame Extension for VLAN tagging
- 802.1x Port based Network Access Control

Agency Compliance

The S50 is designed to comply with the following safety and agency requirements.

Safety Standards and Compliance Agency Certifications

- CUL 60950, 3rd edition
- CSA 22.2 No. 60950
- EN 60950, Safety of Information Technology Equipment
- EN 60825-1 Safety of Laser Products- Part 1: Equipment Classification Requirements and User Guide
- EN 60825-2 Safety of Laser Products- Part 2: Safety of Optical Fibre Communication Systems
- 21 CFR 1040.10 and 1040.11 FDA laser device requirements

Electromagnetic Emissions

- USA: FCC CFR47 Part 15, Subpart J, Class A
- Canada: ICES-003, Issue-2, Class A
- Europe: EN 55022 1998 (CISPR 22: 1997), Class A
- Japan: VCCI V3/01.4 Class A

Immunity

- EN55022 1998(CISPR 22: 1997), Class A
- EN 61000-4-2 ESD
- EN 61000-4-3 Radiated Immunity
- EN 61000-4-4 EFT
- EN 61000-4-5 Surge
- EN 61000-4-6 Low Frequency Conducted Immunity
- EN 300 386 v1.3.1 (2001-09) EMC for Network Equipment
- EN 55024 1998

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