



9000 Series Rack Products

Reference Guide

Second Edition (September 2000)
Part Number 142553-002
Compaq Computer Corporation

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Compaq 9000 Series Rack Products Reference Guide
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About This Guide

This guide is designed to be used as step-by-step instructions for installation and as a reference for operation, troubleshooting, and future upgrades.

Text Conventions

This document uses the following conventions to distinguish elements of text:

Keys	Keys appear in boldface. A plus sign (+) between two keys indicates that they should be pressed simultaneously.
USER INPUT	User input appears in a different typeface and in uppercase.
<i>FILENAMES</i>	File names appear in uppercase italics.
Menu Options, Command Names, Dialog Box Names	These elements appear in initial capital letters.
COMMANDS, DIRECTORY NAMES, and DRIVE NAMES	These elements appear in uppercase.
Type	When you are instructed to <i>type</i> information, type the information without pressing the Enter key.
Enter	When you are instructed to <i>enter</i> information, type the information and then press the Enter key.

Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.



WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.



CAUTION: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

IMPORTANT: Text set off in this manner presents clarifying information or specific instructions.

NOTE: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Symbols on Equipment

These icons may be located on equipment in areas where hazardous conditions may exist.



Any surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

WARNING: To reduce the risk of injury from electrical shock hazards, do not open this enclosure.



Any RJ-45 receptacle marked with these symbols indicates a Network Interface Connection.

WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.



Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching.



Power Supplies or Systems marked with these symbols indicate the equipment is supplied by multiple sources of power.

WARNING: To reduce the risk of injury from electrical shock, remove all power cords to completely disconnect power from the system.

Rack Stability



WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
 - The full weight of the rack rests on the leveling jacks.
 - The stabilizing feet are attached to the rack if it is a single rack installations.
 - The racks are coupled in multiple rack installations.
 - A rack may become unstable if more than one component is extended for any reason. Extend only one component at a time.
-

Getting Help

If you have a problem and have exhausted the information in this guide, you can get further information and other help in the following locations.

Compaq Technical Support

You are entitled to free hardware technical telephone support for your product for as long you own the product. A technical support specialist will help you diagnose the problem or guide you to the next step in the warranty process.

In North America, call the Compaq Technical Phone Support Center at 1-800-OK-COMPAQ¹. This service is available 24 hours a day, 7 days a week.

Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for world wide Technical Support Centers are listed on the Compaq website. Access the Compaq website at <http://www.compaq.com>.

Be sure to have the following information available before you call Compaq:

- Technical support registration number (if applicable)
- Product serial number (s)
- Product model name(s) and numbers(s)
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level
- Detailed, specific questions

Compaq Website

The Compaq website has information on this product as well as the latest drivers and Flash ROM images. You can access the Compaq website at <http://www.compaq.com>.

Compaq Authorized Reseller

For the name of your nearest Compaq Authorized Reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the Compaq website for locations and telephone numbers.

¹ For continuous quality improvement, calls may be recorded or monitored.

Chapter 1

Overview

As computer systems have evolved in size and complexity, managing them has become a critical concern. By centralizing your equipment, the efficiency and accessibility of your system can be increased dramatically. Using rack-mountable products lets you decrease the footprint required to house your existing hardware while still providing expansion capability.

Compaq Rack System

All Compaq rack-mountable products are designed to fit our industry-standard 19-inch wide racks. Compaq offers several rack sizes to meet your system needs.

Racks and rack-mountable components are typically described using “U” measurements. One “U” is 1.75 inches (44.45mm) high.

This sturdy, industrial-strength rack series offers the following features:

- Models—Rack 9122 (22U), Rack 9136 (36U), and Rack 9142 (42U)
- Color—Opal
- Design—Perforated front door, solid side panels (optional), and perforated back door

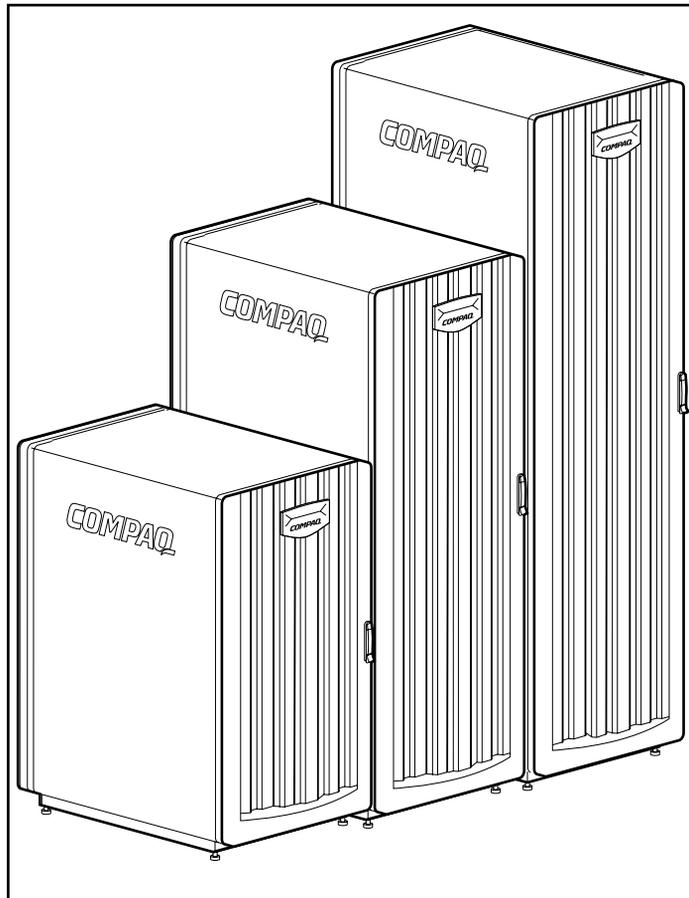


Figure 1-1. Compaq 9000 Series Rack products

Rack Options

In addition to the standard racks, optional Compaq rack accessory kits are available to complement or to complete your rack solution.

- **Sidewall Panels**—Enclosures for the sides of a rack.
- **Stabilizing Feet**—Essential to increase stability for free standing single racks, or use modified side feet, allowing 9000 Series rack to be stabilized from the front, when placed between non-9000 series racks.
- **Ballast Kit**—Provides additional stability and support when used with Stabilizer Feet when very heavy equipment is routinely installed, removed, or accessed within the rack.
- **Coupling Kit**—Joins two or more racks together for a multibay configuration.
- **Fan Kit 110VAC/220VAC**—Enhances natural convection cooling by increasing the airflow in the rack, pulling hot air out of the top of the rack.
- **Ground Bonding Kit**—Reduces the electro-magnetic emissions that may be given off by electronic components operating within the rack cabinet. The kit ties all the conductive structural components of the rack together with conductive cables, and is designed to be attached to a ground bonding point on the rack's AC power distribution device. It is intended for use with all Compaq 9000 Series racks.
- **Monitor/Utility Shelf**—A 1U fixed, ventilated shelf that holds a monitor or other rack component (bezels for 15-inch and 17-inch monitors are included).
- **Keyboard Drawer**—A 1U drawer that holds a concealed keyboard.
- **Sliding Shelf Kit**—Allows easy access to various rack components.
- **Depth Adjustable Fixed Rail Kit**—Provides rails that can be adjusted to various depths.
- **Flat Panel Monitor Rackmount**—A 2U Rackmount TFT Flat Panel monitor.
- **Server Console Switch**—A programmable switch panel and the connection hardware used to switch a keyboard, a monitor, and a mouse among multiple servers.

- **Blanking Panels**—Cover empty areas in a rack and enhances airflow. Multiple kits are available:
 - ❑ 1U, 2U, 4U, and 8U panels (one of each)
 - ❑ 10 (1U) panels
 - ❑ 10 (2U) panels
 - ❑ 10 (3U) panels
 - ❑ 10 (4U) panels
 - ❑ 10 (5U) panels
- **Networking Cable and Recessed Rail Management Kits**—Routes and organizes cables within the rack. Designed specifically for Compaq Networking products.
- **Cable Management D-Ring Kit**— Designed for use with all 9000 Series racks to assist with cable management.
- **25-inch Rail Adapter Kit**— Allows adapting the size of the inner rails on Compaq 9000 Series racks to accommodate third-party rack options. Adapters may be stacked for requirements greater than 2U.
- **Extension Kit**— Adds 3 ½ inches of depth to rear of the rack.
- **Shock Pallet Spares Kit**— Used to transport a configured rack

This is only a sampling of the many Compaq Rack options available. For more complete information see the Compaq website:

[http:// www.compaq.com/racks](http://www.compaq.com/racks)

Compaq also offers several rack-mountable power products. For more complete information see the Compaq website:

[http:// www.compaq.com/ups](http://www.compaq.com/ups)

Contact your nearest Compaq authorized reseller or service provider for information about ordering Compaq parts. For the name of your nearest Compaq authorized reseller, see “Getting Help” in the “About This Guide” section of this manual.

Delivery Considerations

When preparing to receive palletized Compaq Racks, consider the following:

- The dock door at the receiving site has to accommodate the height and width of palletized racks.
 - The 48-inch x 32-inch pallet does not fit through a standard-width internal door, which is about 30 inches wide.
 - The 42U palletized rack is approximately 85.38 inches high and does not fit through a standard-height door.
- Do not lay a rack on its side, because the sheet metal can wrench and distort.
- Transport a rack as far into the building as possible while it is still on the pallet. Ideally, move the palletized rack to its final destination before removing the rack from the pallet, or removing any of the packaging.

Summary of Installation Sequence

The following is the recommended sequence of events for the most efficient installation of your Compaq Rack and components:

1. Install the Rack Builder Pro software (shipped with the rack on CD) or install the Rack Builder Online software. The latest versions of both software utilities can be downloaded from the Compaq website:
[http:// www.compaq.com/racks](http://www.compaq.com/racks)
2. Using Rack Builder Pro or Rack Builder Online, plan the rack component location and installation sequence.
3. Watch the Rack Installation Video (on CD) that came with your rack.
4. Select a location to unpack and set up your rack. This location should be as close as possible to the permanent location for your rack.
5. Remove the packaging from the rack and verify the hardware contents.
6. Move the rack to its permanent location and stabilize it.
7. Remove any doors and panels from the rack as appropriate to provide necessary access.
8. Compaq recommends starting with products in sidewall locations, such as Power Distribution Units (PDU) or switchboxes, and then install product from the bottom first if possible, such as an Uninterruptible Power System (UPS).

9. Install the appropriate rails and/or tray for the first rack-mountable component.
10. Install the individual components.
11. Connect any appropriate cables to the component.
12. Attach a cable management arm, if required.
13. Install the remaining components, in the appropriate sequence.
14. Complete any cabling attachments or adjustments.
15. Reinstall any rack doors and panels, including any blanking panels.
16. Power up and configure the system.

Installation Service

In the United States, Compaq can make arrangements to have your rack system installed by qualified Guaranteed Service Providers. This installation service covers the entire hardware installation sequence, from unpacking the components to routing cabling and running a test of the system.

Installation can also be provided directly by Authorized Compaq Service Providers. See “Getting Help” in the “About This Guide” section of this manual for more information on Compaq support.

Chapter 2

Configuration Factors

Before populating your new rack, it is important to plan the placement of each component. Factors of each component, such as weight, accessibility, power, temperature, and airflow requirements, affect installation order and component placement in the rack.

Rack Configuration Software

To help you plan your rack configuration more efficiently, Compaq provides the following software utilities: Rack Builder Pro and Rack Builder Online. The latest versions of both software utilities can be downloaded from the Compaq website:

<http://www.compaq.com/racks>

Rack Builder Pro and Rack Builder Online have two modes of operation:

- **Assisted Mode (Rack Builder Pro) or Help Me Build It Mode (Rack Builder Online)**—includes a simple interview session to help determine your rack and rack component needs. Once selections are made, the application adds the necessary power products and rack assembly devices, such as tower-to-rack conversion kits, to complete the final rack assembly.
- **Builder Mode (Rack Builder Pro) or Let Me Build It Mode (Rack Builder Online)**—lets you select the individual devices that are required for your configuration.

NOTE: Rack Builder Pro is available through the second quarter of 2001. Rack Builder Online will be available in November 2000.

Features of the Compaq rack configuration software include:

- **Multiple Rack Configuration**—allows for a number of racks to be configured in one session. Up to six racks can be viewed and configured on-screen at one time.
- **Graphics**—graphical representations of the systems are used to visually represent the “U” height that each component occupies, and are not true graphical representations of the products/systems.
- **Labeling**—allows the capability to label individual racks and components within a rack to aid in rack maintenance and configuration.
- **Drag & Drop**—graphics of devices in a multiple rack configuration can be “dragged and dropped” between racks.
- **Reports**—new reports have been added to provide rack configuration labeling and rack suite graphics for configurations that include multiple racks. All reports can be previewed and saved as .doc or .rtf files.
- **Third-Party Support**—you can define and add third-party products.

If you are planning a new rack, use Rack Builder Pro or Rack Builder Online to view your rack as you build it. Then print out a report and use it as your shopping list. Once your rack configuration is in place, use Rack Builder Pro or Rack Builder Online to assist in maintenance and upgrades.

See the documentation accompanying the software utilities for installation and use of the software programs.

Component Placement

The following rules apply to the physical placement of components in the rack:

- **Weight**—Sort all components by weight, placing the heaviest components at the bottom of the rack.
- **Server Console Switch**—Position the switch box above the keyboard, or mount the switch box behind the keyboard or on the side of the rack.
- **Keyboard**—When using a 22U rack, place the keyboard in the topmost position. When using a 42U or 36U rack, place the keyboard at a nominal height of 20U.
- **Monitor**—When using a CRT Monitor with a 42U or 36U rack, position the monitor topmost within the rack. If using a 22U rack, place the monitor on top of the rack.

If you are using an optional rack-mountable flat panel monitor, select a position to accommodate the desired viewing height (a minimum of 4 "U"s above the keyboard tray).

- **Balance**—When connecting racks, be sure to balance the weight load between the racks, placing the heaviest components at the bottom. For example, if you have several UPS units and several servers, do not put all of the UPS units into one rack—distribute them evenly in the bottom positions of each rack.

Additional Considerations

Following are additional items to consider, based on your specific rack configuration:

- **Power**—If an Uninterruptible Power System (UPS) is installed, do not exceed its output rating. Be sure to review the installation instructions provided with each component for important cautions and warnings.
- **PDU**s—Install PDUs before installing other components.
- **Height**—The height of the rack and of rack-mountable components is measured in U increments (1U = 1.75 inches). When you are configuring your rack installation, remember that the total U measurement of the components you want to install cannot exceed the stated U height of the rack.
- **Keyboard**—The rack keyboard requires prior installation of a 1U Keyboard Drawer Rack Option Kit.

- **Monitor**—If using a 42U or 36U rack, the monitor requires installation of a Monitor/Utility Shelf Rack Option Kit unless you are using a Flat Panel Monitor Rackmount Option Kit.
- **Server Console Switch**—If a switch box is configured, use the CPU-to-Switch cable included with the server. The standard distance between the switch box and the keyboard, monitor, and/or mouse can vary by 3, 6, 12, 20 and 40-ft lengths. Optional Plenum-rated KVM cables are available in 20 feet and 40 feet lengths.

NOTE: National Electrical Regulations governing the installation of building wiring require that an appropriate cable, meeting fire-safety standards, be used any time cabling is routed:

- through an overhead drop-ceiling.
- under a computer room's raised flooring.
- from room to room.
- from floor to floor.

Be sure that the cable jacket, or sleeving, is made of material that does not burn easily and does not exude toxic fumes when exposed to heat. Be sure that the cable you have selected is appropriate for your installation site. If you require United States Plenum-Rated (CL2P) cable, please contact your local Compaq authorized reseller to obtain the following options:

- 149363-B21—20-foot plenum cable
 - 149364-B21—40-foot plenum cable
- **Coupling Kits**—The number of coupling kits needed to join a series of racks is one less than the number of racks in the suite. Each coupling kit supplies parts to bay two cabinets on 24" or 600 mm center line spacing.
 - **Sidewall Panels**—Only one set of sidewall panels is required for each row of bayed racks.
 - **Stabilizing Feet**—A stand-alone 42U or 36U rack requires stabilizing feet. The 22U rack comes standard with the components of the Stabilizer Rack Option Kit.

Optimum Environment

Specific requirements for space, power, temperature, and airflow must be met to provide optimum performance with minimum maintenance for your rack environment.

Space Requirements

Consider the following spatial needs when deciding where to place your rack:

- The outside size for Compaq racks is 24 inches wide by 34 inches deep.
- At least 4 feet of clearance is needed all the way around the pallet and *above* the rack to remove the packing materials.
- At least 30 inches of clearance is needed in front of the rack to allow the door to open all the way.
- At least 30 inches of clearance is needed in back of the rack to provide access to components.
- At least 15 inches of clearance is needed around a power supply for servicing.

Power Requirements



WARNING: To reduce the risk of personal injury, fire or damage to the equipment, do not overload the AC supply branch circuit that provides power to the rack. Consult the electrical authority having jurisdiction over your facility wiring and installation requirements.

When planning for power distribution requirements for your rack configuration, note the following:

- The power load must be balanced between available AC supply branch circuits.
- The overall system AC current load must not exceed 80 percent of the branch circuit AC current rating.
- If a UPS is used, the load should not exceed 80 percent of the UPS's marked electrical current rating.



CAUTION: To reduce the risk of damage to the equipment, verify that all AC Voltage Selector Switches are set correctly to match your local AC line voltage (115V or 230V). If the AC Voltage Selector Switch is not properly set, your components will be damaged when power is applied.

The installation of this equipment shall be in accordance with Local/Regional electrical regulations governing the installation of Information Technology Equipment by licensed electricians. This equipment is designed to operate in installations covered by the National Electric Code (ANSI/NFPA 70, 1993) and the code for Protection of Electronic Computer/Data Processing Equipment (NFPA-75, 1992).

For electrical power ratings on options, refer to the product's rating label or user documentation supplied with that option.

Grounding Requirements

For proper operation and safety, all powered rack-mountable components are required to be properly grounded in accordance with NFPA 70-1993, Article 250. All power distribution devices, branch wiring, and receptacles must be listed grounding-type devices.

When using power strips for electrical distribution, make sure that ground integrity is maintained for each connection made. Plug each component into a reliably grounded outlet.



WARNING: To reduce the risk of electric shock or damage to your equipment, do not disable the power cord grounding feature. This equipment is designed to be connected to a grounded (earthed) power outlet that is easily accessible and located as close as possible to the equipment. The grounding plug is an important safety feature.

Temperature Requirements

For safe and reliable operation of equipment, locate the system in a well-ventilated, climate-controlled environment.

The Compaq Maximum Recommended Ambient Operating Temperature (T_{MRA}) for most server products is 35°C (95°F). Therefore, the temperature in the room where the rack is located should not exceed 35°C (95°F).

The operating temperature inside the rack is always higher than the room temperature, and is dependent on the configuration of equipment in your rack. Check the T_{MRA} for each piece of equipment before installation.

The maximum internal rack temperature for your configuration should not exceed the values in the following table:

Table 2-1
Rack Internal Temperature Maximums

Equipment Included	Maximum Internal Rack Temperature
Compaq Rack-Mountable Servers	35°C/95°F
Compaq Rack-Mountable options	40°C/104°F
Compaq PDUs	50°C/122°F
Other manufacturers' options	See other manufacturers' specifications



CAUTION: To reduce the risk of damage to the equipment when installing third-party options:

- Make sure that the option equipment does not impede airflow to the rack-mountable products already installed in the rack nor increase the internal rack temperature beyond the Compaq specified maximum rating.
- Make sure that the manufacturer's Maximum Recommended Ambient Operating Temperature for the option equipment is not exceeded when the option equipment is installed in a Compaq rack.

Airflow Requirements

Compaq rack-mountable products typically draw in cool air through the front and exhaust warm air out through the back of the rack. The front door of the rack, therefore, must be adequately ventilated to allow ambient room air to enter the rack, and the back door must be adequately ventilated to allow the warm air to escape the rack. Do not block the ventilation apertures.

Fan Kits

If additional cooling is required, fan kits can be used to draw heated air from the back of the rack, out through the top.

Blanking Panels

If the front of the rack is not completely filled with components, the remaining gaps between the components can cause changes in the airflow that adversely affect cooling within the rack. Cover these gaps with blanking panels.

Chapter 3

Preparing the Rack

It is strongly recommended that you configure your Compaq rack using the Rack Builder Pro or Rack Builder Online software utility before beginning the installation process.

This chapter discusses the following topics:

- Checking the hardware
- Stabilizing the rack
- Completing the rack setup
- Moving the rack to another location

Required Tools

You will need the following tools to install your rack components:

- Flat-blade screwdriver
- Phillips screwdrivers—#1, #2, and #3
- Torx screwdrivers—T-10, T-15, T-25, and T-30
- Adjustable wrench
- Allen wrench
- Cage nut fitting tool (included with rack-mounting hardware)

Checking the Hardware

After unpacking the rack and its components, locate the Compaq Rack Kit Components List that was shipped with your rack. Verify that you received all listed components.

You will typically have extra fasteners after completing your rack configuration and component installation.

IMPORTANT: Retain the extra fasteners for future use.

Stabilizing the Rack



WARNING: The rack allows you to stack computer components on a vertical rather than a horizontal plane. To reduce the risk of personal injury or damage to the equipment, you must take precautions for rack stability and safety. Follow these instructions carefully and heed all cautions and warnings throughout the installation instructions.

Standalone Racks

If you are installing a single (standalone) rack, make sure the rack is level and stabilizing feet have been attached, before installing the components. If an unstable rack is loaded with components, it can become unbalanced and tip over.

Leveling Feet

The leveling feet, located beside each caster on the rack, unscrew and extend to the floor, resting in leveling foot bases (gold disks) provided with your rack. These feet support the rack and help compensate for uneven surfaces.

After positioning the rack in its final location, use an adjustable wrench to extend the leveling feet into the bases until the weight of the rack is fully on the feet and plates, not the casters. This stabilizes the rack for installation of your components.



CAUTION: To reduce the risk of damage to the casters, make sure that the full weight of the rack rests on the leveling feet, and not on the casters. The casters are designed **only** as an aid in moving the rack into position. They are not designed to support the weight of the rack, and the casters will become damaged if relied on to support the rack.

Stabilizing Feet



WARNING: To reduce the risk of personal injury, you must attach Compaq Rack stabilizing feet to all standalone (not bayed) racks.

For standalone racks, stabilizing feet must be installed to help level and support the rack as you install components.

- **For Rack Models 9142 and 9136:** Each Stabilizer Rack Option Kit contains three full size and two modified stabilizing feet. The modified side feet are provided with the Stabilizer Rack Option Kit to allow you to stabilize a 9000 Series rack from the front, when the 9000 Series rack is placed between non-9000 series racks. Order one kit for each standalone rack. Attach one stabilizing foot to the front and one to each side of the rack.
- **For Rack Model 9122:** The Stabilizer Rack Option Kit components come standard with each Rack Model 9122.

Stabilizing feet are not required on the back of a standalone rack.

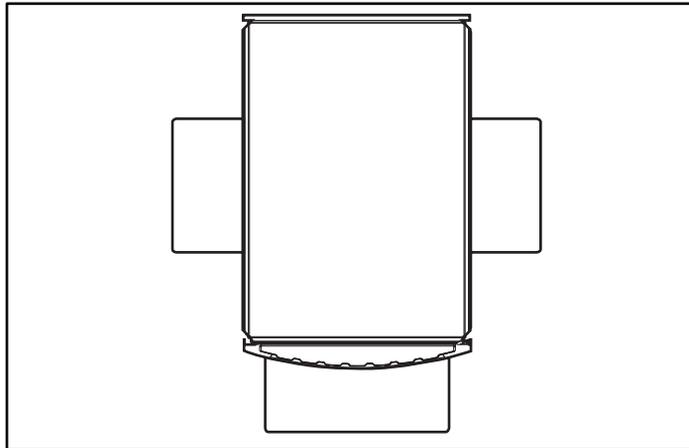


Figure 3-1. Full size stabilizing feet attached (top view)

Multiple Racks

Join multiple racks to save space and increase stability. This is accomplished by installing an optional Coupling Kit. Each optional Coupling Kit contains the hardware to join two similar racks.

Following are some tips for using multiple racks:

- Stabilizing feet are optional with coupled racks. The modified feet in the kit should be used to allow stabilizing a 9000 Series rack from the front, when the 9000 Series rack is placed between non-9000 series racks.
- The number of coupling kits needed to join a series of racks is one less than the total number of racks in the suite.
- Position the racks and install the Coupling Kits before you populate the racks with components.

Completing the Rack Setup

To provide easier access to all sides of the rack while you are installing the various components, first remove any exterior panels and doors.

Opening the Rack Door

To open the rack door:

1. Unlock the lock.
2. Press the handle release button. The handle pops out.
3. Lift the handle up and out to open the door.

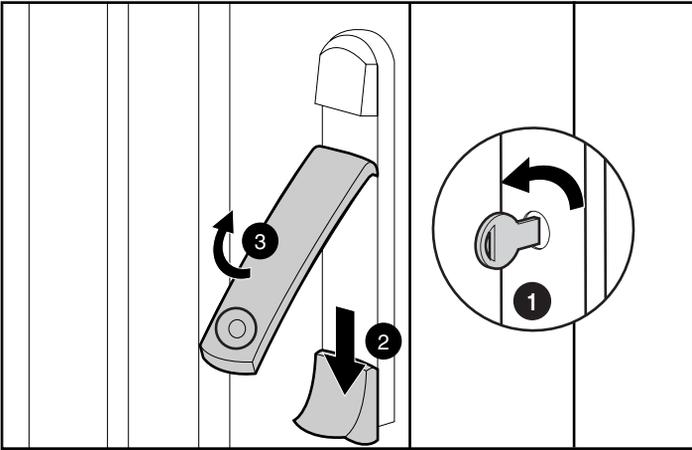


Figure 3-2. Opening the door

Removing a Rack Door

1. Lift up the top hinge release.

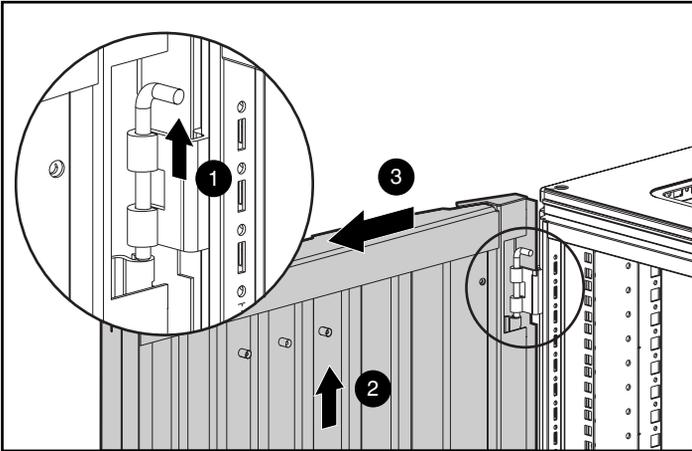


Figure 3-3. Removing a door

2. Tilt the door out and lift to remove the bottom door pin.
3. Lift the door out and away from the rack. Store the door in an upright position, taking care to protect the front panel from damage.

To replace the door, insert the door pins back into the hinges until they click into place.

Removing Sidewall Panels

Sidewall panels are provided as standard equipment with the 22U rack.

For 42U and 36U racks, side panels can be ordered as an option. If your rack has side panels, remove them before installing mounting brackets and other hardware.

To remove the sidewall panels:

1. Remove the six T-30 screws holding the sidewall panel.
2. Pull the panel away from the rack.

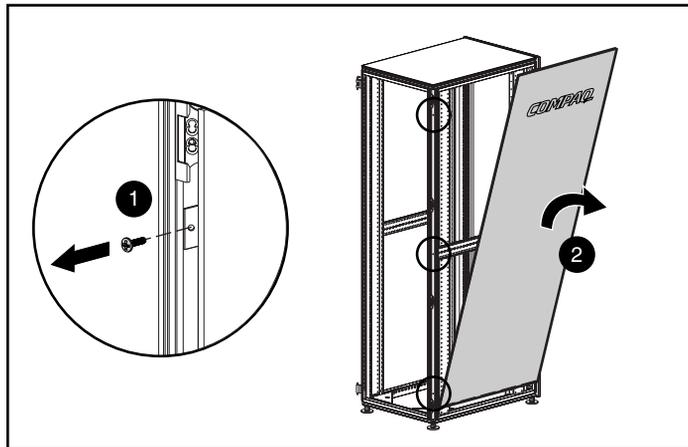


Figure 3-4. Removing a sidewall panel

NOTE: For instructions on how to replace the panels, see the Side Panels section in Chapter 6.

Installing Components into the Rack

It is strongly recommended that you configure your Compaq rack using the Rack Builder Pro or Rack Builder Online software utility before beginning the installation process.

This chapter provides general instructions for installing typical Compaq rack-mountable components, and addresses items to consider as you set up your rack. For detailed instructions on installing a specific component, see the user documentation that shipped with that component.

See Appendix A, “Electrostatic Discharge,” before installing components into the rack.



WARNING: To reduce the risk of personal injury or damage to the equipment, always load the heaviest item first and always load the rack from the bottom up. This makes the rack bottom-heavy and helps prevent the rack from becoming unstable. See Chapter 2, “Configuration Factors,” for more information about the placement of rack-mountable components. This information is also included in the Rack Builder Pro or Rack Builder Online Software.



WARNING: To reduce the risk of personal injury, always make sure the rack is adequately stabilized before extending a component outside the rack. A rack may become unstable if more than one component is extended for any reason. Extend only one component at a time.



CAUTION: To reduce the risk of damage to the equipment when installing third-party options:

- Make sure the option equipment does not impede airflow to the Rack-Mountable ProLiant Servers or increase the internal rack temperature beyond the Compaq specified maximum rating.
 - Make sure the Manufacturer's Maximum Recommended Ambient Operating Temperature of the option equipment is not exceeded when the option is installed in the rack.
-

Overview

Chapter 3 provided instructions to help you prepare your Compaq Rack to receive rack-mountable components. This chapter helps you to prepare each component for installation.

General Guidelines

Observe these general guidelines when loading your components:

- Use the configuration you prepared with the Rack Builder Pro or Rack Builder Online utility as a guideline for installing the components.
- For safety and rack stability, load the heavier components first, and load the rack from the bottom up. When coupling racks, be sure to balance the weight load between the racks, placing the heaviest components at the bottom. For example, if you have several UPS units and several servers, do not put all of the UPS units into one rack—distribute them evenly in the bottom positions of each rack.
- Allow a minimum clearance of 30 inches between the wall and the rack to provide adequate access for installation and service.

Installation Sequence

Typical steps for installing rack-mountable components in a Compaq rack include:

1. Installing zero U devices first, PDUs, switchboxes, and so on.
2. Using the template to measure and mark the rack for correct placement of the installation hardware.
3. Installing the cage nuts into the rack.
4. Preparing the rails for mounting.
5. Installing the rails into the rack.
6. Preparing the component chassis for mounting in the rack.
7. Inserting the component into the rack and securing it.
8. Attaching the cable management arm to the component.
9. Attaching any cables and power cords, being sure to adhere to all cautions and warnings contained in the individual component installation instructions.
10. Attaching the cable management arm to the rack.
11. Routing the cables down the side channel of the rack.

Using the Template

Use the template that shipped with your rack-mountable component to mark the location of the mounting hardware on the mounting rails of the rack.

Push back the tabs (marked ) in the top of the template and place them in the correct holes in the mounting rails. Match up the hole pattern indicated on the sides of the template with the hole pattern in the mounting rails.

Make sure you begin measuring in the correct place. If a rack component is already installed immediately below the planned position of the new component, place the template on top of the previously installed component against the front mounting rails.

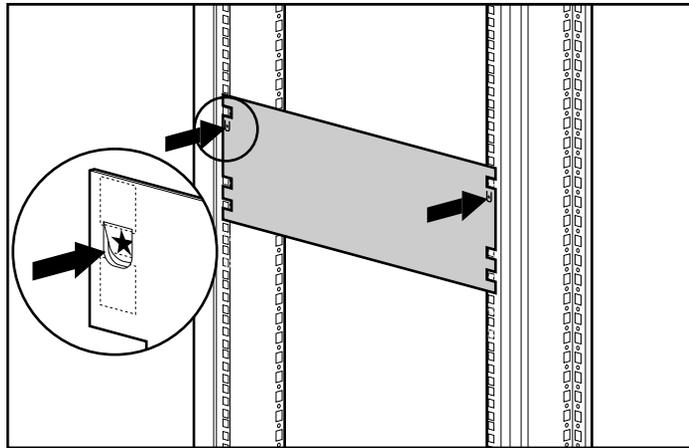


Figure 4-1. Measuring with the template

Use the front of the template to mark the attachment points for rack mounting brackets, rails, components, or cage nuts on the front of the rack.

Use the back of the template to mark the attachment points for rack mounting brackets, rails, components, or cage nuts on the back of the rack.

Inserting the Cage Nuts

Use the cage nut insertion tool to install the cage nuts on the inside of the mounting rails:

1. Hook the bottom lip of the cage nut in the square rail perforation.
2. Insert the tip of the insertion tool through the perforation and hook the top lip of the cage nut. Pull the cage nut until the top lip snaps into position.

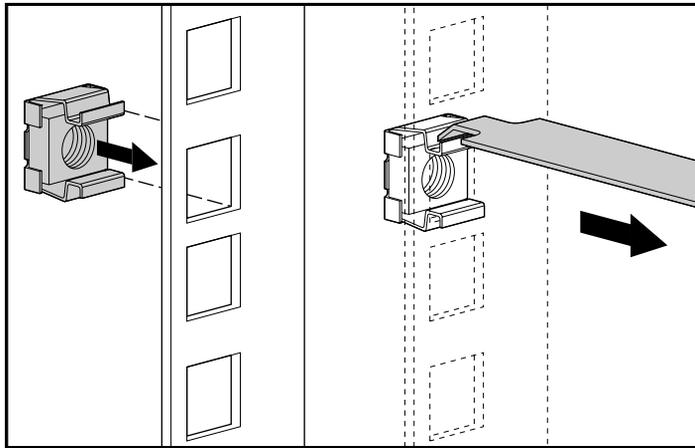


Figure 4-2. Inserting cage nuts

Installing the Rails

There are two types of rack-mount rails:

- Adjustable fixed rails—Components mounted with this type of rail are typically designed to slide into the rack one time, for initial installation. The function of adjustable fixed rails is to support the component in the rack.
- Sliding rails—Components mounted with this type of rail are designed for frequent accessibility and/or maintenance.

Adjustable Fixed Rail Installation

1. Loosen the wing nuts and extend the brackets to the desired length.
Tighten the wing nuts slightly to stabilize the bracket during installation.

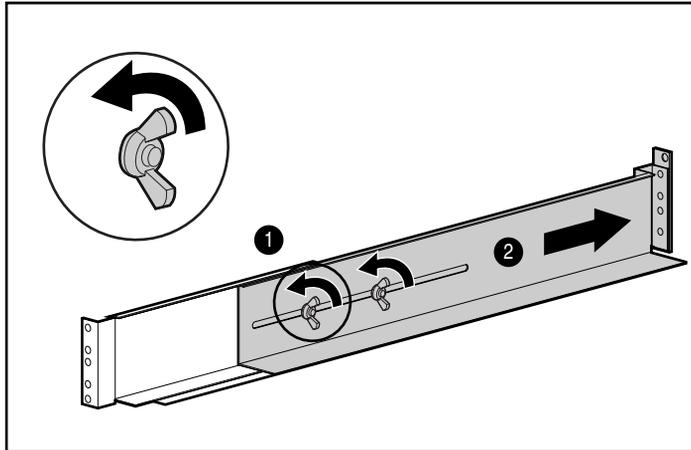


Figure 4-3. Adjusting the fixed rails

2. Insert at least one screw through each rack-mounting rail and into the front of each adjustable rail.

NOTE: After installing your component, insert at least one more screw in each adjustable rail for additional support.

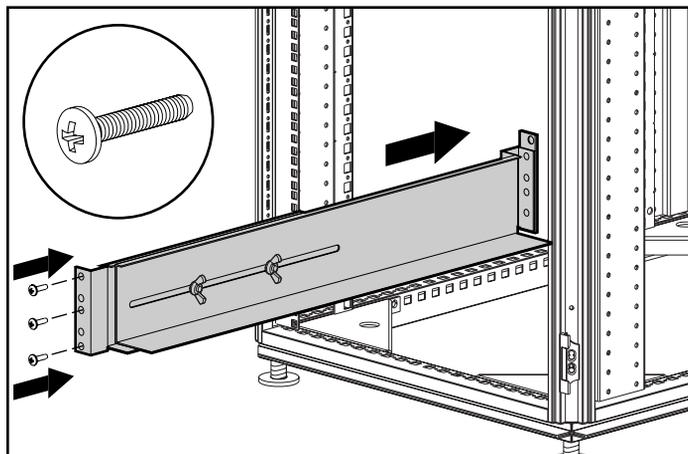


Figure 4-4. Fastening the fixed rail to the front of the rack

3. Insert the back screws into the cage nuts installed earlier.

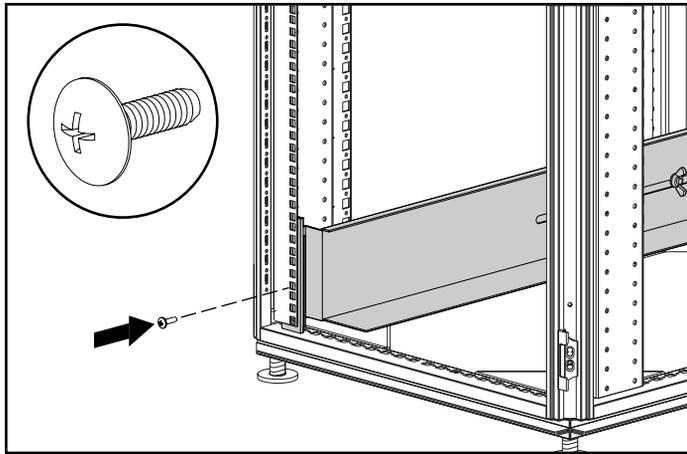


Figure 4-5. Fastening the fixed rail to the back of the rack

4. Retighten the wing nuts on the adjustable rails. The rails are now ready for installation of your component.

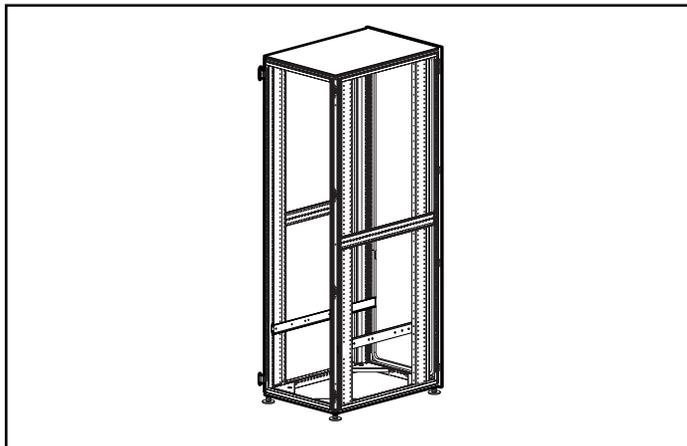


Figure 4-6. Rack ready for component installation

Sliding Rail Installation

1. Extend the component rail until the component rail release latch clicks ❶.
2. Hold down the latch ❷ and *completely remove* the component rail from the sliding bracket rail assembly. The component rail will be attached to the system chassis before inserting the unit into the rack.

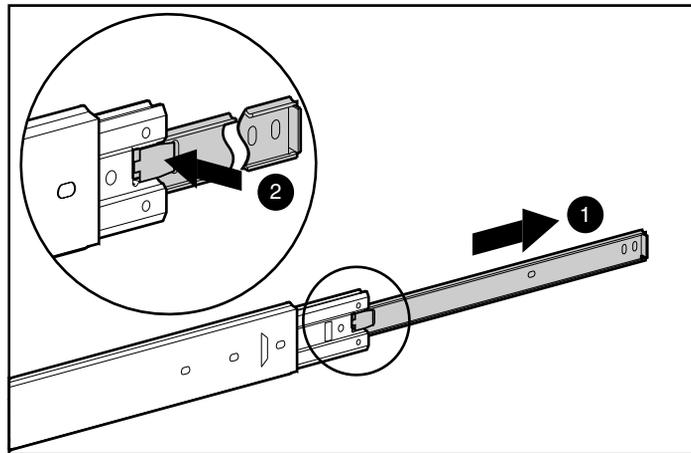


Figure 4-7. Removing the component rail

Aligning the Sliding Bracket Rails

After removing the component rails, attach the sliding bracket rails to the rack mounting brackets.

Note the orientation of the rack mounting brackets:

- ❶ The front flange has alignment tabs.
- ❷ The back flange is designed to install flush against the rack.

There are a total of eight screw holes in the standard rack mounting brackets. All of the screw holes may not be used, depending on the component you are installing. Check the documentation shipped with your component to see which screws need to be installed.

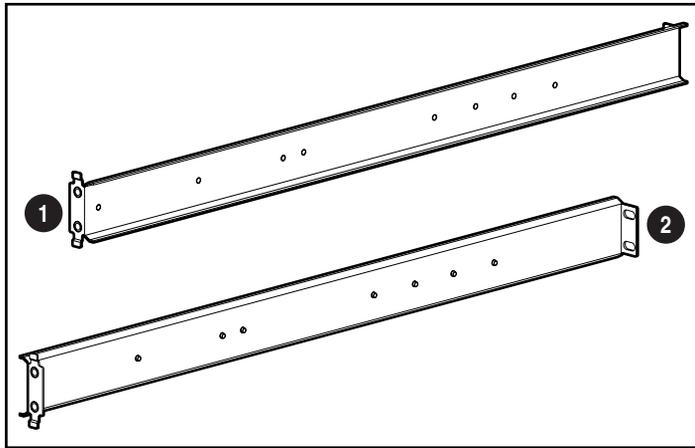


Figure 4-8. Orienting the rack mounting brackets

Note the orientation of the sliding bracket rails:

- ❶ The front of the sliding bracket rail allows the inner slide to move forward on ball bearings.
- ❷ The back end has a stop for the inner slide.

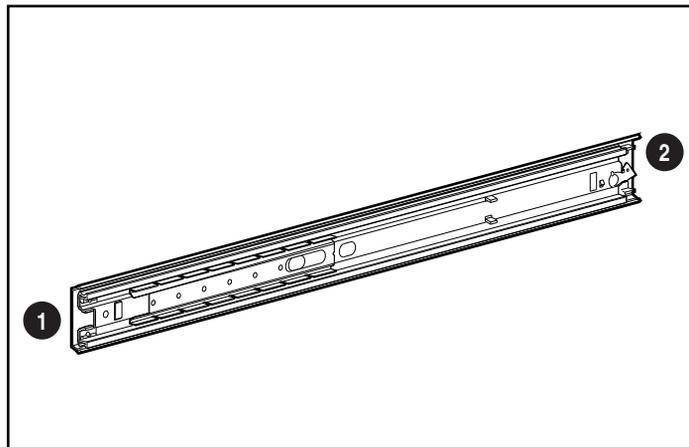


Figure 4-9. Orienting the sliding bracket rails

While matching fronts, lay one rack mounting bracket and one sliding bracket rail together so that the screw holes are aligned.

Attaching the Sliding Bracket Rails

1. Extend the inner slide until the screw holes in the rack mounting bracket and the sliding bracket rail are aligned ❶. There are two exposed holes near the back of the sliding bracket rail and one that is accessible through a slot in the inner slide. Use 8-32 x 3/8 screws to attach the sliding bracket rail to the rack mounting bracket.
2. Adjust the inner slide until you can access another screw hole ❷. Insert an 8-32 x 3/8 screw.
3. Adjust the inner slide again and insert the last screw ❸.

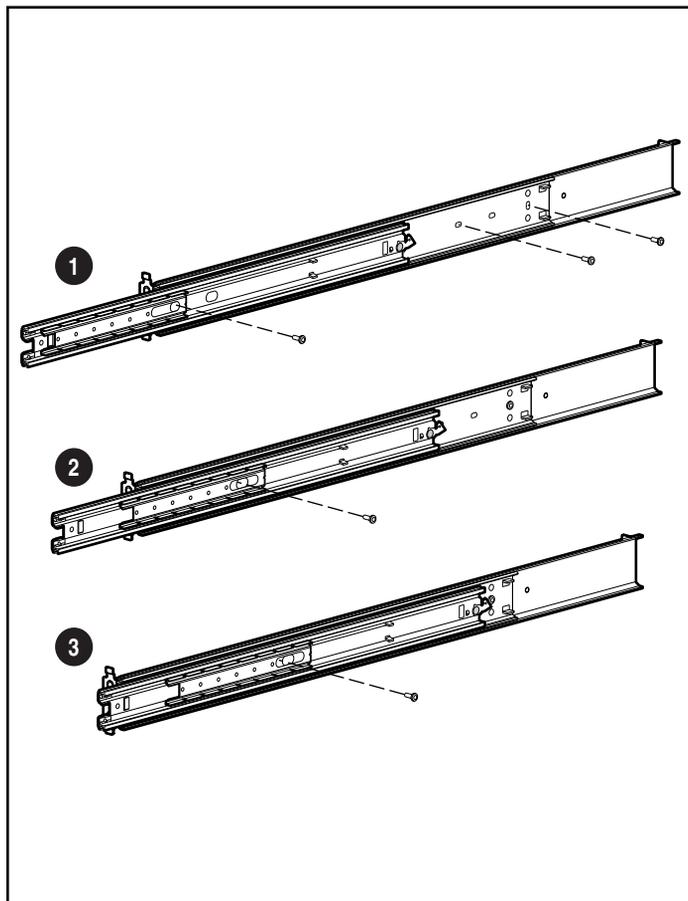


Figure 4-10. Attaching the sliding bracket rails to the rack mounting brackets

4. Attach the front of the rack mounting bracket assembly to the inside of the front mounting rail of the rack using two M6 x 16 screws. The tabs on the front of the rack mounting bracket help to align it correctly with the mounting rail.

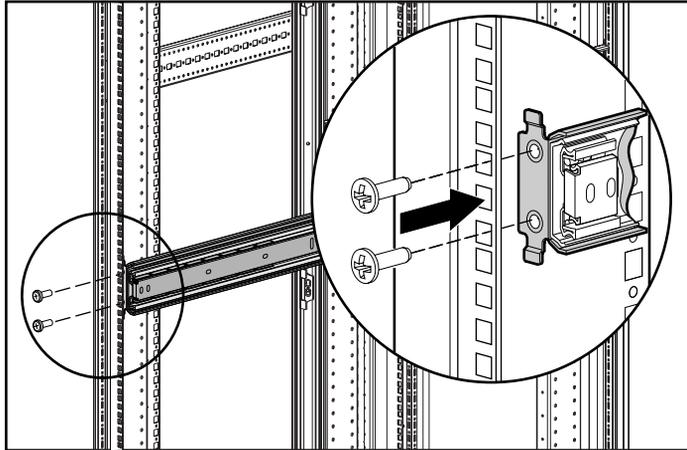


Figure 4-11. Attaching the front of the rack mounting bracket assembly

5. Align the rack mounting bracket assembly with the back mounting rail of the rack. Secure the back of the rack-mounting bracket to the back mounting rail with two M6 x 16 screws. Insert the screws through the cage nuts.

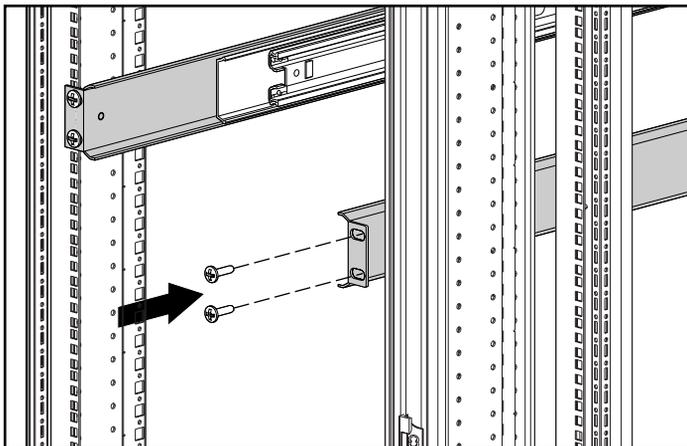


Figure 4-12. Attaching the back of the rack mounting bracket assembly

Component Preparation

These are general instructions for installing a typical Compaq rack-mountable component. See the documentation that shipped with each component for complete installation instructions.

Adjustable Fixed Rails

If the component mounts with fixed rails, typically there is nothing additional to install on the component chassis. The component slides into place along the rails you installed in the rack.

Sliding Rails

For a sliding rail installation, you need to install rails on the component before you can insert it into the rack.

1. Locate the component rails that you set aside when they were removed from the sliding bracket rails earlier.
2. Use three 8-32 x 3/8 screws to install each component rail on the side of the chassis.

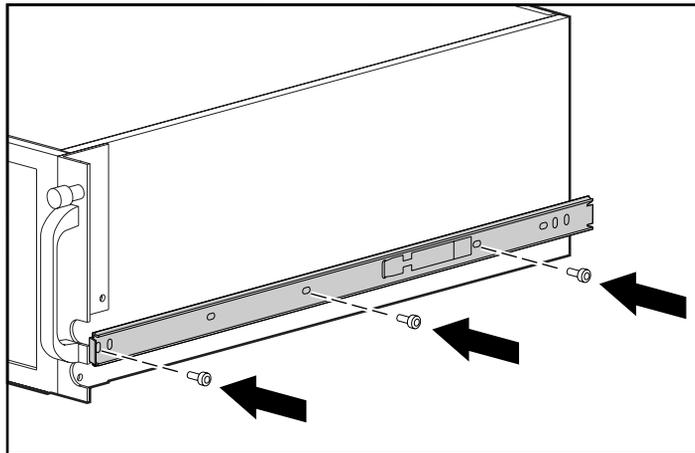


Figure 4-13. Attaching the component rails to the chassis

Cable Management Arm Bracket

If the component uses a cable management arm, attach the bracket that supports the cable management arm to the component chassis with two 6-32 x 1/4 screws.

NOTE: The cable management arm is installed after the component is installed into the rack.

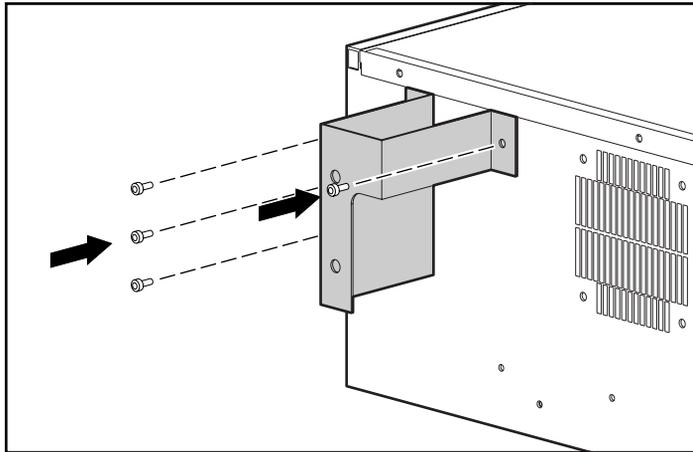


Figure 4-14. Attaching the cable management arm bracket to the unit

Component Installation

After all rack-mounting hardware has been installed on the component, you can insert it into the rack.



WARNING: Components can be very heavy. To reduce the risk of personal injury or damage to the equipment:

- Remove all pluggable power supplies and modules to reduce the weight of the product before lifting it.
 - Observe local occupational health and safety requirements and guidelines for manual material handling.
 - Get help to lift and stabilize the product during installation or removal, especially when the product is not fastened to the rails.
 - When installing the product into or removing the product from the rack, the product is unstable when not fastened to the rails.
-

Inserting the Component into the Rack

To install a component into the rack:

1. Read and adhere to the warning above. The component can be heavy. Be sure that you have an adequate number of individuals, or a mechanical lifting device to help you install the component into the rack.
2. Fully extend the sliding bracket rails.
3. With the unit well supported, lift it up and align the component rails on the chassis with the sliding bracket rails mounted on the rack. Slide the unit into the rack until it clicks into the latches on the component rails.
4. Press in the component rail release latches on either side of the chassis and slide the unit all the way back into the rack.

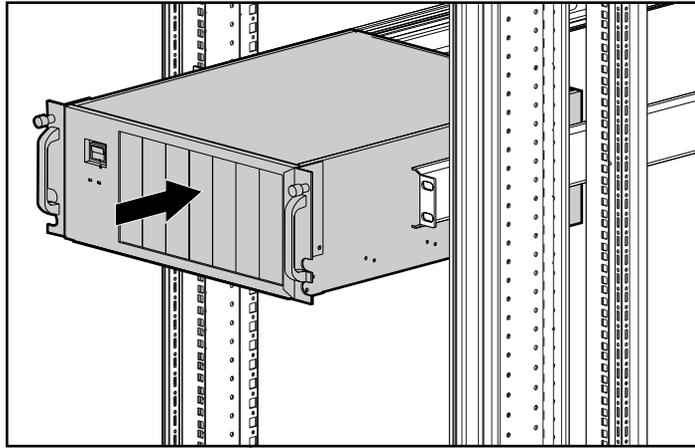


Figure 4-15. Inserting the unit into the rack

NOTE: The first time you slide the unit into the rack, you may have to apply some pressure to loosen the ball bearings. After that, they should slide easily.

5. Using the cage nuts, tighten the thumbscrews on the front of the unit to secure it to the rack.

Attaching the Cable Management Arm

Extend the cable management arm and bend the hinged bracket to the right.

Use two M6 x 12 Phillips screws to attach the cable management arm to the bracket you installed on the chassis earlier.

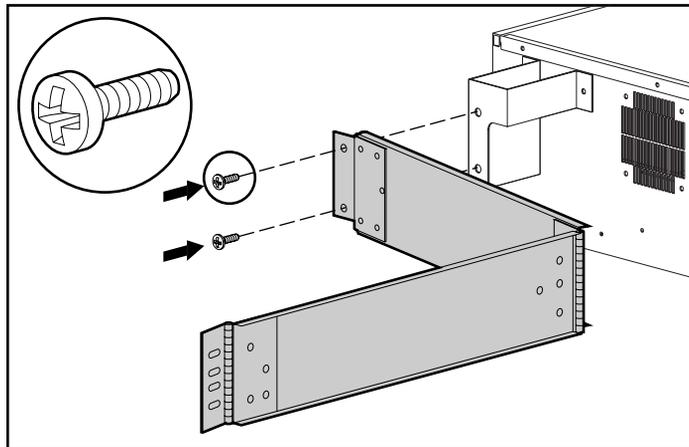


Figure 4-16. Attaching the cable management arm to the bracket

Attaching the Cables

Attach any cables that need to be connected to the component.

Attach the power cord using these steps:

1. Remove the label covering the AC power outlet.
2. Set the input voltage selection switch to the appropriate position.
3. Attach the AC power cord to the unit.
4. Plug the AC power cord to a grounded AC outlet.



WARNING: To reduce the risk of electrical shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.



CAUTION: Make sure that the voltage selection switch is in the proper position (115 VAC or 230 VAC). Failure to do so will result in damage to the equipment.

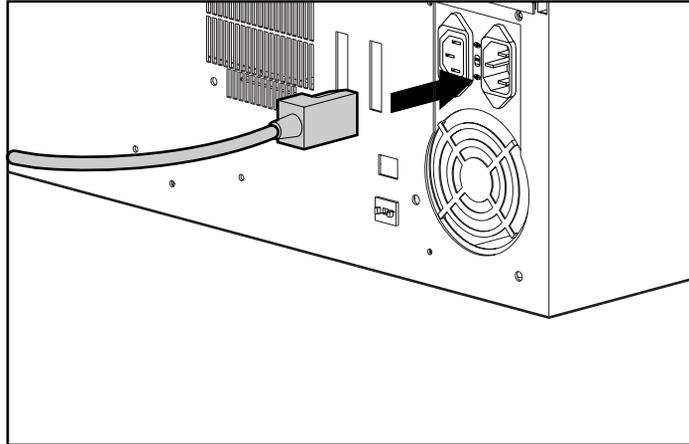


Figure 4-17. Attaching the AC power cord

When using optional power distribution devices, make sure that ground integrity is maintained for each connection by plugging each component into a reliably grounded outlet.

Routing the Cables

Align the screw retaining plate behind the back mounting rail of the rack and attach the cable management arm to the rail with two 10-32 x 5/8 screws.

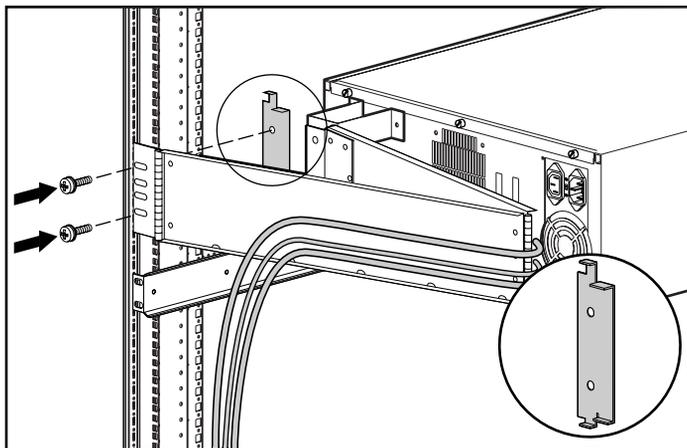


Figure 4-18. Attaching the cable management arm to the rack

As you slide the unit in and out of the front of the rack, the cable management arm collapses and extends so that the cables remain connected to the unit and stay untangled. Secure any cables that you attach to the component to this arm.

With the cable arm extended, bundle all of the cables, including the power cable, and secure them to the cable management arm with the fasteners provided. Leave enough slack in the cables so that you can bend the cable management arm easily.

Route the bundled cables over the top of the cable management arm and down the cable channel on the side of the rack.

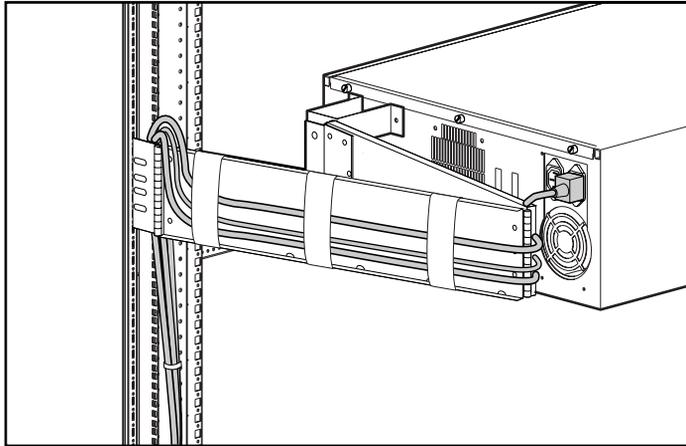


Figure 4-19. Routing the cables

The component is now securely mounted in the rack.

Completing the Installation

After all components have been installed in your rack, complete these remaining steps to finish the rack installation:

- Installing blanking panels
- Installing side panels
- Reattaching the doors
- Power cabling

Installing Blanking Panels



CAUTION: To reduce the risk of damage to internal components, blanking panels must be installed to cover any empty space at the front of the rack.

Use blanking panels to cover any empty areas at the front of the rack. This is necessary to provide adequate airflow when the rack is not filled completely with components.

Installing Sidewall Panels

It is recommended that you install optional sidewall panels after the brackets, rails, and all components are in place.

Install sidewall panels on standalone racks and on each end of a set of coupled racks.

Reattaching the Doors

Closed doors on a rack protect equipment, provide additional security, and enhance the overall appearance of the rack.

Before shutting and/or locking the doors, make sure the retaining screws on all of the components are in place and have been securely tightened.

Attaching Power Cables

After all cables and power cords have been routed to their proper destinations, attach the power cords to a main power switch, such as a properly rated power distribution unit.

If you are not using a power distribution unit, route the power cords directly to a properly rated and grounded AC wall or floor outlet.



WARNING: To reduce the risk of electrical shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
 - Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
-



CAUTION: Make sure that the voltage selection switch is in the proper position (115 VAC or 230 VAC). Failure to do so will result in damage to the equipment.

Chapter 6

Options

The following options are available for use with your Compaq 9000 Series Racks:

- Coupling Kit
- Side Panels Kit
- Stabilizer Kit
- 25-inch Rail Adapter Kit
- Ballast Kit
- Extension Kit
- Fan Kit (110V/220V)
- Ground Bonding Kit
- Cable Management D Ring Kit
- Blanking Panel Kit
- Short Rear Door Kit

Rack Considerations

Before beginning these procedures, make sure you understand and follow these precautions:



WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
 - The full weight of the rack rests on the leveling jacks.
 - The stabilizing feet are attached to the rack, if it is a single-rack installation.
 - The racks are coupled in multiple-rack installations.
 - Only one component is extended at a time. (A rack may become unstable if more than one component is extended for any reason.)
-

Coupling Kit



[View Installation](#)

The Coupling Option Kit allows you to connect multiple 9000 series racks of the same size.

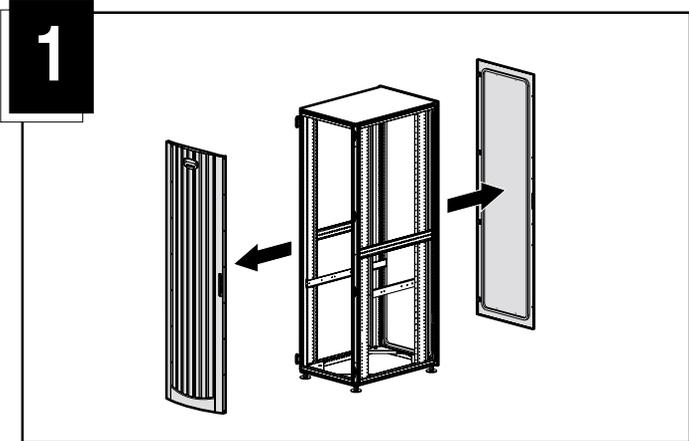
Kit Contents

- 24-inch coupling brackets (6)
- 600mm coupling brackets (6)
- T30 flathead screws (15)

Installation

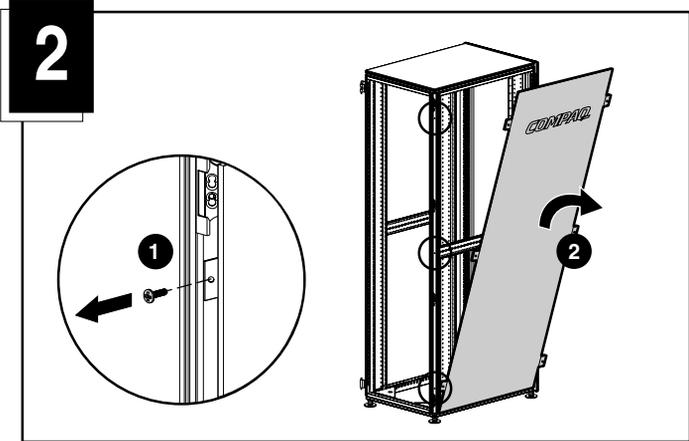
Step 1

Remove the front and rear doors.



Step 2

If side panels are present between the racks you plan to connect, ❶ remove the screws from the side rails, then ❷ remove the panels.



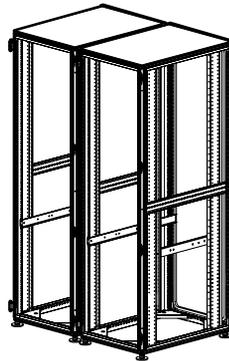


WARNING: To reduce the risk of personal injury or damage to the rack and equipment, the racks must be properly positioned and secured together according to these instructions. Failure to do so could result in an unstable installation.

Step 3

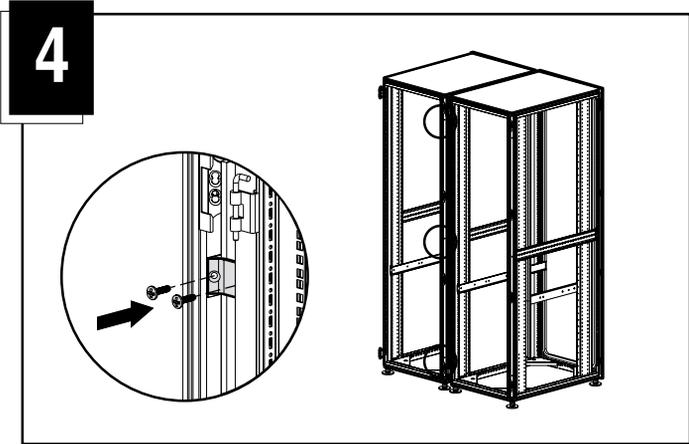
Position the racks side by side. Be sure that the feet of the racks are on solid flooring (no cracks or openings).

3



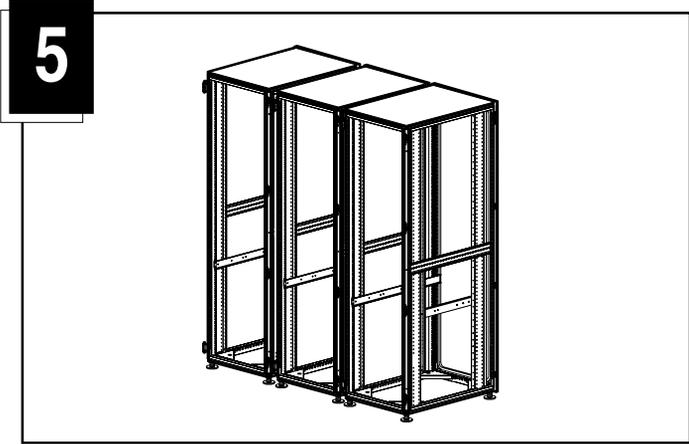
Step 4

Use either a 24-inch bracket or a 600-mm bracket, depending on the floor layout. Attach three brackets to the front and three brackets to the rear of each rack set, using two T30 screws in each bracket.



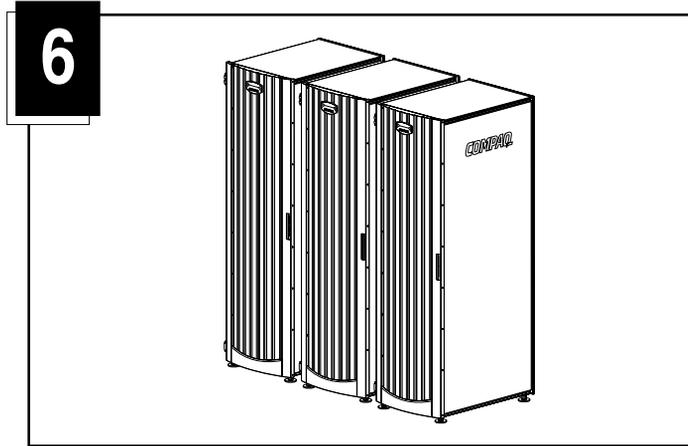
Step 5

Couple any additional racks.



Step 6

Attach a side panel to each end, and reattach the front and rear doors.



Installation is complete.

Side Panels



[View Installation](#)

This section explains how to attach and remove side panels from the Compaq 9000 Series 42U, 36U, or 22U rack products.

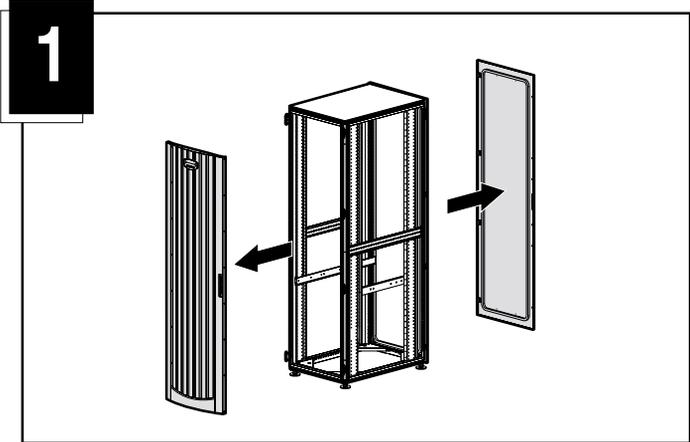
NOTE: A 22U rack ships standard with side panels.

Kit Contents

- Side panel (2)
- Hangers (4)
- T-30 screws (12)
- T-30 driver (1)

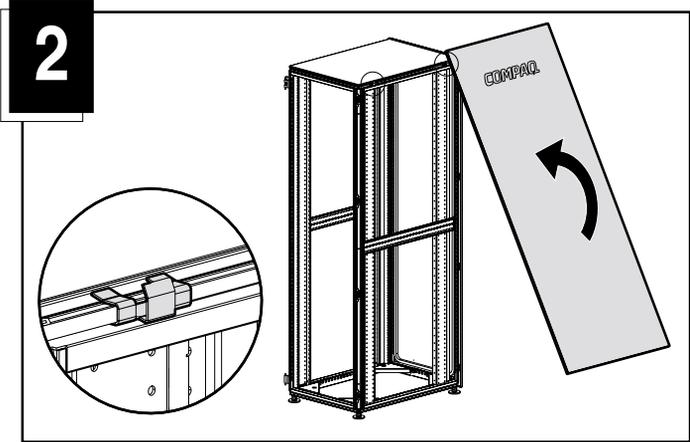
Step 1

If necessary, remove front and rear doors.



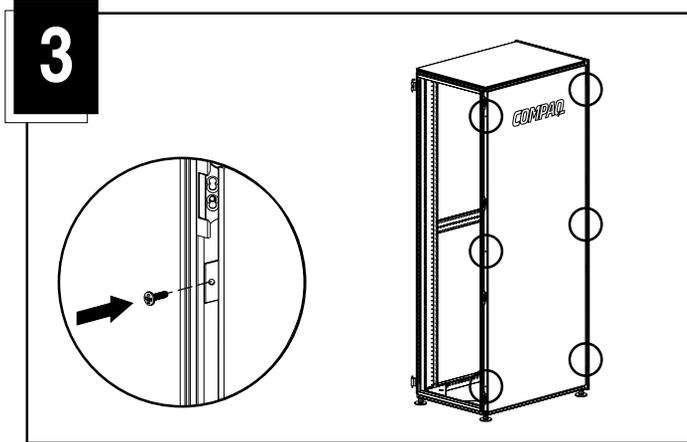
Step 2

Attach two hangers to each side of the rack, approximately 4 inches (10.16 cm) from the edge, then hook the top of each side panel to the hangers.



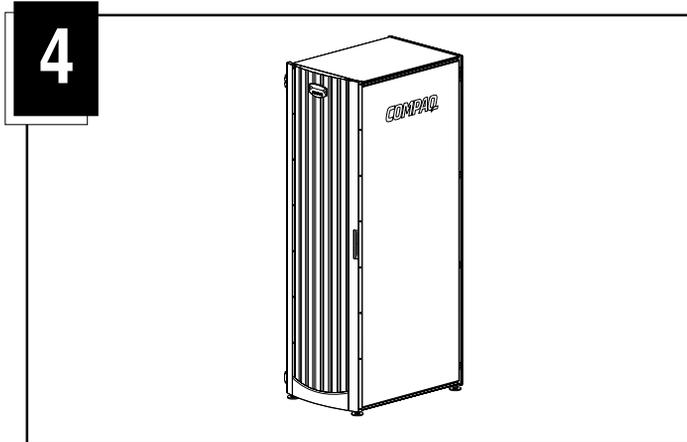
Step 3

Secure each panel with T-30 screws.



Step 4

Replace the front and rear doors.



Installation is complete.

Stabilizer Kit



[View Installation](#)

The Stabilizer Option Kit allows you to stabilize 9000 series racks to prevent tipping.

Kit Contents

The items and quantities required for installation:

- Full size side feet (2)
- Full size front foot
- U Bracket
- Self-retaining cage nuts (4)
- Thread-forming screws (13)
- Modified side feet (2)

This kit may contain extra pieces of hardware for your convenience.

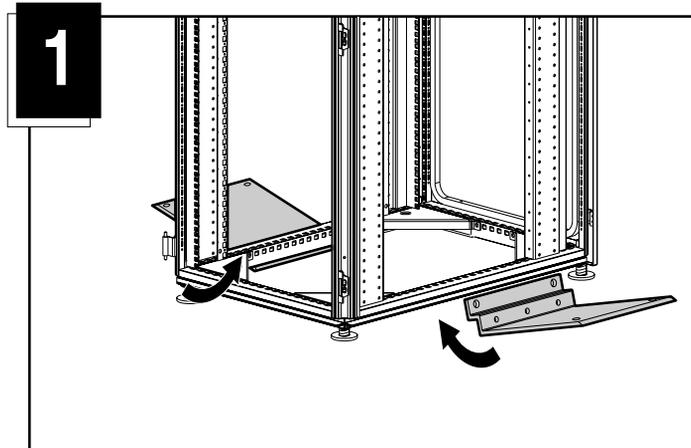
Additional Equipment

- Adjustable wrench

Installation (full size side feet)

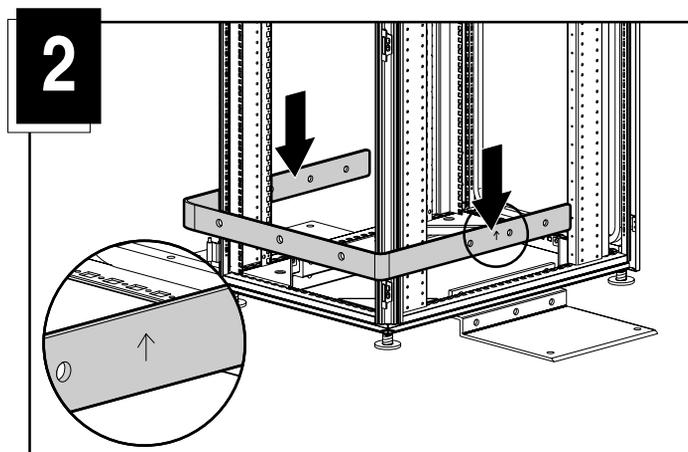
Step 1

Tilt the side feet up and slide them under the bottom of the rack on each side.



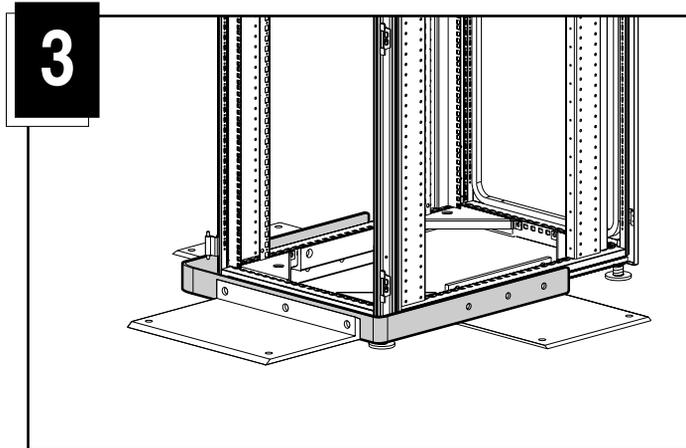
Step 2

Slide the U bracket around the bottom front of the rack, aligning the side screw holes. Be sure that the image of the arrow on the U bracket is pointing up. Insert and partially tighten the screws.



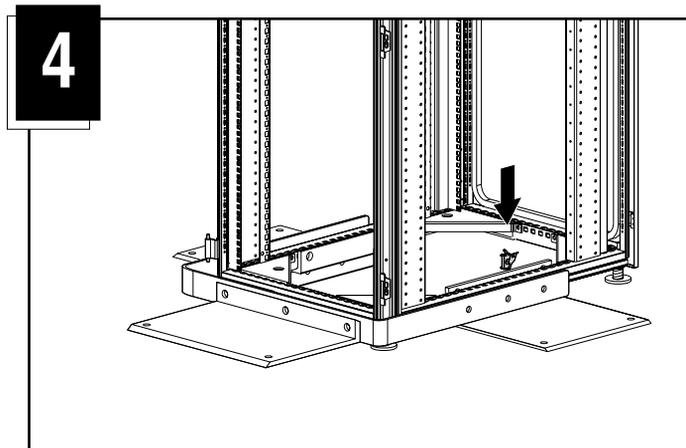
Step 3

Place the front stabilizer foot against the U bracket.



Step 4

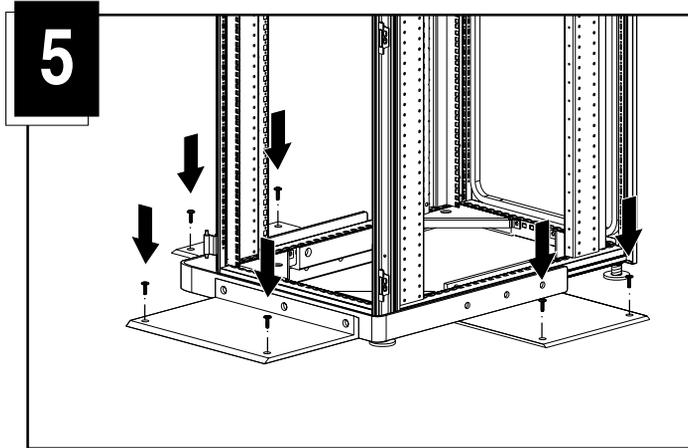
Insert self-retaining cage nuts and align with side panel holes. Insert and tighten screws.



Tighten the front stabilizer foot screws. Reinstall any rack components.

Step 5

Holes are available in the front and the side stabilizer feet to mount the rack to the floor.



Installation is complete.

Optional Modified Side Feet Installation

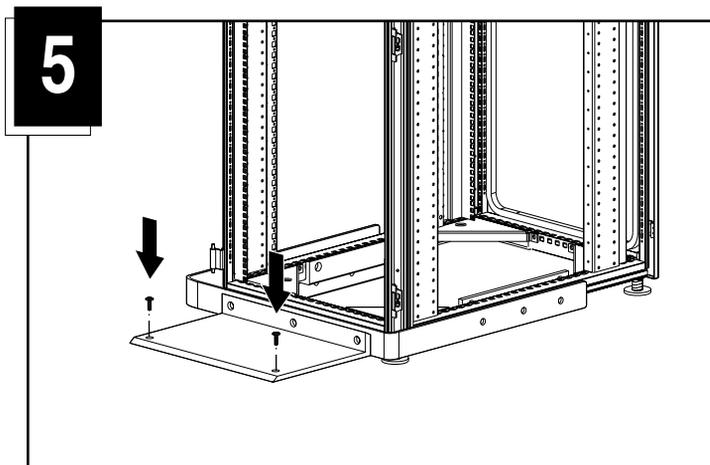
The modified side feet are provided with the Stabilizer Option Kit to allow you to stabilize a 9000 Series rack from the front, when the 9000 Series rack is placed between non-9000 series racks.

The installation sequence for the modified side feet is identical to the standard installation. Follow steps 1-4 of the full size side feet installation sequence, then proceed to step 5, below.



WARNING: This feature is NOT for stand alone 9000 series racks, as it will only stabilize the rack from the front. The rack **MUST** be placed between racks that are secured by coupling kits or individual stabilizer feet from the manufacturer.

Holes are available in the front stabilizer foot to mount the rack to the floor.



Installation is complete.



[View Installation](#)

25-inch Rail Adapter Kit

The Compaq 25-inch Rail Adapter Rack Option Kit lets you adapt the size of the inner rails on Compaq 9000 Series racks to accommodate third-party rack options.

Kit Contents

The items and quantities required for installation:

- Rack rail adapters (4)
- 10-32 Nutbars (4)
- Self-tapping screws (8)
- 10-32 screws (16)
- Square washers (16)

This kit may contain extra pieces of hardware for your convenience.

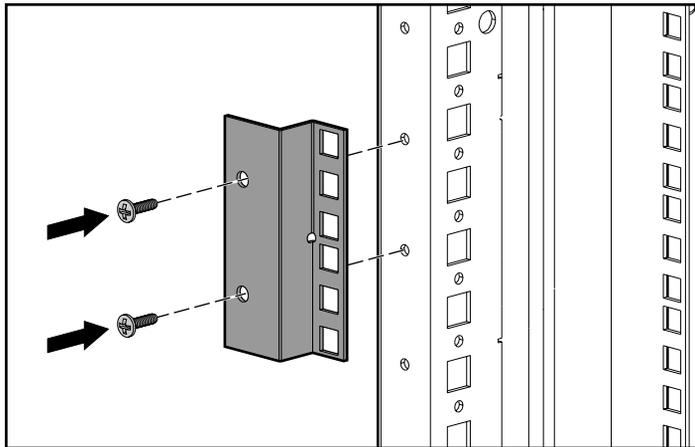
Additional Equipment

- Phillips screwdriver

Installation

Step 1

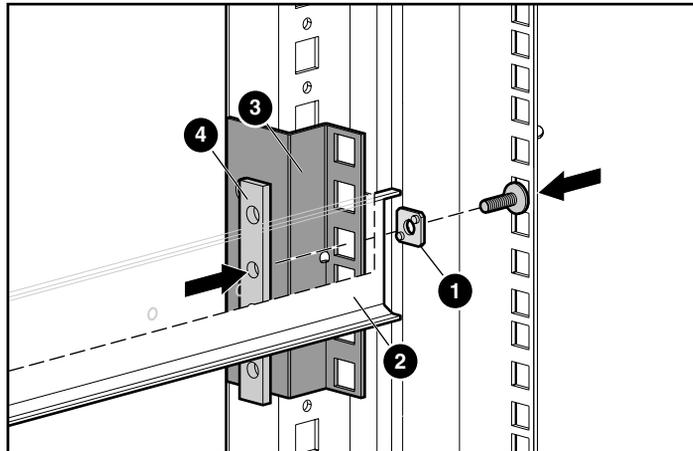
Secure a pair of 25-inch rail adapters to the rack, attaching one adapter to the back of the right rail and one adapter to the back of the left rail. Position the 25-inch rail adapter in the appropriate location and insert and tighten two self-tapping screws.



Step 2

Secure the inner mounting rail to the adapter with a 10-32 nutbar:

Insert a 10-32 screw through a flat washer ❶, then through the inner mounting rail ❷, through the 25-inch rail adapter ❸, and into a 10-32 nutbar ❹. Tighten the screw. Repeat to add a second screw.



Installation is complete.

Ballast Option Kit



[View Installation](#)

This option is for use with Compaq 9142 or 9136 single rack installations to provide additional stability.

Kit Contents

- Ballast assembly (2)
- 5.5 mm self-tapping screws (10)

Additional Equipment

You will also need a Phillips screwdriver.

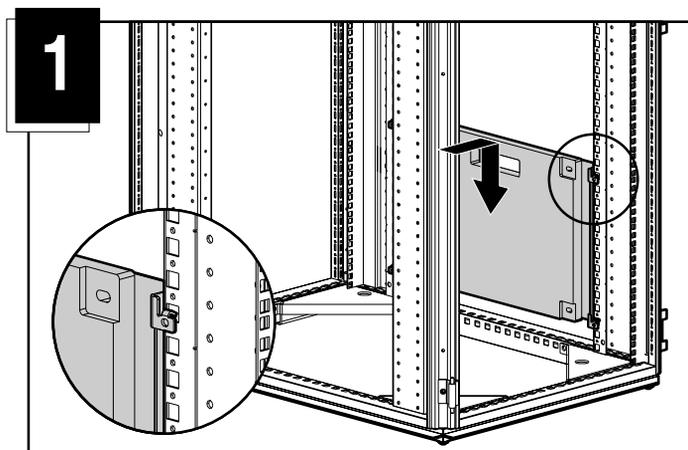
Installation



CAUTION: To avoid personal injury or damage to the equipment, it is recommended that the Ballast Rack Option Kit only be installed in unconfigured racks.

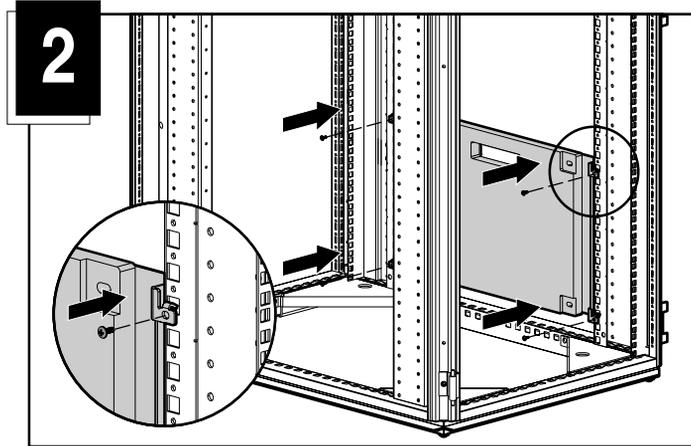
Step 1

Place ballast in the lowest position in the rack (right or left side of rack) and insert the tabs into the appropriate mounting rail slots.



Step 2

Insert four 5.5-mm, self-tapping screws and tighten.



Repeat for the other side.

Extension Kit



[View Installation](#)

The Rack Extension Option Kit is used to add 3 ½ inches of depth to the rear of the rack.

Kit Contents

Below are the items and quantities required for assembly:

- Door extension (1)
- T-25 5.5 mm torx head screws (6)
- T-30 torx head screw (1)
- Screw fasteners (5)
- Grounding strap (1)
- Serrated washer (1)
- Threaded nut (1)
- Hinge

This kit may contain extra pieces of hardware for your convenience.

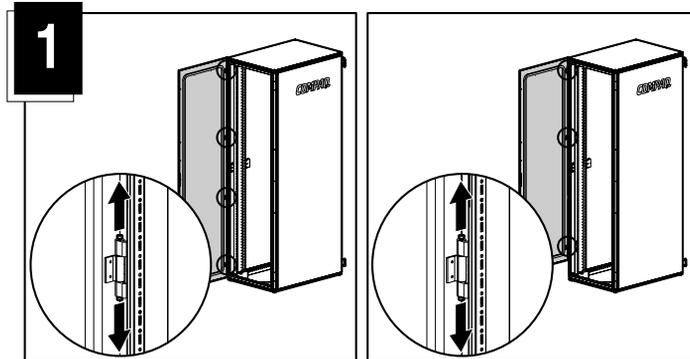
Additional Equipment

- T-25 torx screwdriver
- T-30 torx screwdriver
- Adjustable wrench

Installation

Step 1

Open the hinge brackets on the rear of the rack to release the door. Pull up on the top hinge bracket pin and pull down the lower hinge bracket pin.

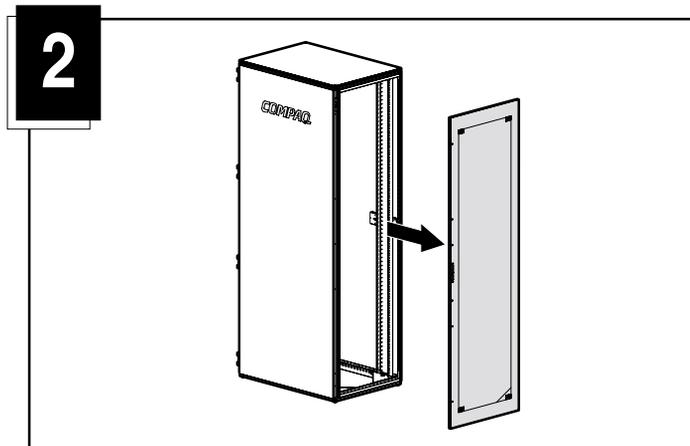


NOTE: Full length rear door

Short rear door

Step 2

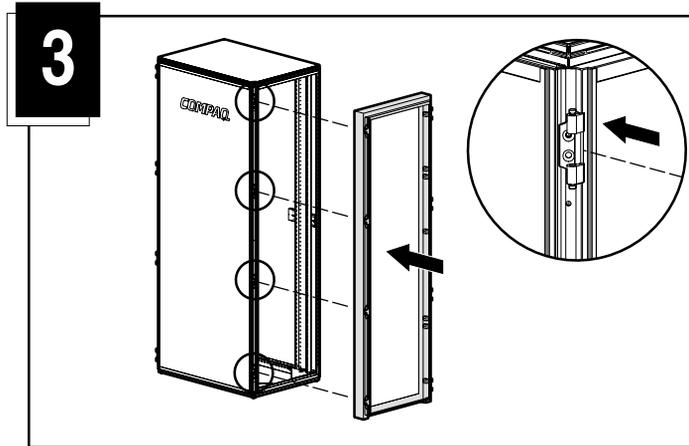
Lift the door away from the rack. Place the door in an upright position taking care to protect from damage.



NOTE: If a short rear door was removed, an additional hinge must be added to the rear of the rack before installing the extension, proceed to step 3B.

Step 3A (after removal of a full-length rear door)

Attach the door extension to the rear of the rack by inserting the hinges on the extension into the hinge brackets on the rack. Close the hinge brackets to secure. Proceed to Step 4.

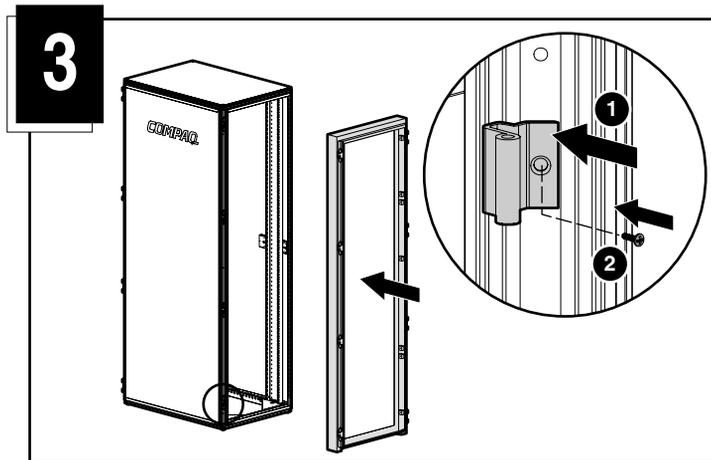


Step 3B (after removal of a short rear door)

Install the new hinge that ships with this kit.

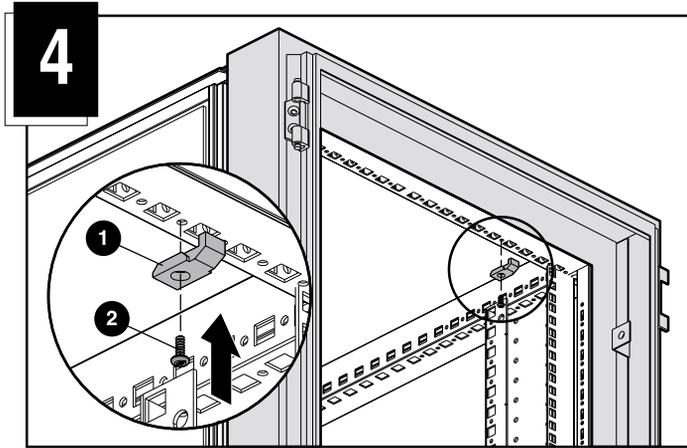
- ❶ Position the hinge on the lower left side of the rack.
- ❷ Insert a T-30 screw and tighten using a T-30 torx screwdriver.

NOTE: After installing the new hinge, attach the door extension to the rear of the rack, as illustrated in step 3A.



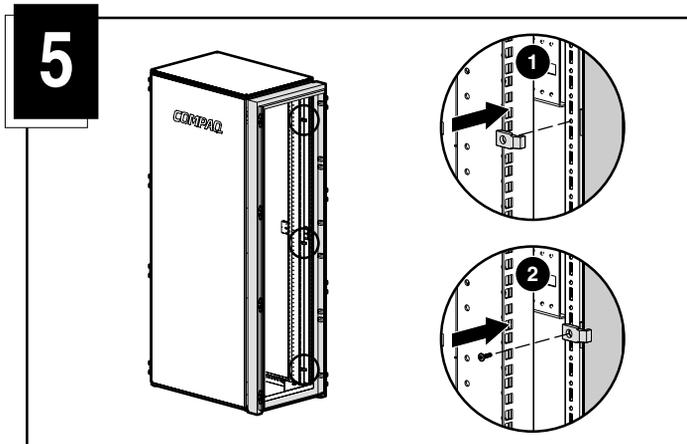
Step 4

- 1 Install one screw fastener in the top right of the rack frame.
- 2 Secure the screw fastener with one T-25 5.5-mm torx head screw.



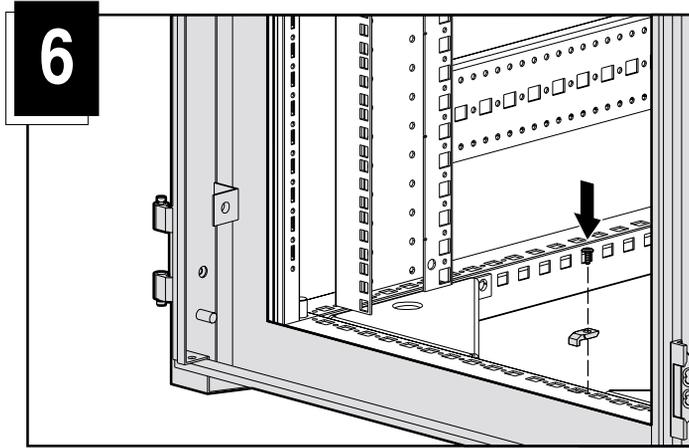
Step 5

- 1 Install three screw fasteners along the right side of the rack frame.
- 2 Secure with T-25 5.5-mm torx head screws.



Step 6

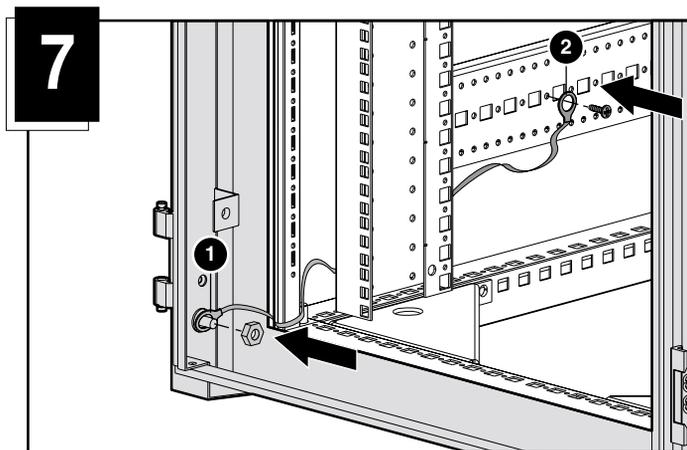
Install one screw fastener and one T-25 5.5-mm torx head screw in the bottom right of the rack frame.



Step 7

Attach a grounding strap from the ❶ grounding stud on the lower left side of the door extension to the ❷ system chassis rail.

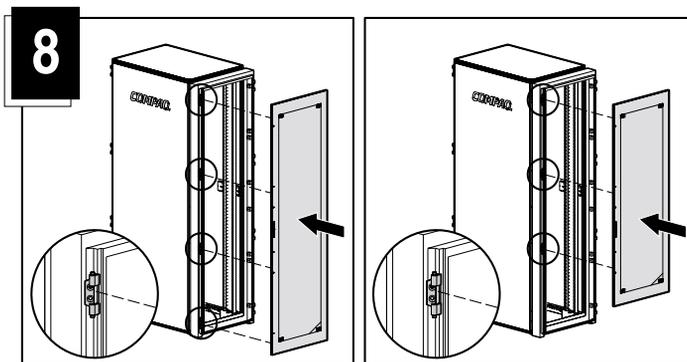
- a. Place a serrated washer over the ground stud.
- b. Place the end of the grounding strap over the washer.
- c. Place a threaded nut over the grounding strap and tighten the nut.
- d. Insert a T-25 torx head screw through the other end of the grounding strap and secure it to the system chassis rail.



Step 8

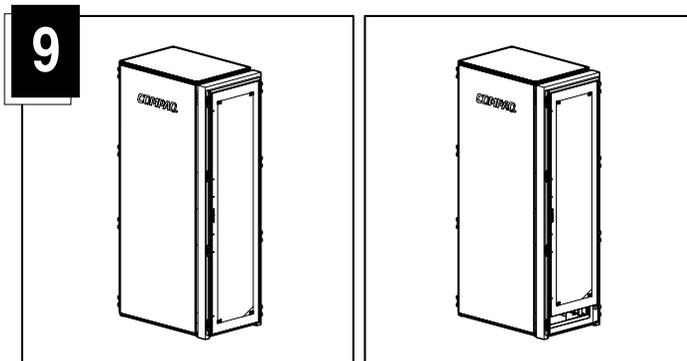
Replace the rear door by inserting the door hinges into the hinge brackets located on the door extension. Close the hinge brackets to secure the door.

NOTE: If replacing a short rear door, only the top three hinge brackets are used.



NOTE: Full length rear door

Short rear door



NOTE: Full length rear door

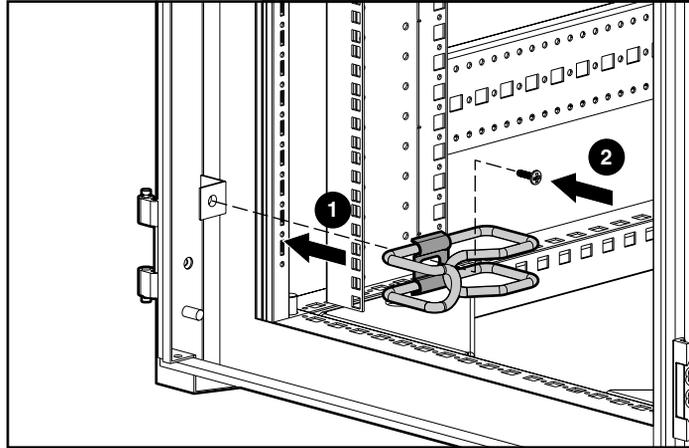
Short rear door

Installation is complete.

[View Installation](#)

Cable Management D Ring Option

❶ Align the cable management bracket and D Ring with the appropriate weld tab, then ❷ secure with a 6-mm screw supplied in your original rack hardware kit.



Fan (110V/220V) Kit

[View Installation](#)

This option is for use with all Compaq 9000 Series racks to enhance natural convection cooling by increasing the airflow in the rack.

Kit Contents

- Fan assembly
- Power cord (2)
- Cable fastener (4)

Additional Equipment

You will also need a Phillips screwdriver.

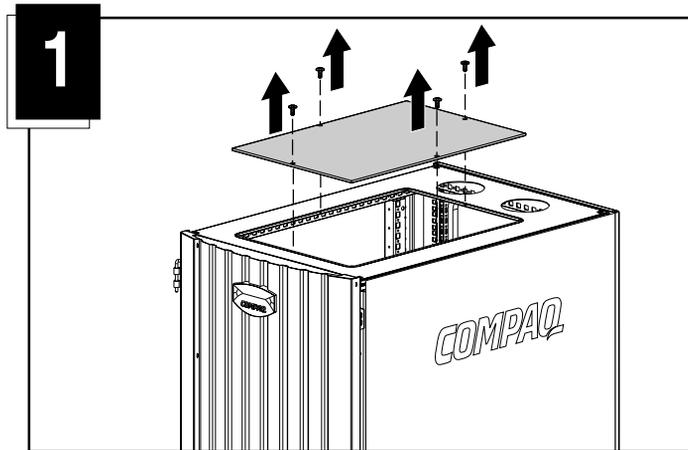
Installation Instructions

Step 1

Remove the four screws securing the top cover to the rack, then remove the top cover. Retain the screws for use in step 2.

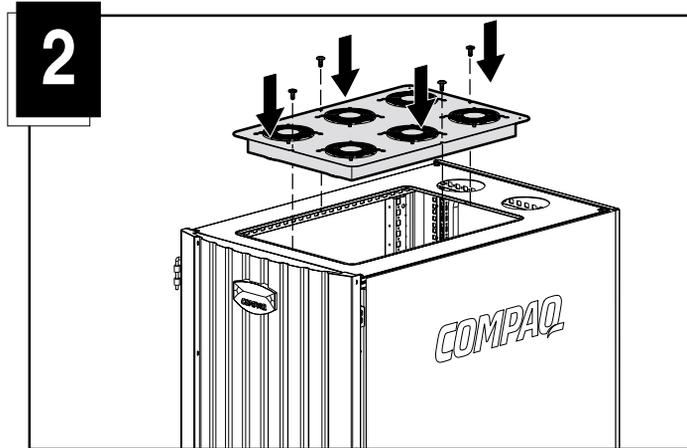


WARNING: To reduce the risk of personal injury or damage to your equipment, do not use the rack or any of its components to gain access to the top of the rack.



Step 2

Insert the fan assembly into the top of the rack with the power plug facing the rear of the rack. Secure using the four screws retained from step 1.

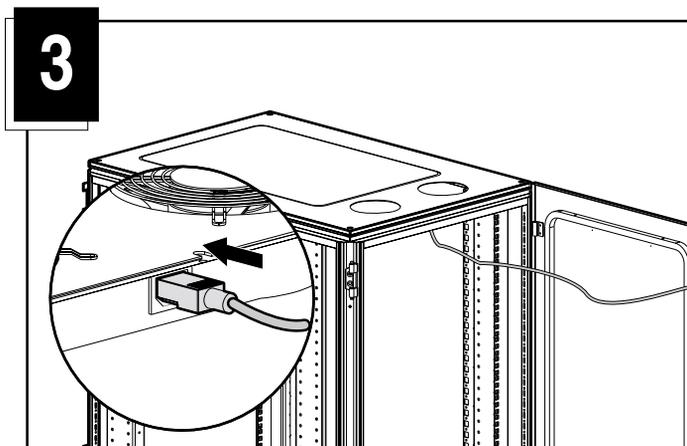


Step 3

Attach the power cord to the fan assembly.

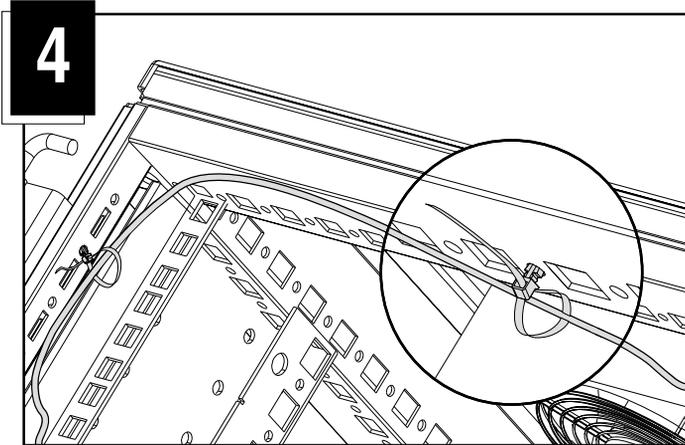


WARNING: To reduce the risk of personal injury or damage to your equipment, be sure that you are using the proper power cord.



Step 4

1. Insert the notched end of the tie wrap into a small hole in the rack rail and push in to lock in place.
2. Encircle the power cord with the tie wrap, then insert the free end into the hole on the other end of the tie wrap and pull tight.
3. Cut off excess length of the tie wrap.



Ground Bonding Rack Option Kit



[View Installation](#)

This option reduces the electro-magnetic emissions that may be given off by electronic components operating within the rack cabinet. The kit ties all the conductive structural components of the rack together with conductive cables, and is designed to be attached to a ground bonding point on the rack's AC power distribution device. It is intended for use with all Compaq 9000 Series racks.

Kit Contents

Below are the items and quantities required for assembly:

- 6-inch (15.24 cm) grounding strap (3)
- 14.5-inch (36.83 cm) grounding strap (4)
- Mountable wire tie (10)
- M8 nut (5)
- Internal serrated lock washer (5)
- M8 x 20 hex head screw (1)
- Paint cutter washer (2)
- T-25 5.5 mm torx head screw (10)

This kit may contain extra pieces of hardware for your convenience.

Additional Equipment

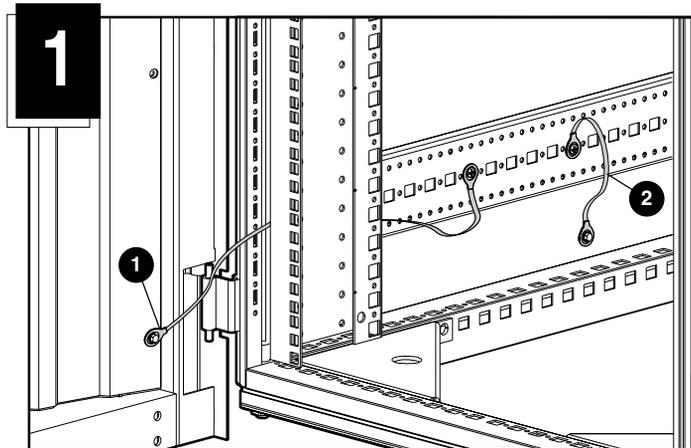
You will also need:

- T-25 torx screwdriver
- Adjustable wrench

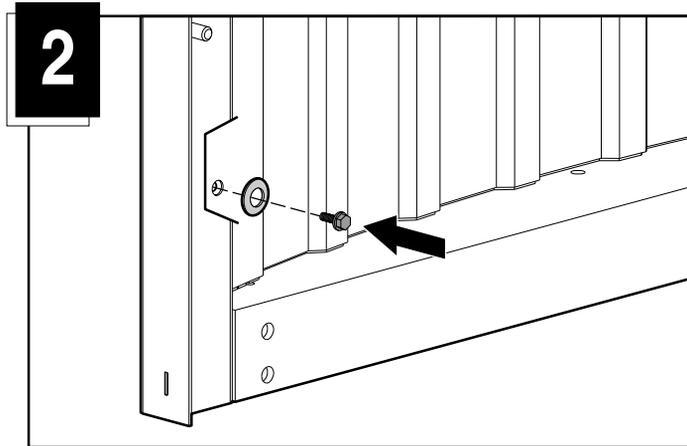
Installation

Attach grounding straps to the locations shown in the following figures.

- ❶ From the front door to the system chassis rail:
 - a. Remove the front door panel screw.
 - b. Place one end of a 14-inch grounding strap over the screw, then place a paint cutter washer onto the screw.
 - c. Reinsert and tighten the screw into the door panel.
 - d. Insert a self-tapping screw through the other end of the grounding strap and secure it to the system chassis rail.
- ❷ From the system chassis rail to the side panel:
 - a. Insert a self-tapping screw through one end of a 6-inch grounding strap and secure it to the system chassis rail.
 - b. Place an internal serrated lock washer over the ground lug on the side panel.
 - c. Place the other end of the grounding strap over the washer.
 - d. Place a nut over the grounding strap and tighten the nut.

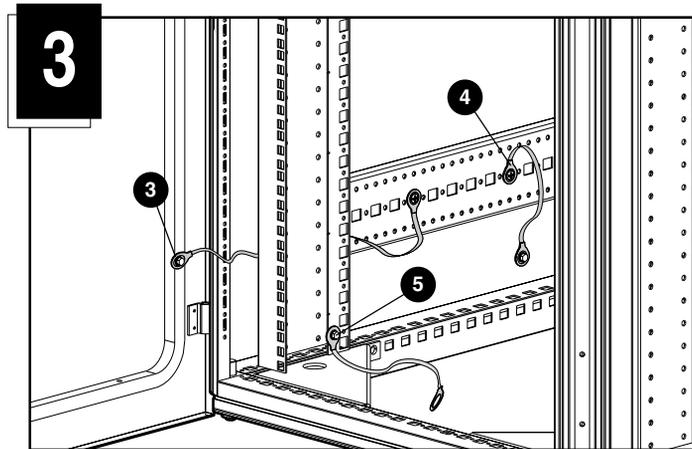


Remove the door screw, insert one paint cutter washer, then reinsert and tighten the screw.



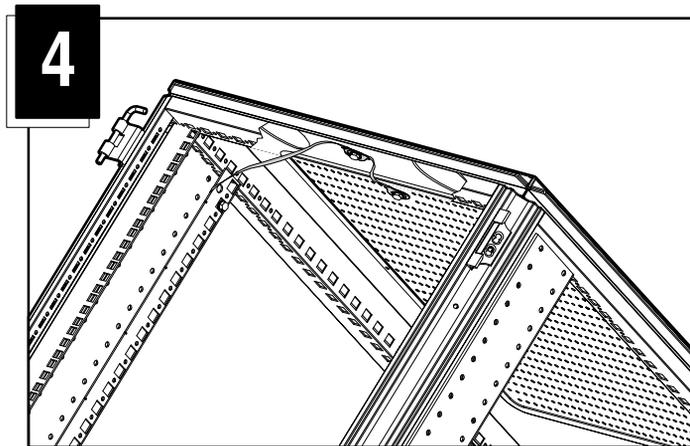
- ③ From the system chassis rail to the rear door:
 - a. Insert a self-tapping screw through one end of a 14-inch grounding strap, then place a paint cutter washer and secure to the 4.5-mm hole on the rear stiffner door.
 - b. Insert a T-25 torx head screw through the other end of the grounding strap and secure to the system chassis rail.
- ④ See ②.

- 5 From the system chassis rail to a known earth (ground) reference “terminal.”
 - a. Insert the grounding bolt through the grounding bolt hole.
 - b. From the inside of the rack, place one end of a 14-inch grounding strap over the end of the bolt.
 - c. Place an internal serrated lock washer over the grounding strap.
 - d. Place a nut over the washer and tighten the nut.
 - e. Secure the other end of the grounding strap to a ground bonding terminal on the system AC power distribution device or a known earth reference terminal in the building.



From the 19-inch mounting angle rail to the top of the rack, then to the perforated panel:

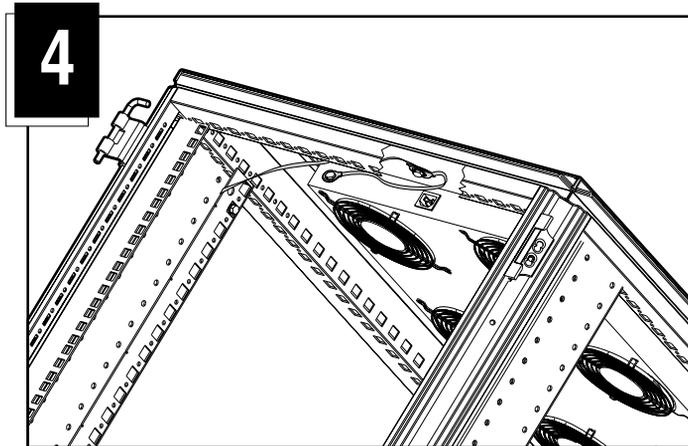
- a. Use a pair of pliers to remove the cap from the ground lug on the top of the rack and the perforated panel.
- b. Insert a self-tapping screw through one end of a 6-inch grounding strap and secure it to the 19-inch mounting angle rail.
- c. Place an internal serrated lock washer over the ground lug on the top inside of the rack.
- d. Place the other end of the grounding strap over the washer.
- e. Place one end of another 6-inch grounding strap over the one in step d.
- f. Place a nut over the grounding straps and tighten the nut.
- g. Place the other end of the grounding strap over the ground lug on the perforated panel.
- h. Place a nut over the grounding strap and tighten the nut.



OR

From the 19-inch mounting angle rail to the top of the rack, then to the fan kit:

- a. Use a pair of pliers to remove the cap from the ground lug on the top of the rack and the fan kit.
- b. Insert a self-tapping screw through one end of a 6-inch grounding strap and secure it to the 19-inch mounting angle rail.
- c. Place an internal serrated lock washer over the ground lug on the top inside of the rack.
- d. Place the other end of the grounding strap over the washer.
- e. Place one end of another 6-inch grounding strap over the one in step d.
- f. Place a nut over the grounding straps and tighten the nut.
- g. Place the other end of the grounding strap over the ground lug on the fan kit.
- h. Place a nut over the grounding strap and tighten the nut.



Installation is complete.

Cable Management D Ring Option Kit



[View Installation](#)

The Compaq Cable Management D Rings Rack Option Kit is designed for use with all 9000 Series racks to assist with cable management.

Kit Contents

- Cable management brackets (10)
- Cable management D Rings (10)
- 5.5 mm thread-forming screws (10)

This kit may contain extra pieces of hardware for your convenience.

Additional Hardware

You will also need the following components from your original rack hardware kit:

- M6 screws
- M6 cage nuts
- Cage nut insertion tool

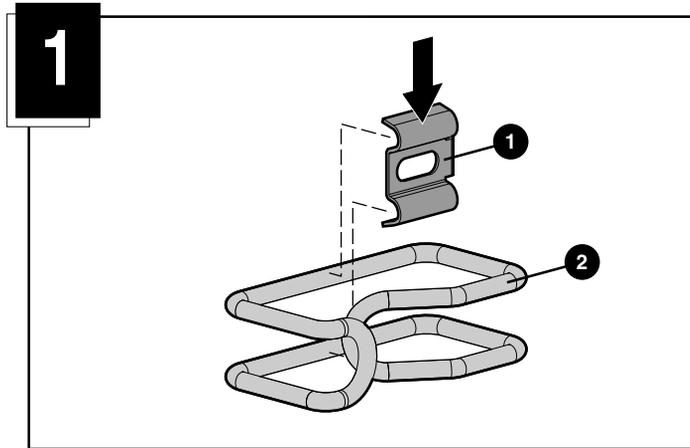
Additional Equipment

You will also need a Phillips screwdriver.

Installation

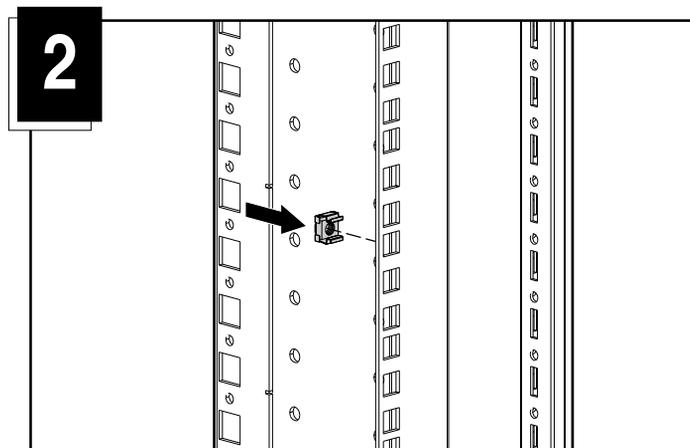
Step 1

Place a cable management D Ring ❶ on a cable management bracket ❷.



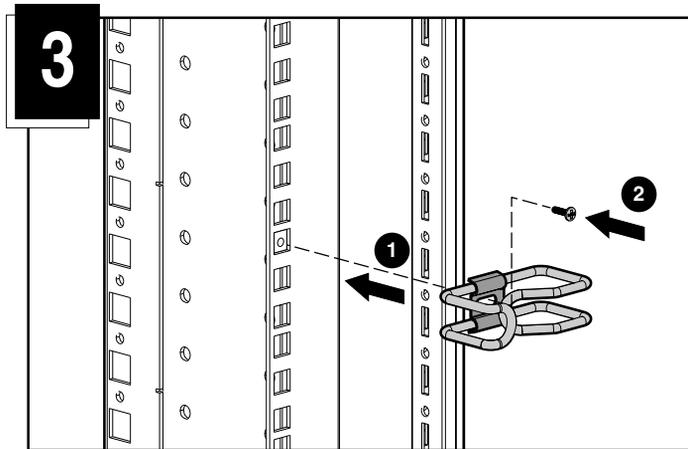
Step 2 – Front Mount

Install a cage nut in the rack. Cage nuts are provided in your original rack hardware kit.



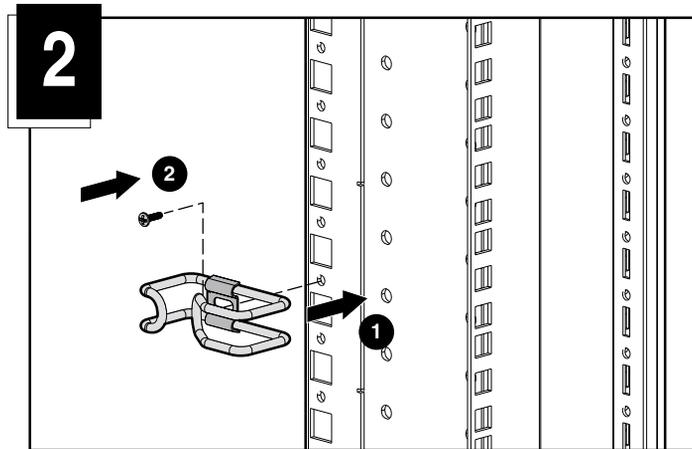
Step 3 – Front Mount

- 1 Align the bracket with the previously installed cage nut.
- 2 Secure the bracket with one of the M6 screws supplied in the original rack hardware kit.



Step 2 - Side Mount

- 1 Align the bracket with the appropriate screw hole.
- 2 Secure the bracket with one of the 5.5 mm thread-forming screws supplied with this kit.



Installation is complete.

Blanking Panels Option Kit



[View Installation](#)

The Compaq Blanking Panels Option Kit lets you cover open areas of your rack to better control airflow. This option can be used with all Compaq 9000 series racks.



CAUTION: To reduce the risk of damage to internal components, blanking panels must be installed to cover any empty space at the front of the rack.

Kits Available

- 1U, 2U, 4U, and 8U panels (one of each) or
- 10 (1U) panels or
- 10 (2U) panels or
- 10 (3U) panels or
- 10 (4U) panels or
- 10 (5U) panels

This kit may contain extra pieces of hardware for your convenience.

Additional Hardware

You will also need the following components from your original rack hardware kit:

- M6 screws
- Cage nuts
- Cage nut insertion tool

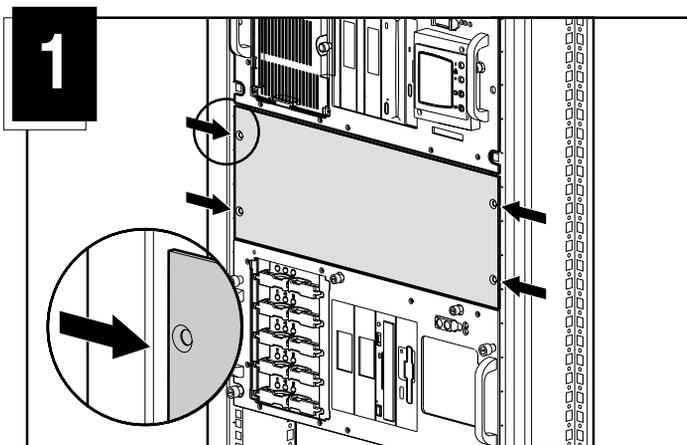
Tools Required

You will also need a Phillips screwdriver.

Installation

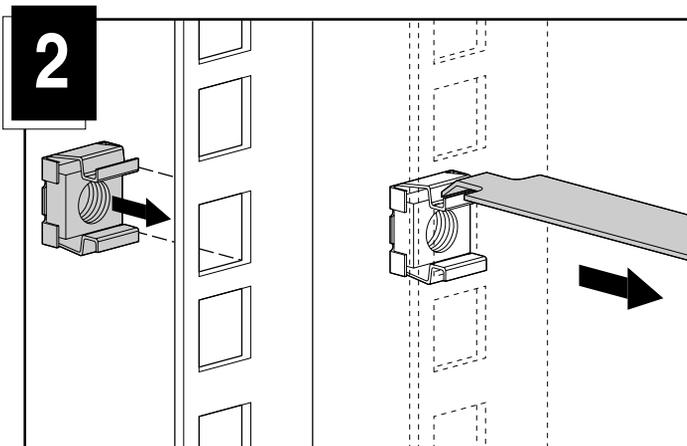
Step 1

Hold the panel up to the rack and mark the attachment points for the cage nuts, which are supplied in your original rack hardware kit.



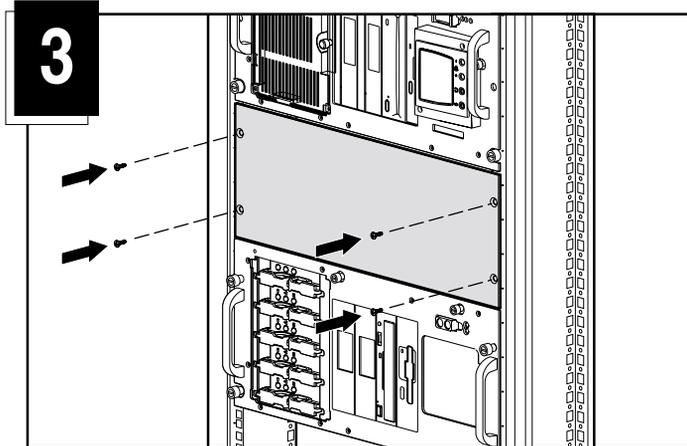
Step 2

Insert the cage nuts.



Step 3

Align the panel with the holes over the cage nuts and insert the M6 screws.



Installation is complete.



[View Installation](#)

Short Rear Door Option Kit

The Compaq 9000 Series Rack Short Rear Door Option Kit provides a 4U (seven-inch) opening at the bottom rear of the rack.

Kit Contents

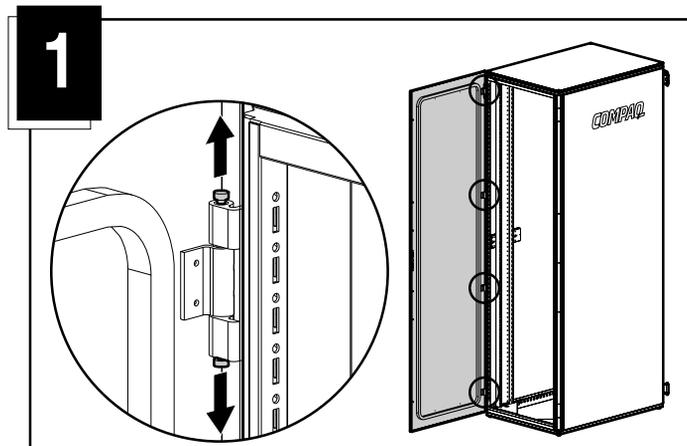
Below are the items and quantities required for assembly:

- Short Rear Door (1)

Installation

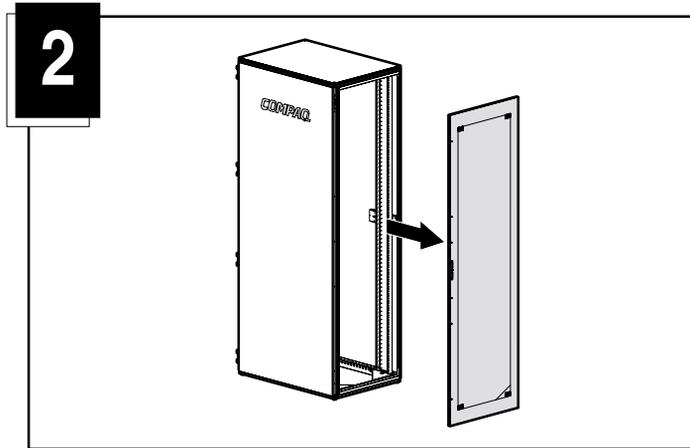
Step 1

Open the four hinge brackets on the rear of the rack to release the existing door. Pull up on the top hinge bracket pin and down on the lower hinge bracket pin.



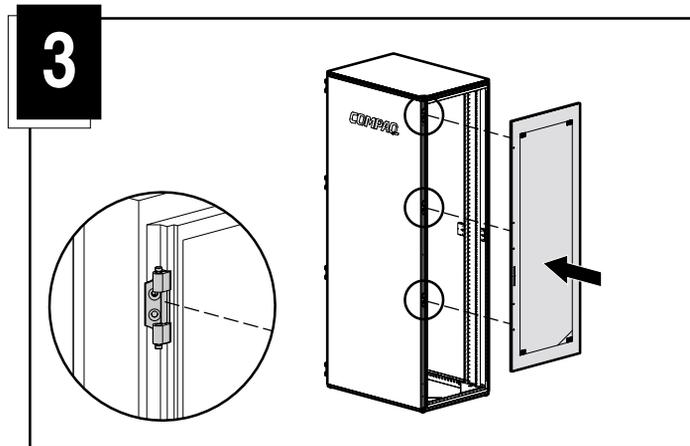
Step 2

Lift the door away from the rack. Place the door in an upright position, taking care to protect from damage.



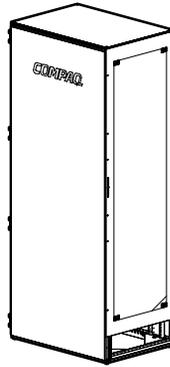
Step 3

Attach the short rear door by inserting the hinges on the door into the hinge brackets located on the rear of the rack. Secure the hinges by closing the hinge brackets.



NOTE: The fourth hinge may be left on the rack or removed and stored for future use.

4



Installation is complete.

1U Keyboard Drawer Option Kit

The 1U Keyboard Drawer is a convenient rack mount system for easy keyboard storage and access.

The retractable drawer occupies 1U of Compaq rack space and can be used with all Compaq Rack Series.

Kit Contents

- Keyboard drawer
- Slide brackets (2)
- Latch bracket
- Beaded cable tie (extras included)
- Cable tie mount (extras included)
- Drawer cover
- Rail covers (2)
- Rail cover base (2)
- Rack template card

Additional Equipment

You will also need the following equipment from your Compaq rack.

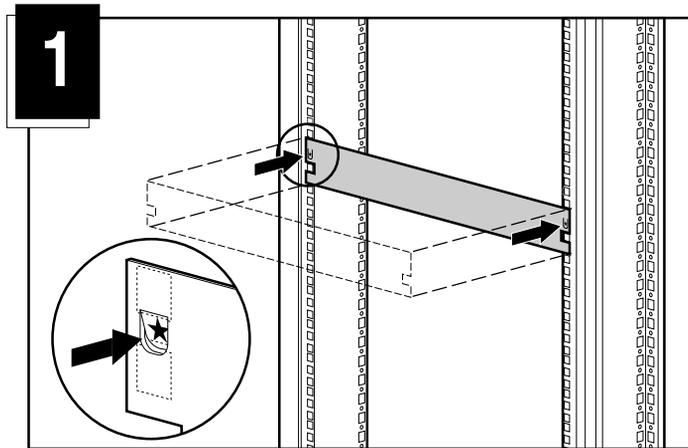
- Cage nuts (2)
- M6 screws (6)

Installation

Step 1

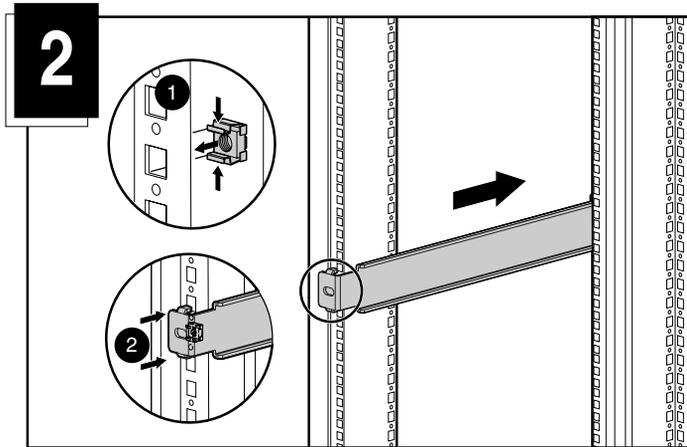
From the printed report generated by the Rack Builder Pro or rack Builder Online software, determine the rack position of the keyboard drawer. Then, measuring from the top of the component below, use the template to carefully measure on the front and rear of the rack frame to mark the attachment points for the mounting brackets and rear cage nuts.

When using the template on the back of the rack, mark the rack at the top of the template to help align the next component.



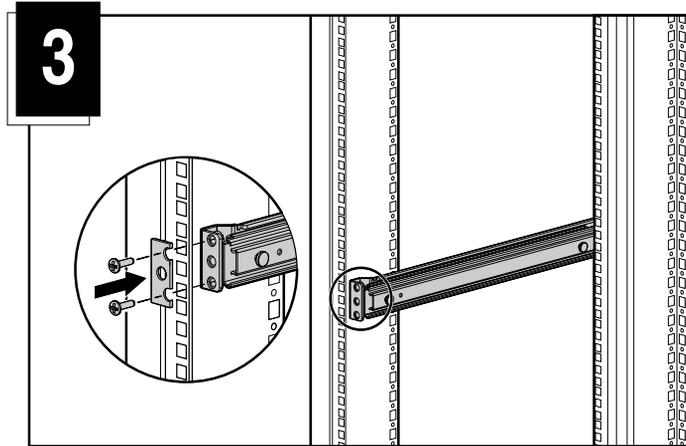
Step 2

- ❶ Insert cage nuts on the rear of the rack in each of the holes marked using the template.
- ❷ Insert a rail mounting bracket into the rack and hook the tabs into the appropriate holes in the rear of the rack, aligning the screw holes at the front of the rack.



Step 3

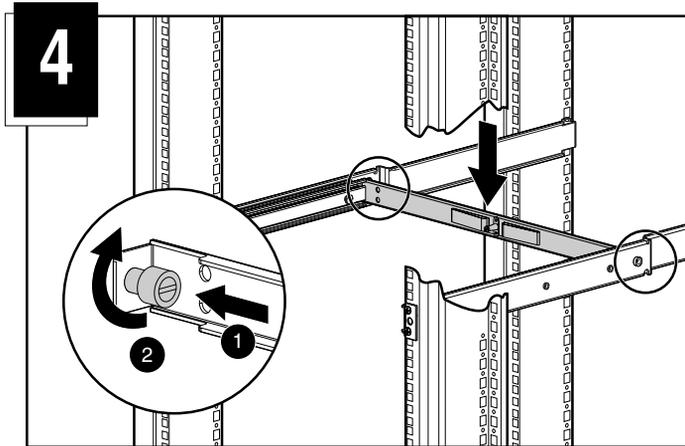
Align the rail with the holes on the front of the rack. Insert two M6 screws and begin to tighten. Insert a rail cover base, then extend the rail and press it against the rack to help properly align the screws, then tighten.



Step 4

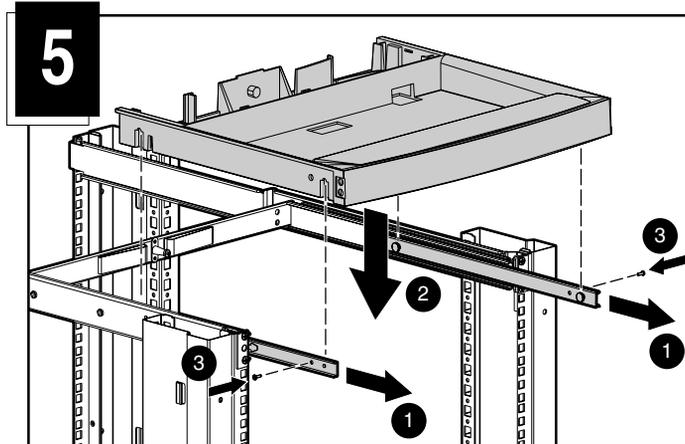
Attach the Latch Bracket to each mounting bracket with the latch receptacle facing the front of the rack.

- ❶ Flex rail out slightly to allow the latch bracket to be inserted. Line up the screws on the latch bracket with the holes in the rails.
- ❷ Turn thumbscrews to tighten.



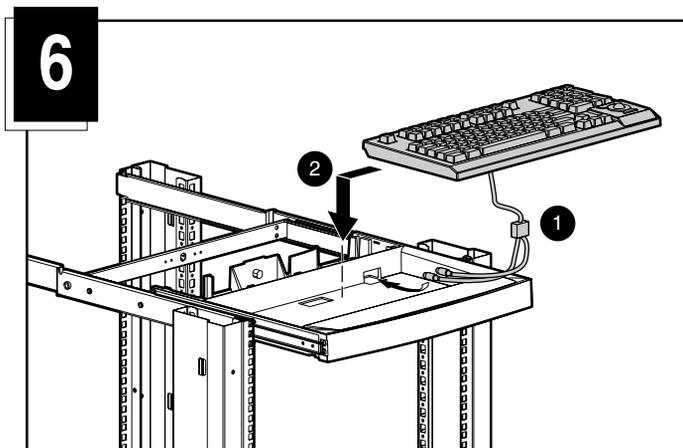
Step 5

- ❶ Fully extend the sliding rails.
- ❷ Set the tray onto the rails, lining up the openings on the tray with the tabs on the rails.
- ❸ Secure with one screw on each rail.



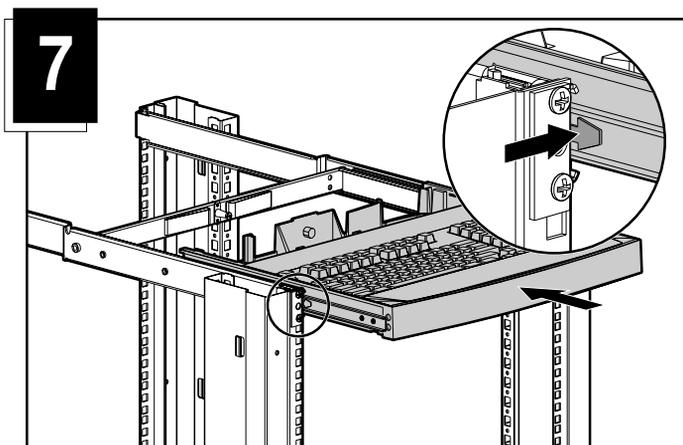
Step 6

- 1 Thread the keyboard cable through the opening in the back of the tray.
- 2 Place the keyboard into the drawer.



Step 7

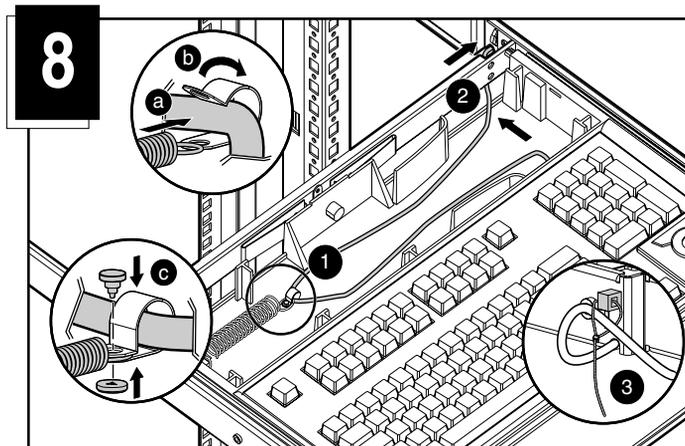
Press in on the metal release levers on the outside of each rail, then push drawer into the rack to latch.



Step 8

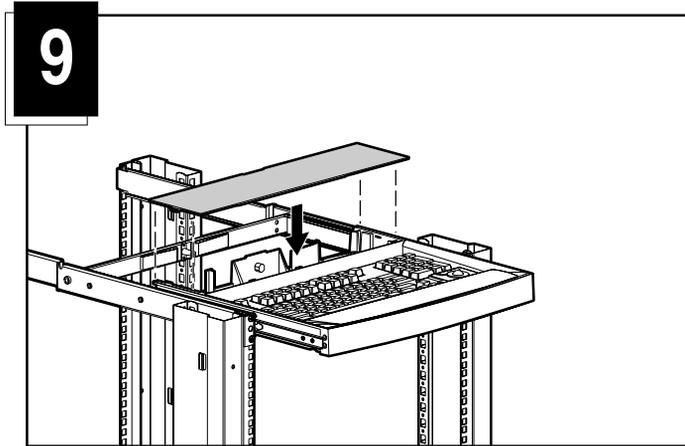
Route the keyboard cable.

- ❶ Insert keyboard cable into plastic clip on the cable management spring.
 - a. Open clip.
 - b. Insert cable.
 - c. Close and secure clip.
- ❷ Route cable through the rear of the keyboard drawer and under the rail, fitting it into the notch on the bottom of the rail.
- ❸ Snap the cable tie mount into the hole just above the notch. Insert the beaded cable tie into the cable tie mount, wrap it around the keyboard cable and put the straight end through the loop end, then pull to tighten.



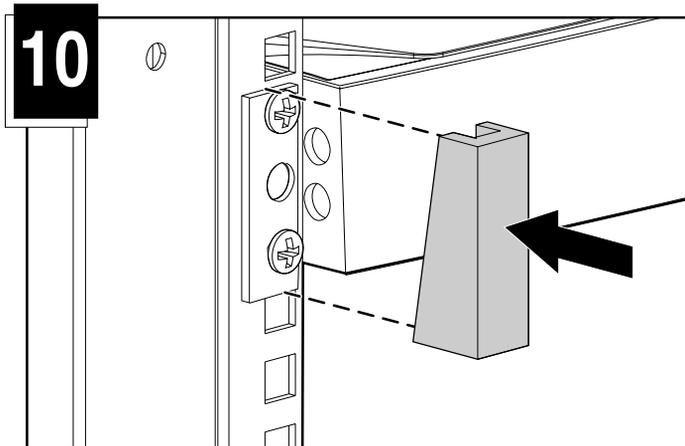
Step 9

Slightly bend the cover to fit over the rear drawer area and snap into place.



Step 10

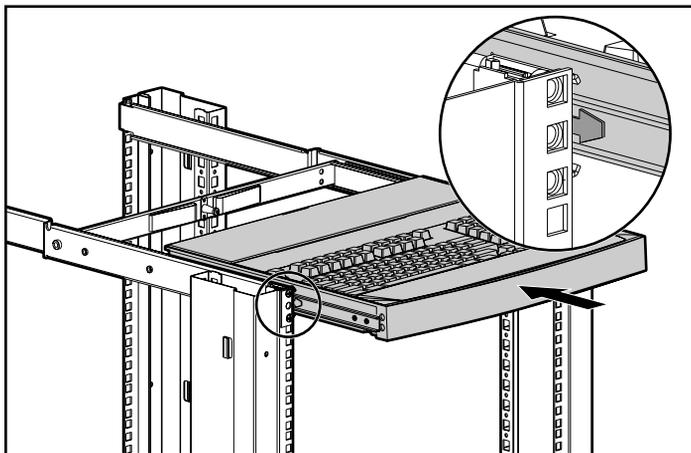
On the front of the rack, snap the rail covers into place with the large end at the bottom.



Using the Keyboard Drawer

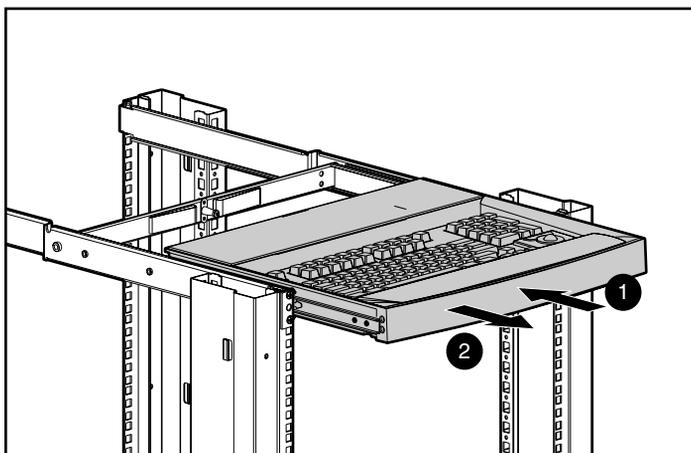
To store the drawer:

Push the drawer back into the rack.



To access the drawer:

- 1 Push in on the plastic frame to release.
- 2 Pull out until the drawer is fully extended.



Appendix **A**

Electrostatic Discharge

To prevent damage to the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Make sure you are always properly grounded when touching a static-sensitive component or assembly.

Grounding Methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm \pm 10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have a Compaq authorized reseller install the part.

NOTE: For more information on static electricity, or assistance with product installation, contact your Compaq authorized reseller.

Appendix **B**

Shipping Instructions

Transportation Methods

Depending on your circumstances and time schedule, there are three transportation methods for transporting your rack:

- Air
- Land
- Sea

Air Transport

The 42U, 36U, and 22U rack models are designed and packaged to be shipped upright on a pallet or shock pallet or horizontally in a crate. All 9000 series racks are under the maximum height requirement of 86 inches for shipping air cargo.

NOTE: The 42U rack has a packaged height of 85.38 inches and is restricted to cargo planes with door heights greater than 85.50 inches.

To ship a rack to a location that does not accommodate large cargo planes, the rack must be transported in a shipping crate.



CAUTION: Compaq Series 9000 Integrated racks **MUST** be shipped upright. If this is not possible, remove all components from the rack and prepare them for shipping or choose an alternate transportation method.

A passenger plane with cargo space has a height limitation of 63 inches. Because a palletized 22U rack is below this limitation, it can be shipped more easily by air. It also must be shipped upright on a pallet. Double stacking is not permitted.

Because of the dimensions and the weight of the racks, check with carriers for their limitations before shipping.

Land Transport

All Compaq Racks can be shipped by common carriers. Carriers providing air ride capabilities are preferred.

Ship racks upright on their pallets. Do not lay the racks horizontally or double stack them.

Because of the dimensions and the weight of the racks, please check with carriers for their restrictions before shipping.

Sea Transport

Racks can be shipped by sea, but it takes four to six weeks for the shipment to arrive.

Ship racks upright on their pallets. Do not lay the racks horizontally or double stack them.

Delivery Services

Compaq provides two methods of delivery for customers in North America: Inside Rack Delivery Service and Expedited Rack Delivery Service. The highlights and limitations of each method are described in the following sections.

If you want both Inside Rack Delivery and Expedited Rack Delivery, you must specify **both** part numbers on your purchase order.

Inside Rack Delivery Service

Inside Rack Delivery Service (Part No. 184649-001) is available for receiving sites that do not have the proper facilities for the standard dock-to-dock delivery, or when you need delivery to a specific location within a site. The rack is transported as close as possible to the desired location. If a stairway or a non-accessible doorway is encountered, the rack is left there.

Highlights

- The palletized rack is unloaded by transportation personnel.
- Transportation personnel provide material handling equipment.
- The rack is delivered to the desired location within the facility (see “Limitations”).
- Delivery service is for a single rack.

Limitations

- If shipping a non-integrated rack, door widths and corridors must accept a 32-inch x 43-inch pallet.
- If shipping an integrated rack, door widths and corridors must accept a 32-inch x 46-inch pallet.
- Door heights and corridors must be at least 2 meters tall for the 42U rack.
- A proper freight elevator must be available for deliveries to upper and lower floors.
- Transportation personnel will not remove the rack from the shipping pallet.
- Transportation personnel will not remove the pallet or packaging.

Expedited Rack Delivery Service

Expedited Rack Delivery Service (Part No. 184449-001) is available in the rare instances when air shipment of the rack is required.

Highlights

- Special packaging, such as crating, is provided as required.
- Shipment is made by a Compaq-selected air carrier.
- Delivery service is for a single rack.

Limitations

- This service is available only in the continental United States, Alaska, and Hawaii.
- Inside rack delivery is not included.

Shipping/Delivery Considerations

The following precautions should be observed when receiving the racks and components.

- A dock door is needed at the receiving site to accommodate the height and width of the palletized racks.
- If shipping an integrated rack or a non-integrated rack, the 43-inch x 32-inch pallet does not fit through a standard width internal door, which is about 30 inches wide.
- If shipping an integrated rack, the 46-inch x 32-inch pallet does not fit through a standard width internal door, which is about 30 inches wide.
- The palletized 42U rack is approximately 85 inches high and does not fit through a standard height door.
- Do not lay the rack horizontally, because the sheet metal can wrench and distort.
- Transport the rack as far into the building as possible while still on the pallet. Then remove the rack from the pallet and roll the rack on its casters, being careful to keep the rack from tipping. Ideally, the palletized rack should be moved to its final destination, then removed from the pallet.

Appendix **C**

Specifications

Model 9142

Table C-1
42U Rack Physical Characteristics

Feature		U.S.	Metric	
Dimensions	Total Cabinet Area	Height	78.7 in	2000 mm
		Depth	35.8 in	909 mm
		Width	23.7 in	603 mm
	Shipping (with packaging materials)	Height	83.38 in	2168.65 mm
		Depth	48 in	1219.2 mm
		Width	32 in	812.8 mm
Weight	Operating	253 lb	114.84 kg	
	Shipping	325 lb	147.52 kg	
Color	Opal			

Model 9136

Table C-2
36U Rack Physical Characteristics

Feature		U.S.	Metric	
Dimensions	Total Cabinet Area	Height	68.6 in	1742 mm
		Depth	35.8 in	909 mm
		Width	23.7 in	603 mm
	Shipping (with Packaging materials)	Height	75.25 in	1911.35 mm
		Depth	48 in	1219.2 mm
		Width	32 in	812.8 mm
Weight	Operating	176 lb	79.89 kg	
	Shipping	234 lb	106 kg	
Color	Opal			

Model 9122

Table C-3
22U Rack Physical Characteristics

Feature		U.S.	Metric	
Dimensions	Total Cabinet Area	Height	43 in	1092 mm
		Depth	35.8 in	909 mm
		Width	23.7 in	603 mm
	Shipping (with packaging materials)	Height	52.25 in	1327.15 mm
		Depth	48 in	1219.2 mm
		Width	32 in	812.8 mm
Weight	Operating	165 lb	75 kg	
	Shipping	225 lb	102.13 kg	
Color	Opal			

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