HP ProLiant ML150 Gen9 Server User Guide

Abstract

This document is for the person who installs, administers, and troubleshoots servers and storage systems. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

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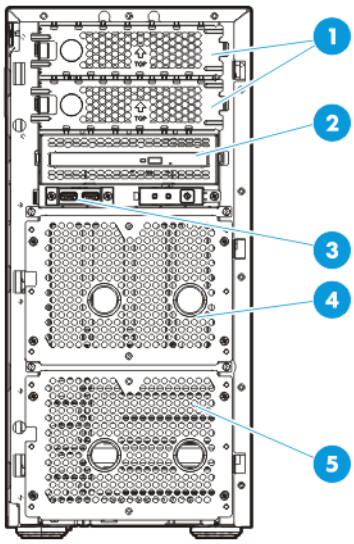
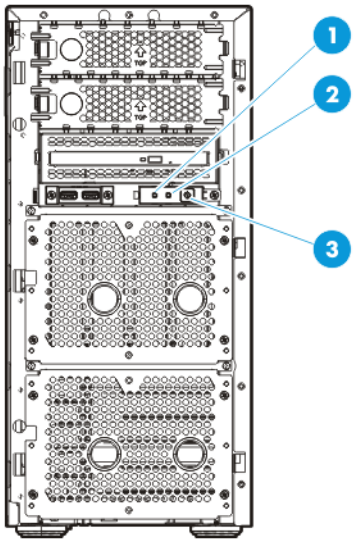
Component identification

Front panel components



Item	Description
1	Media bays (2)
2	Slim optical disk drive (optional)
3	USB 3.0 connectors
4	Box 2
5	Box 1

Front panel LEDs and buttons

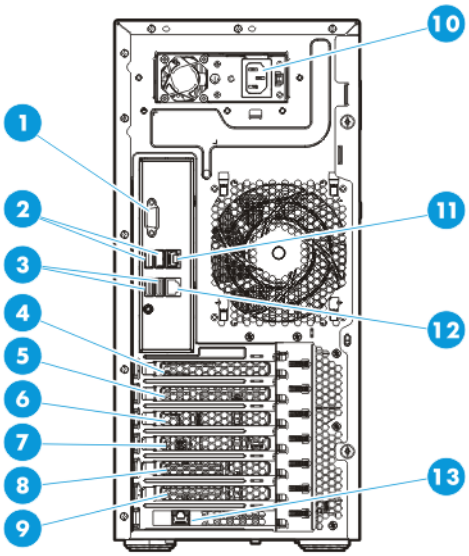


Item	Description	Status
1	Health LED	*Solid green = Normal Flashing green (1 Hz/cycle per sec) = iLO is rebooting. Flashing amber = System degraded Flashing red (1 Hz/cycle per sec) = System critical
2	NIC status LED	Solid green = Link to network Flashing green (1 Hz/cycle per sec) = Network active Off = No network activity
3	Power On/Standby button and system power LED	Solid green = System on Flashing green (1 Hz/cycle per sec) = Performing power on sequence Solid amber = System in standby Off = No power present**

* To identify components in a degraded or critical state, review the system IML or use iLO to review the system health status.

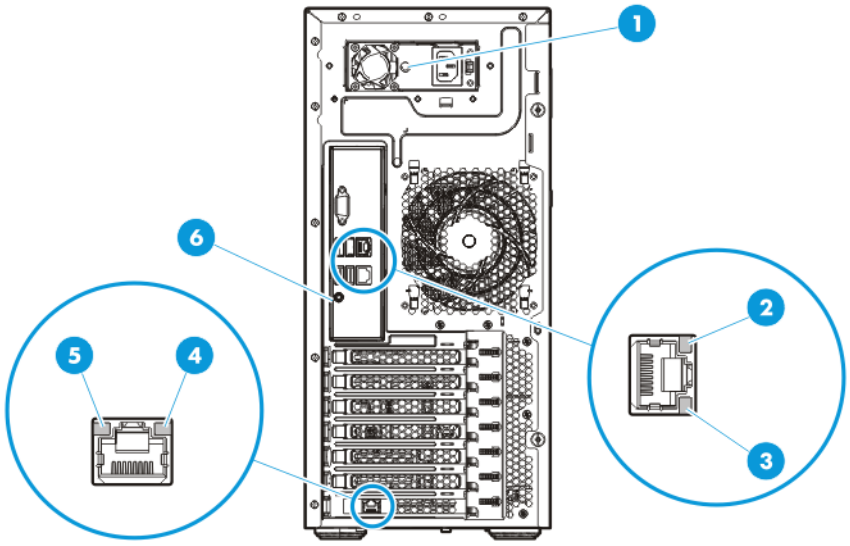
** Facility power is not present, power cord is not attached, no power supplies are installed, power supply failure has occurred, or the power button cable is disconnected.

Rear panel components



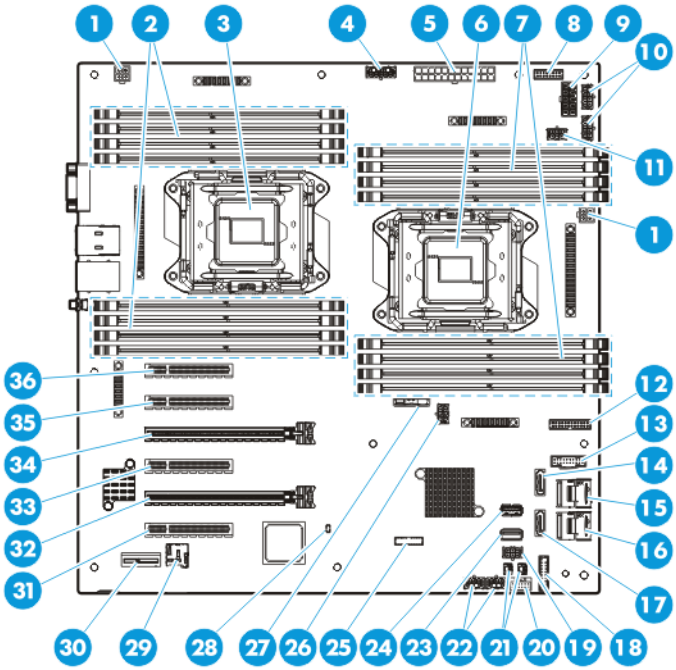
Item	Description
1	Video connector
2	USB 3.0 connectors
3	USB 2.0 connectors
4	Slot 1 PCIe3 x8 (8, 4, 1), for Processor 2
5	Slot 2 PCIe3 x8 (8, 4, 1), for Processor 1
6	Slot 3 PCIe3 x16 (16, 8, 4, 1), for Processor 2
7	Slot 4 PCIe3 x8 (8, 4, 1), for Processor 1
8	Slot 5 PCIe3 x16 (16, 8, 4, 1), for Processor 1
9	Slot 6 PCIe3 x8 (8, 4, 1), for Processor 1
10	Power supply
11	NIC connector 1
12	NIC connector 2
13	Dedicated iLO port (optional)

Rear panel LEDs



Item	Description	Status
1	Power supply LED	Green = System on Off = No power present
2	NIC link LED	Green = Linked to network Off = No network connection
3	NIC activity LED	Green or flashing green = Network activity Off = No network activity
4	iLO link LED	Green = Linked to network Off = No network connection
5	iLO activity LED	Green or flashing green = Network activity Off = No network activity
6	UID LED	Solid blue = Activated Flashing blue 1 Hz/cycle per sec = Remote management or firmware upgrade in progress 4 Hz/cycle per sec = iLO manual soft reboot sequence initiated 8 Hz/cycle per sec = iLO manual hard reboot sequence in progress Off = Deactivated

System board components



Item	Description
1	4-pin power supply connector
2	DIMM slots for processor 2
3	Processor 2
4	10-pin RPS connector
5	24-pin power supply connector
6	Processor 1
7	DIMM slots for processor 1
8	Power supply sideband signal connector
9	10-pin power supply connector
10	8-pin power supply connector
11	Fan connector 3
12	Front I/O connector
13	Front USB connector
14	SATA connector 1
15	Mini-SAS connector 1
16	Mini-SAS connector 2
17	SATA connector 2
18	TPM connector
19	Fan connector 1
20	HP Smart Storage Battery connector
21	Storage backup power connectors
22	GPU power connectors
23	Internal USB 2.0 connector

Item	Description
24	Internal USB 3.0 connector
25	System maintenance switch
26	Fan connector 2
27	System battery
28	NMI header
29	microSD slot
30	Dedicated iLO port connector
31	Slot 6 PCIe3 x8 (8, 4, 1) for Processor 1
32	Slot 5 PCIe3 x16 (16, 8, 4, 1) for Processor 1
33	Slot 4 PCIe3 x8 (8, 4, 1) for Processor 1
34	Slot 3 PCIe3 x16 (16, 8, 4, 1) for Processor 2
35	Slot 2 PCIe3 x8 (8, 4, 1) for Processor 1
36	Slot 1 PCIe3 x8 (8, 4, 1) for Processor 2

System maintenance switch

Position	Default	Function
S1	Off	Off = iLO 4 security is enabled. On = iLO 4 security is disabled.
S2	Off	Off = System configuration can be changed. On = System configuration is locked.
S3	Off	Reserved
S4	Off	Reserved
S5	Off	Off = Power-on password is enabled. On = Power-on password is disabled.
S6	Off	Off = No function On = ROM reads system configuration as invalid.
S7	Off	Off = Set default boot mode to UEFI. On = Set default boot mode to legacy.
S8	—	Reserved
S9	—	Reserved
S10	—	Reserved
S11	—	Reserved
S12	—	Reserved

To access the redundant ROM, set S1, S5, and S6 to on.

When the system maintenance switch position 6 is set to the On position, the system is prepared to erase all system configuration settings from both CMOS and NVRAM.

△ **CAUTION:** Clearing CMOS and/or NVRAM deletes configuration information. Be sure to properly configure the server or data loss could occur.

IMPORTANT: Before using the S7 switch to change to Legacy BIOS Boot Mode, be sure the HP Dynamic Smart Array B140i Controller is disabled. Do not use the B140i controller when the server is in Legacy BIOS Boot Mode.

NMI functionality

An NMI crash dump creates a crash dump log before resetting a system which is not responding.

Crash dump log analysis is an essential part of diagnosing reliability problems, such as failures of operating systems, device drivers, and applications. Many crashes freeze a system, and the only available action for administrators is to restart the system. Resetting the system erases any information which could support problem analysis, but the NMI feature preserves that information by performing a memory dump before a system reset.

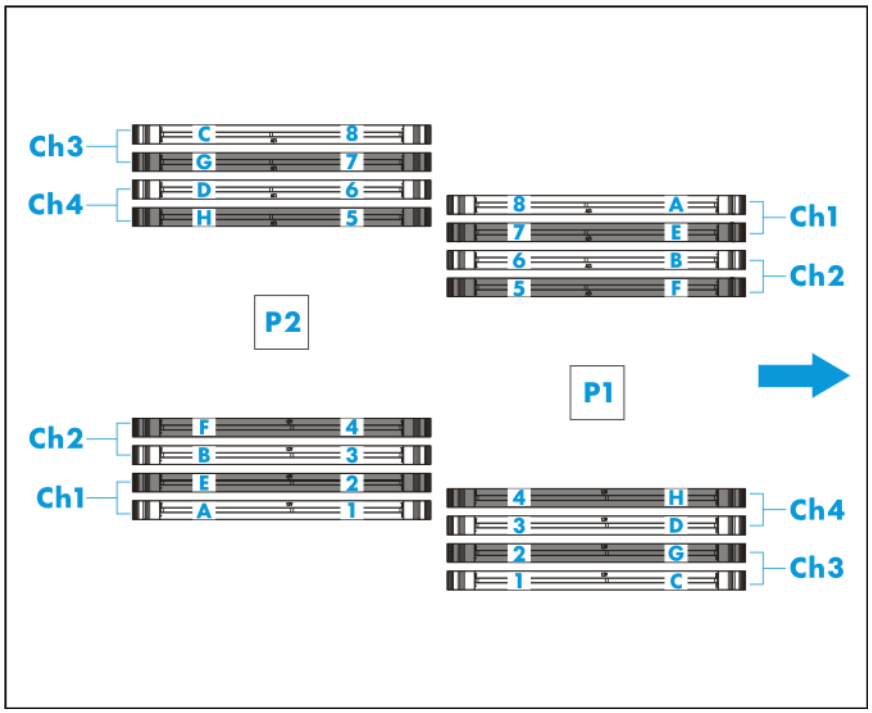
To force the system to invoke the NMI handler and generate a crash dump log, do one of the following:

- Use the iLO Virtual NMI feature.
- Short the NMI header ("System board components" on page 11).

For more information, see the HP website (http://www.hp.com/support/NMI).

DIMM slot locations

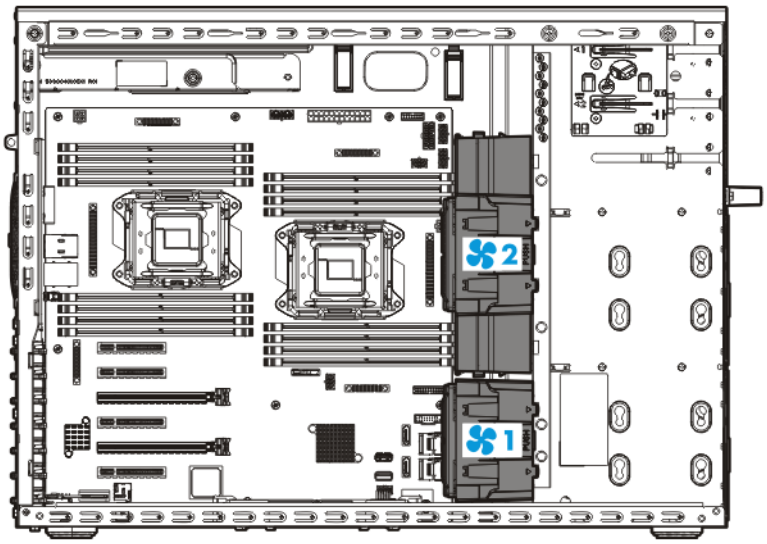
DIMM slots are numbered sequentially (1 through 8) for each processor. The supported AMP modes use the letter assignments for population guidelines.



NOTE: The arrow indicates the front of the server.

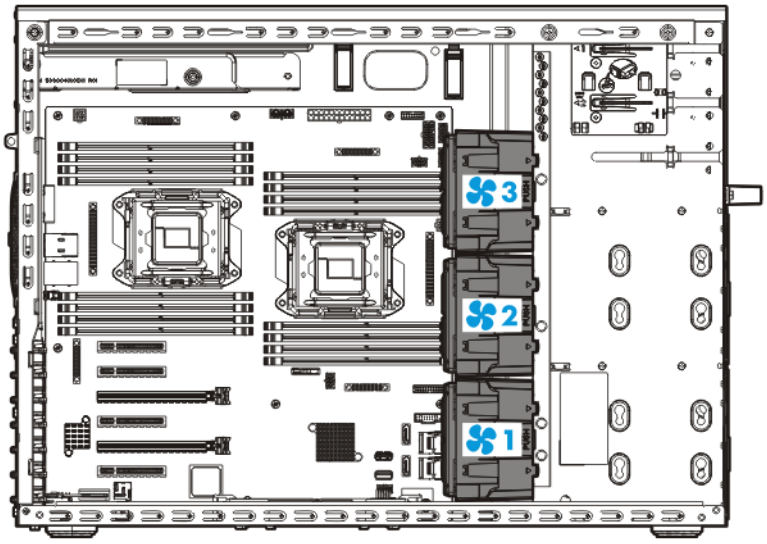
Fan locations

- Single-processor configuration



Item	Description
1	Fan 1
2	Fan 2

- Two-processor configuration



Item	Description
1	Fan 1
2	Fan 2
3	Fan 3

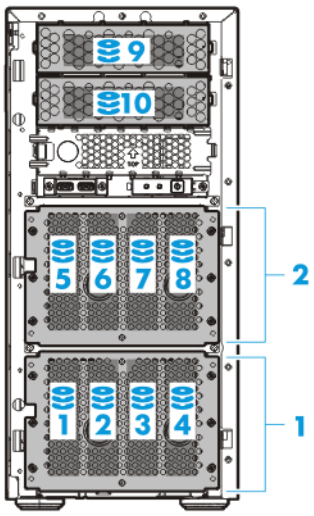
Drive numbering

If only one drive cage is installed, it must be installed in box 2. With optional drive cages installed, the server supports up to 16 SFF hot-plug drives, up to 10 non-hot-plug LFF drives, or up to 8 LFF hot-plug drives. The server does not support mixing SFF and LFF drives.

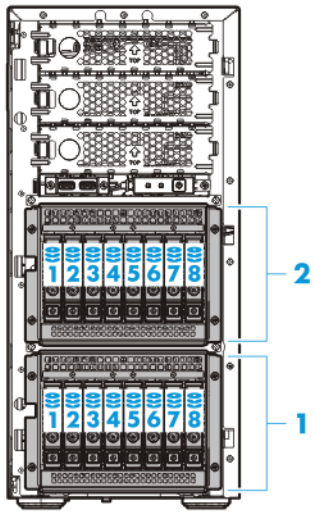
HP recommends that you populate drive bays starting with the lowest SAS or SATA device number. Drives are numbered from left to right in each component box.

The following images show the drive numbering for each of the supported drive configurations. For drive box numbering information, see "Front panel components (on page 7)."

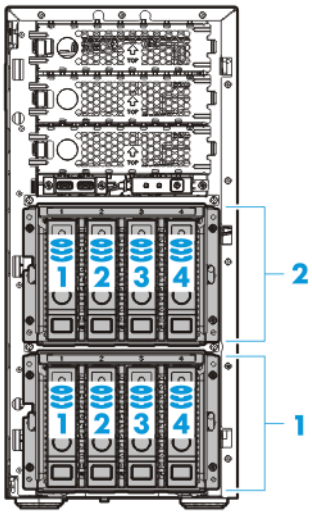
- Four-bay LFF non-hot-plug drive model



- Eight-bay SFF hot-plug drive model

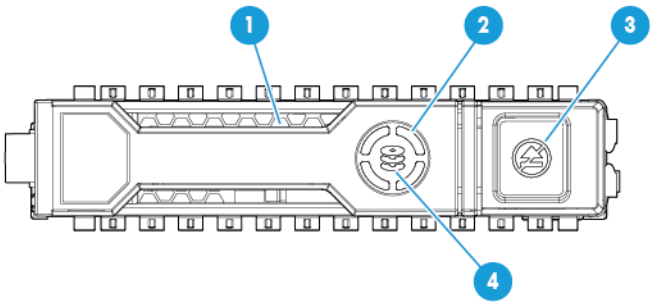


- Four-bay LFF hot-plug drive model



Hot-plug drive LED definitions

When a drive is configured as a part of an array and connected to a powered-up controller, the drive LEDs indicate the condition of the drive.



Item	LED	Status	Definition
1	Locate	Solid blue	The drive is being identified by a host application.
		Flashing blue	The drive carrier firmware is being updated or requires an update.
2	Activity ring	Rotating green	Drive activity
		Off	No drive activity
3	Do not remove	Solid white	Do not remove the drive. Removing the drive causes one or more of the logical drives to fail.
		Off	Removing the drive does not cause a logical drive to fail.
4	Drive status	Solid green	The drive is a member of one or more logical drives.
		Flashing green	The drive is rebuilding or performing a RAID migration, strip size migration, capacity expansion, or logical drive extension, or is erasing.
		Flashing amber/green	The drive is a member of one or more logical drives and predicts the drive will fail.

Item	LED	Status	Definition
		Flashing amber	The drive is not configured and predicts the drive will fail.
		Solid amber	The drive has failed.
		Off	The drive is not configured by a RAID controller.

Operations

Power down the server

Before powering down the server for any upgrade or maintenance procedures, perform a backup of critical server data and programs.

IMPORTANT: When the server is in standby mode, auxiliary power is still being provided to the system.

To power down the server, use one of the following methods:

- Press and release the Power On/Standby button.

  This method initiates a controlled shutdown of applications and the OS before the server enters standby mode.
- Press and hold the Power On/Standby button for more than 4 seconds to force the server to enter standby mode.

  This method forces the server to enter standby mode without properly exiting applications and the OS. If an application stops responding, you can use this method to force a shutdown.
- Use a virtual power button selection through iLO 4.

  This method initiates a controlled remote shutdown of applications and the OS before the server enters standby mode.

Before proceeding, verify the server is in standby mode by observing that the system power LED is amber.

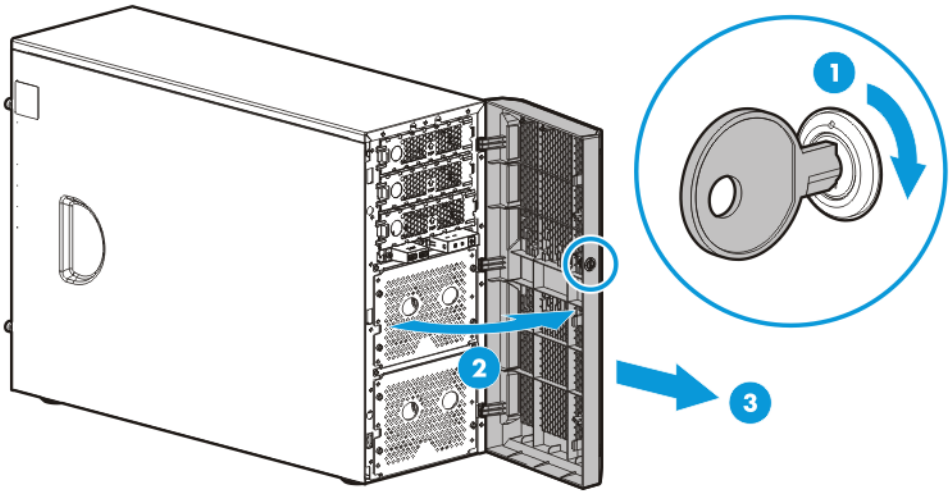
Power up the server

1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Connect each power cord to the server.
3. Connect each power cord to the power source.
4. Press the Power On/Standby button.
5. The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.

Remove the tower bezel

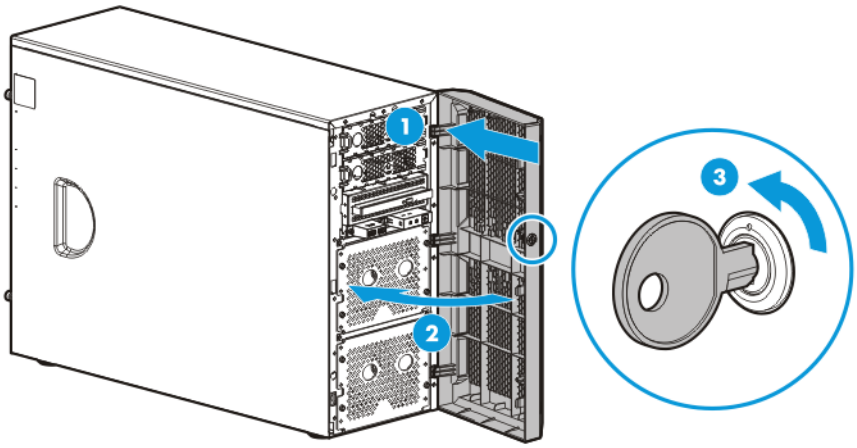
1. Using the key provided with the server, unlock the bezel with a clockwise turn.

2. Remove the tower bezel.



Install the tower bezel

1. Install the bezel.
2. Using the key provided with the server, lock the bezel with a counterclockwise turn.

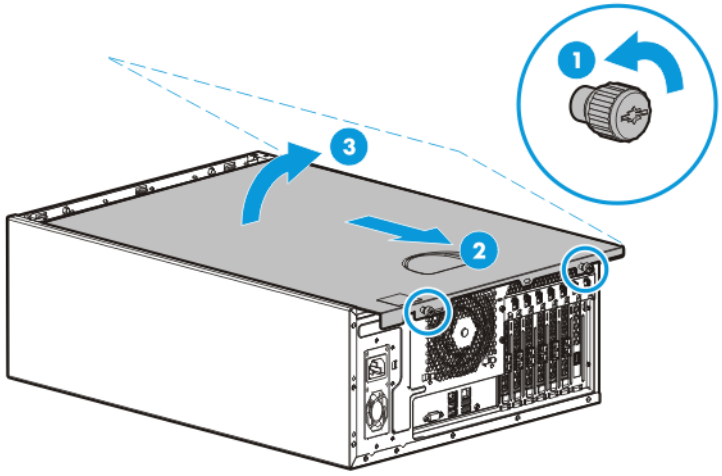


Remove the access panel

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

CAUTION: For proper cooling do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed.

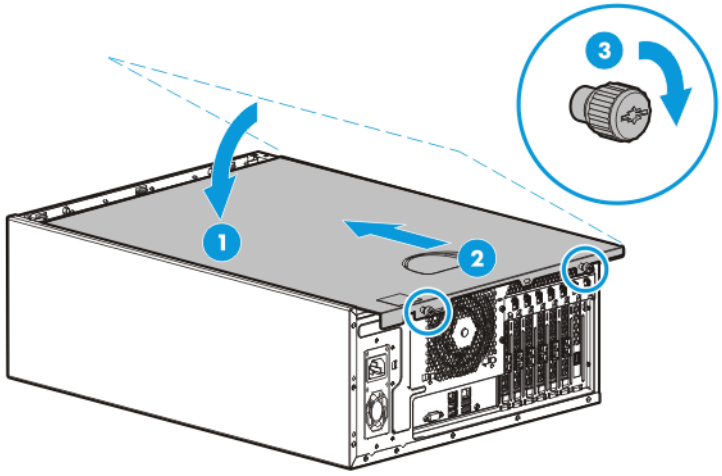
1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the access panel:
   a. Loosen the access panel thumbscrews.
   b. Lift the access panel and remove it from the server.



Install the access panel

1. Install the access panel:
   a. Place the access panel on the chassis, and slide it towards the front of the server.

b. Tighten the thumbscrews.

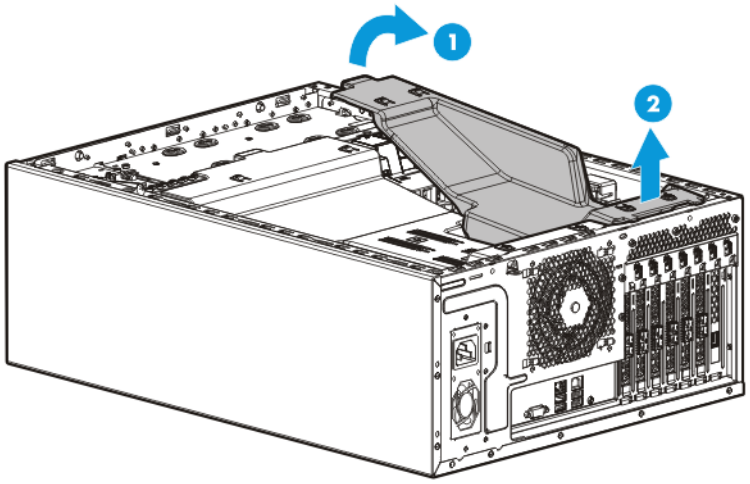


2. Return the server to an upright position.
3. Power up the server (on page 18).
4. Connect each power cord to the server.
5. Connect each power cord to the power source.
6. Install and lock the tower bezel ("Install the tower bezel" on page 19).

Remove the PCI air baffle

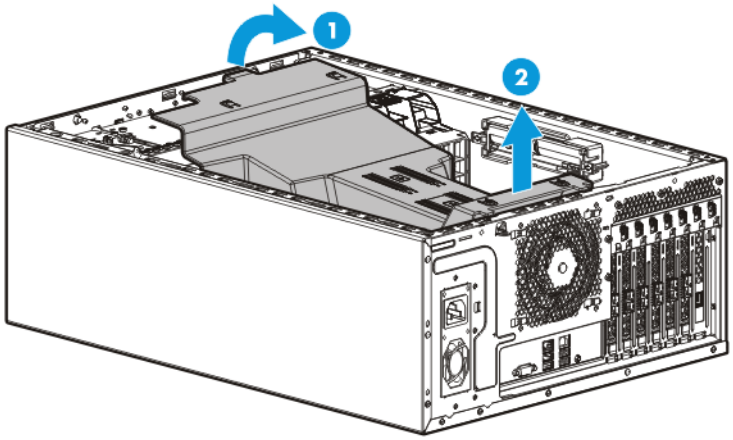
1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the access panel (on page 19).

6. Remove the PCI air baffle.



Remove the system air baffle

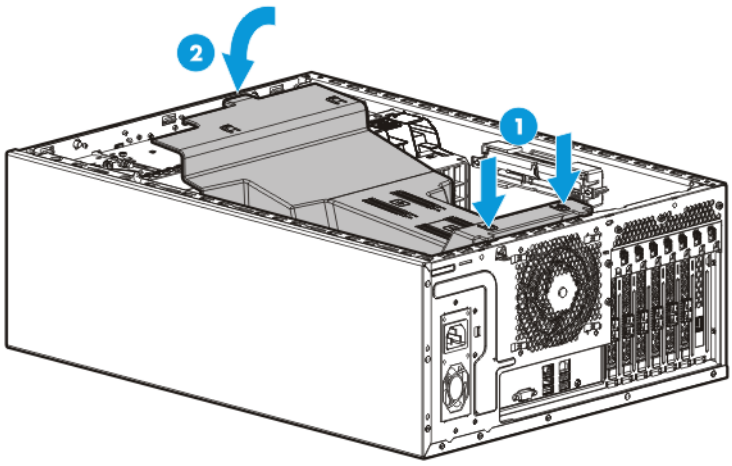
1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the access panel (on page 19).
6. Remove the system air baffle.



Install the system air baffle

CAUTION: For proper cooling do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed.

1. Install the system air baffle.

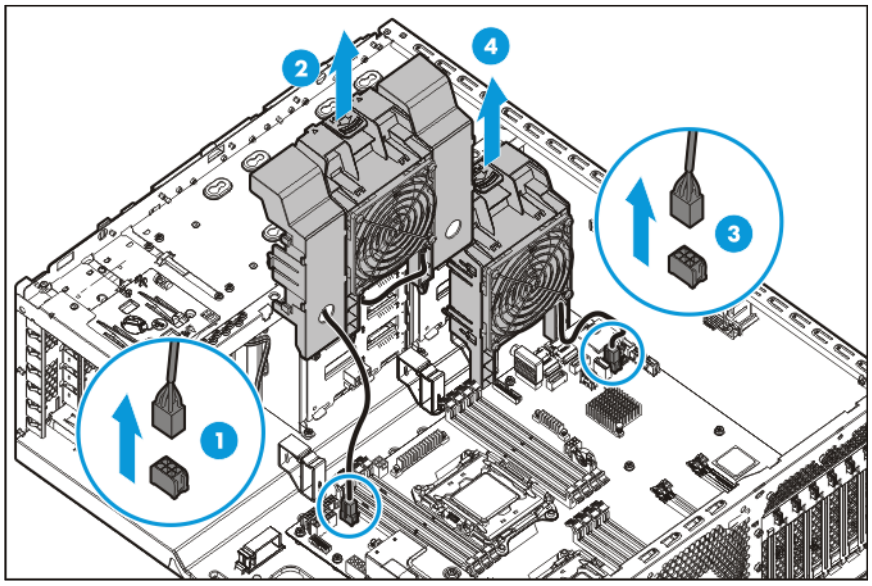


2. Install the access panel (on page 20).
3. Return the server to an upright position.
4. Connect each power cord to the server.
5. Connect each power cord to the power source.
6. Power up the server (on page 18).
7. Install and lock the tower bezel ("Install the tower bezel" on page 19).

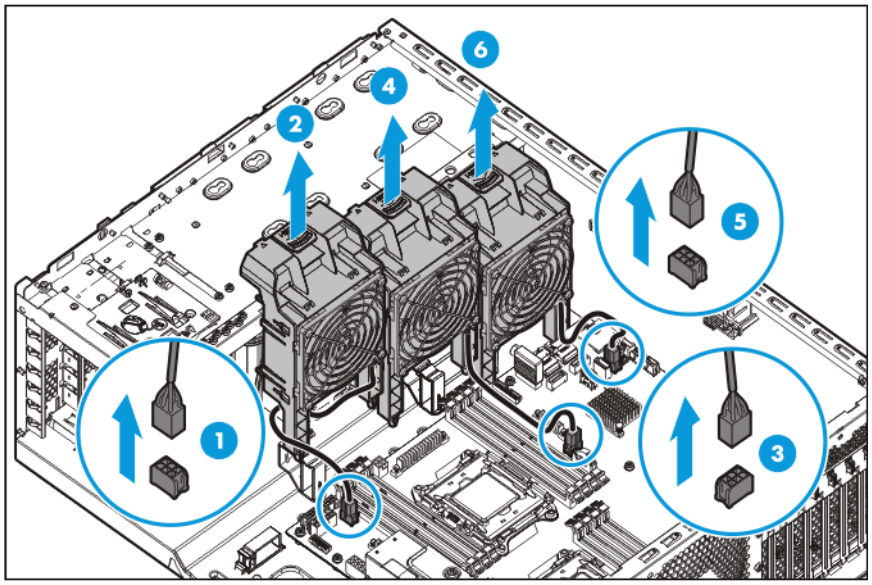
Remove the fans

1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the access panel (on page 19).
6. If installed, remove the PCI air baffle (on page 21).
7. Remove the system air baffle (on page 22).
8. Remove the fans:

- Single-processor configuration



- Two-processor configuration

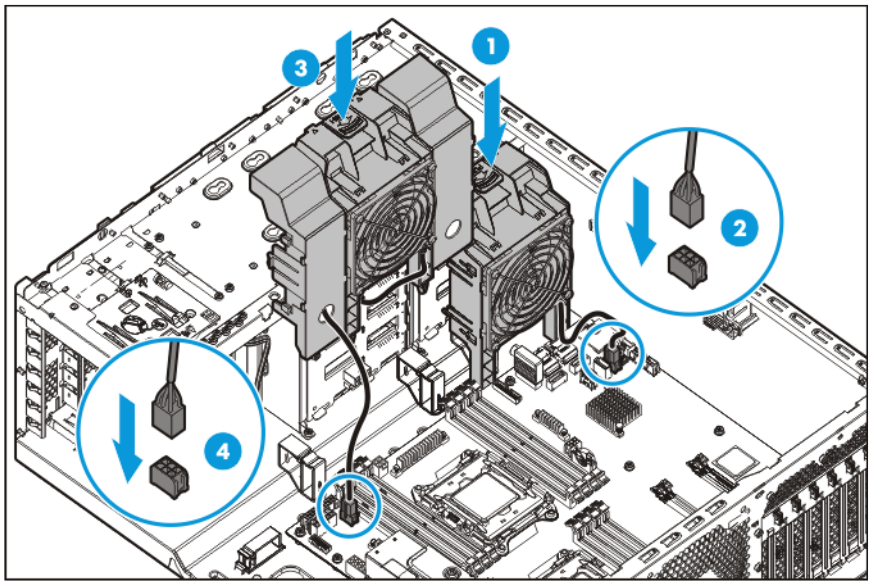


Install the fans

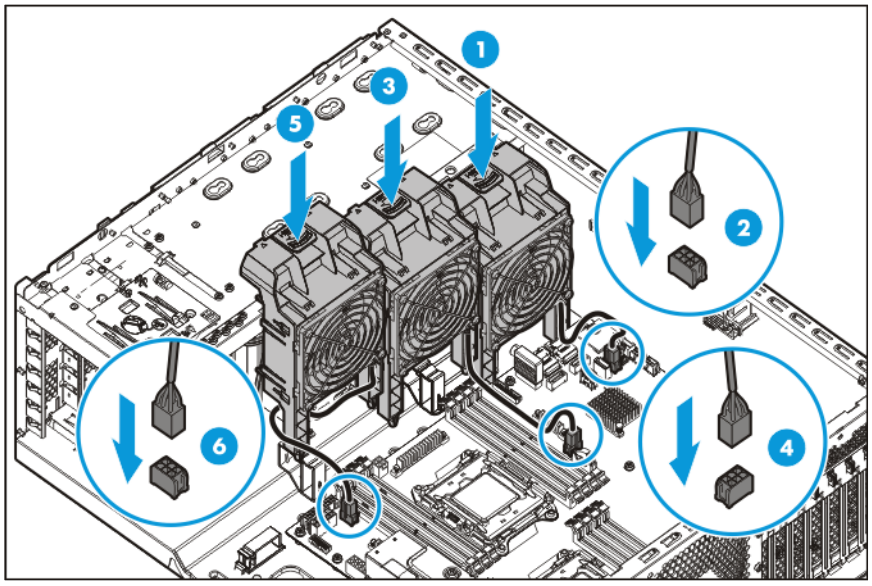
△ **CAUTION:** To prevent damage to the server, ensure that all DIMM latches are in closed and locked position before installing the fans.

1. Install the fans:

- Single-processor configuration



- Two-processor configuration



2. Install the system air baffle (on page 23).
3. If removed, install the PCI air baffle ("PCI air baffle option" on page 53).
4. Install the access panel (on page 20).
5. Return the server to an upright position.
6. Connect each power cord to the server.
7. Connect each power cord to the power source.
8. Power up the server (on page 18).
9. Install and lock the tower bezel ("Install the tower bezel" on page 19).

Setup

Optional installation services

Delivered by experienced, certified engineers, HP Care Pack services help you keep your servers up and running with support packages tailored specifically for HP ProLiant systems. HP Care Packs let you integrate both hardware and software support into a single package. A number of service level options are available to meet your needs.

HP Care Pack Services offer upgraded service levels to expand your standard product warranty with easy-to-buy, easy-to-use support packages that help you make the most of your server investments. Some of the Care Pack services are:

- Hardware support
  - 6-Hour Call-to-Repair
  - 4-Hour 24x7 Same Day
  - 4-Hour Same Business Day
- Software support
  - Microsoft operating systems
  - Linux operating systems
  - HP Insight Control
  - VMware
- Integrated hardware and software support
  - Critical Service
  - Proactive 24
  - Support Plus
  - Support Plus 24
- Startup and implementation services for both hardware and software

For more information on HP Care Pack Services, see the HP website (http://www.hp.com/services/carepack).

Optimum environment

When installing the server, select a location that meets the environmental standards described in this section.

Space and airflow requirements

Tower server

In a tower configuration, leave at least a 7.6-cm (3-in) clearance space at the front and back of the server for proper ventilation.

Rack server

To allow for servicing and adequate airflow, observe the following space and airflow requirements when deciding where to install a rack:

- Leave a minimum clearance of 85.09 cm (33.5 in) in front of the rack.
- Leave a minimum clearance of 76.2 cm (30 in) behind the rack.
- Leave a minimum clearance of 121.9 cm (48 in) from the back of the rack to the back of another rack or row of racks.

HP servers draw in cool air through the front door and expel warm air through the rear door. Therefore, the front and rear rack doors must be adequately ventilated to allow ambient room air to enter the cabinet, and the rear door must be adequately ventilated to allow the warm air to escape from the cabinet.

△ **CAUTION:** To prevent improper cooling and damage to the equipment, do not block the ventilation openings.

When vertical space in the rack is not filled by a server or rack component, the gaps between the components cause changes in airflow through the rack and across the servers. Cover all gaps with blanking panels to maintain proper airflow.

△ **CAUTION:** Always use blanking panels to fill empty vertical spaces in the rack. This arrangement ensures proper airflow. Using a rack without blanking panels results in improper cooling that can lead to thermal damage.

The 9000 and 10000 Series Racks provide proper server cooling from flow-through perforations in the front and rear doors that provide 64 percent open area for ventilation.

△ **CAUTION:** When using a Compaq branded 7000 series rack, install the high airflow rack door insert (PN 327281-B21 for 42U rack, PN 157847-B21 for 22U rack) to provide proper front-to-back airflow and cooling.

△ **CAUTION:** If a third-party rack is used, observe the following additional requirements to ensure adequate airflow and to prevent damage to the equipment:

- Front and rear doors—If the 42U rack includes closing front and rear doors, you must allow 5,350 sq cm (830 sq in) of holes evenly distributed from top to bottom to permit adequate airflow (equivalent to the required 64 percent open area for ventilation).
- Side—The clearance between the installed rack component and the side panels of the rack must be a minimum of 7 cm (2.75 in).

Temperature requirements

To ensure continued, safe, and reliable equipment operation, install or position the system in a well-ventilated, climate-controlled environment.

The maximum recommended TMRA for most server products is 35°C (95°F). The temperature in the room where the server is located must not exceed 35°C (95°F).

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

- Do not permit optional equipment to impede airflow around the server beyond the maximum allowable limits.
- Do not exceed the manufacturer's TMRA.

Power requirements

Installation of this equipment must comply with local and regional electrical regulations governing the installation of information technology equipment by licensed electricians. This equipment is designed to operate in installations covered by NFPA 70, 1999 Edition (National Electric Code) and NFPA-75, 1992 (code for Protection of Electronic Computer/Data Processing Equipment). For electrical power ratings on options, see the product rating label or the user documentation supplied with that option.

CAUTION: Protect the server from power fluctuations and temporary interruptions with a regulating uninterruptible power supply. This device protects the hardware from damage caused by power surges and voltage spikes and keeps the system in operation during a power failure.

When installing more than one server, you might have to use additional power distribution devices to safely provide power to all devices. Observe the following guidelines:

- Balance the server power load between available AC supply branch circuits.
- Do not allow the overall system AC current load to exceed 80% of the branch circuit AC current rating.
- Do not use common power outlet strips for this equipment.
- Provide a separate electrical circuit for the server.

Electrical grounding requirements

The server must be grounded properly for proper operation and safety. In the United States, you must install the equipment in accordance with NFPA 70, 1999 Edition (National Electric Code), Article 250, as well as any local and regional building codes. In Canada, you must install the equipment in accordance with Canadian Standards Association, CSA C22.1, Canadian Electrical Code. In all other countries, you must install the equipment in accordance with any regional or national electrical wiring codes, such as the International Electrotechnical Commission (IEC) Code 364, parts 1 through 7. Furthermore, you must be sure that all power distribution devices used in the installation, such as branch wiring and receptacles, are listed or certified grounding-type devices.

Because of the high ground-leakage currents associated with multiple servers connected to the same power source, HP recommends the use of a PDU that is either permanently wired to the building's branch circuit or includes a nondetachable cord that is wired to an industrial-style plug. NEMA locking-style plugs or those complying with IEC 60309 are considered suitable for this purpose. Using common power outlet strips for the server is not recommended.

Server warnings and cautions

WARNING: This server is very heavy. To reduce the risk of personal injury or damage to the equipment:

- 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. HP recommends that a minimum of two people are required for all rack server installations. A third person may be required to help align the server if the server is installed higher than chest level.
- Use caution when installing the server in or removing the server from the rack; it is unstable when not fastened to the rails.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

WARNING: To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.

CAUTION: Protect the server from power fluctuations and temporary interruptions with a regulating uninterruptible power supply. This device protects the hardware from damage caused by power surges and voltage spikes and keeps the system in operation during a power failure.

CAUTION: Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

Identifying tower server shipping carton contents

Unpack the server shipping carton and locate the materials and documentation necessary for installing the server.

The contents of the server shipping carton include:

- Server
- Power cord
- Hardware documentation and software products

In addition to the supplied items, you might need:

- Hardware options
- Operating system or application software
- PDU
- Torx T-15 screwdriver

Installing hardware options

Install any hardware options before initializing the server. For options installation information, refer to the option documentation. For server-specific information, refer to "Hardware options installation (on page 34)."

Setting up a tower server

Follow the steps in this section to set up a tower server.

1. Place the server on a flat, stable surface.
2. Connect peripheral devices to the server.

WARNING: To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into RJ-45 connectors.

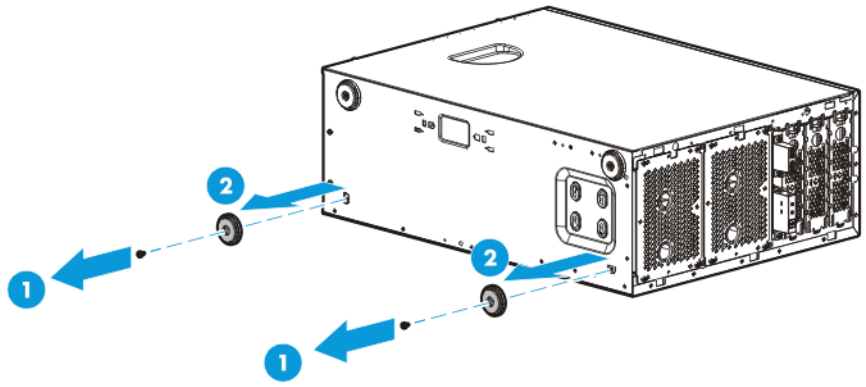
3. Connect the power cord to the rear of the server.
4. Connect the power cord to the AC power source.

WARNING: To reduce the risk of electric 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.
- Unplug the power cord from the power supply to disconnect power to the equipment.
- Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the server.

Installing the server into a rack

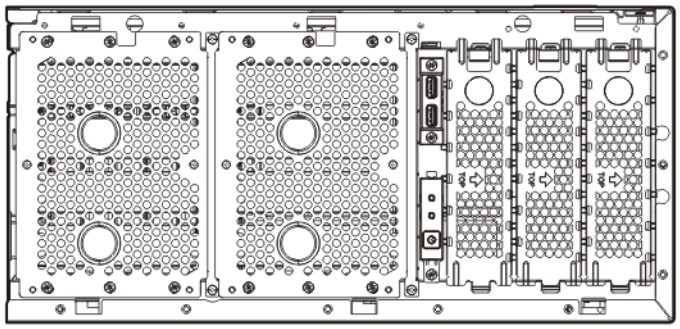
1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the left two stand feet.



NOTE: For detailed instructions on installing the server into the rack, see the Quick Deploy Rail System Installation Instructions included with the kit.

6. Release the thumbscrews and then extend the tray from the rack.

7. Place the server on the tray and secure the server using the straps.



8. Connect each power cord to the server.
9. Connect each power cord to the power source.
10. Power up the server (on page 18).
11. Install and lock the tower bezel ("Install the tower bezel" on page 19).
12. Slide the tray fully into the rack and tighten the thumbscrews.

Rack warnings

⚠ **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 together 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.

⚠ **WARNING:** To reduce the risk of personal injury or equipment damage when unloading a rack:

- At least two people are needed to safely unload the rack from the pallet. An empty 42U rack can weigh as much as 115 kg (253 lb), can stand more than 2.1 m (7 ft) tall, and might become unstable when being moved on its casters.
- Never stand in front of the rack when it is rolling down the ramp from the pallet. Always handle the rack from both sides.

⚠ **WARNING:** When installing a server in a telco rack, be sure that the rack frame is adequately secured to the top and bottom of the building structure.

Powering on and selecting boot options in UEFI Boot Mode

On servers operating in UEFI Boot Mode, the boot controller and boot order are set automatically.

1. Press the Power On/Standby button.
2. During the initial boot:
   - To modify the server configuration ROM default settings, press the **F9** key in the HP ProLiant POST screen to enter the UEFI System Utilities screen. By default, the System Utilities menus are in the English language.
   - If you do not need to modify the server configuration and are ready to install the system software, press the **F10** key to access Intelligent Provisioning.

For more information on automatic configuration, see the UEFI documentation on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).

Installing the operating system

This HP ProLiant server does not ship with provisioning media. Everything needed to manage and install the system software and firmware is preloaded on the server.

To operate properly, the server must have a supported operating system. For the latest information on operating system support, see the HP website (http://www.hp.com/go/supportos).

To install an operating system on the server, use one of the following methods:

- Intelligent Provisioning—The iLO Management Engine is a new feature on ProLiant servers that contains Intelligent Provisioning for embedded deployment, updating, and provisioning capabilities. Intelligent Provisioning can configure the server and install an operating system, eliminating the need for SmartStart CDs and Smart Update Firmware DVDs.

  To install an operating system on the server with Intelligent Provisioning (local or remote):

  a. Connect the Ethernet cable between the network connector on the server and a network jack.
  b. Press the Power On/Standby button.
  c. During server POST, press the **F10** key.
  d. Complete the initial Preferences and Registration portion of Intelligent Provisioning (on page 100).
  e. At the 1 Start screen, click the **Configure and Install** button.
  f. To finish the installation, follow the onscreen prompts. An Internet connection is required to update the firmware and systems software.
- Remote deployment installation—To deploy an operating system remotely, use Insight Control server deployment for an automated solution.

For additional system software and firmware updates, download the HP Service Pack for ProLiant from the HP website (http://www.hp.com/go/spp/download). Software and firmware must be updated before using the server for the first time, unless any installed software or components require an older version. For more information, see "Keeping the system current (on page 107)."

For more information on using these installation methods, see the HP website (http://www.hp.com/go/ilo).

Registering the server

To experience quicker service and more efficient support, register the product at the HP Product Registration website (http://register.hp.com).

Hardware options installation

Introduction

If more than one option is being installed, read the installation instructions for all the hardware options and identify similar steps to streamline the installation process.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

CAUTION: To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause electrostatic discharge.

Second processor option

The server offers single-processor and dual-processor operations.

CAUTION: To avoid damage to the processor and system board, only authorized personnel should attempt to replace or install the processor in this server.

CAUTION: To prevent possible server malfunction and damage to the equipment, multiprocessor configurations must contain processors with the same part number.

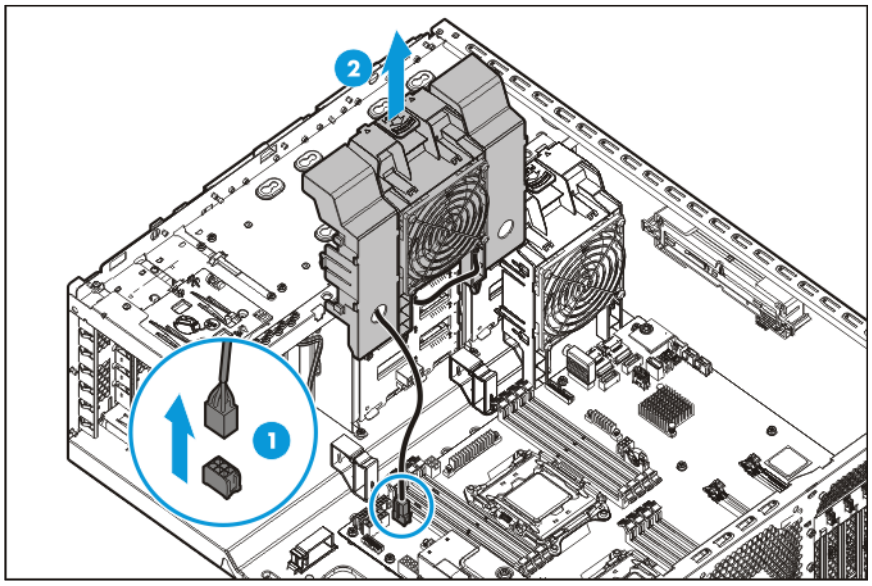
IMPORTANT: If installing a processor with a faster speed, update the system ROM before installing the processor.

To install the component:

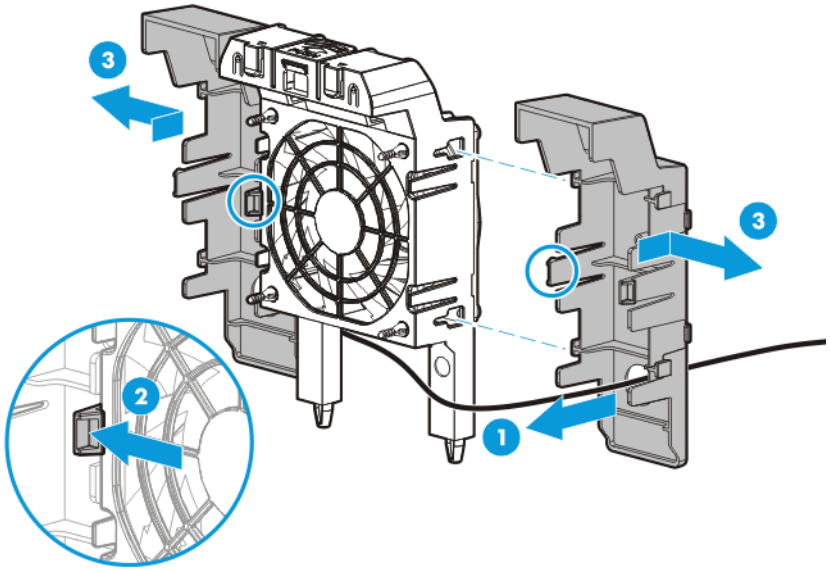
1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the access panel (on page 19).

   CAUTION: For proper cooling do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed.
6. If installed, remove the PCI air baffle (on page 21).
7. Remove the system air baffle (on page 22).
8. Remove fan 2:
   a. Disconnect the fan cable from the connector.

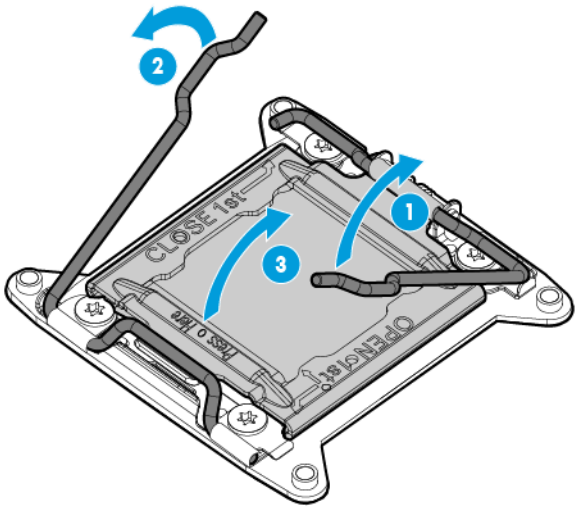
b. Remove the fan.



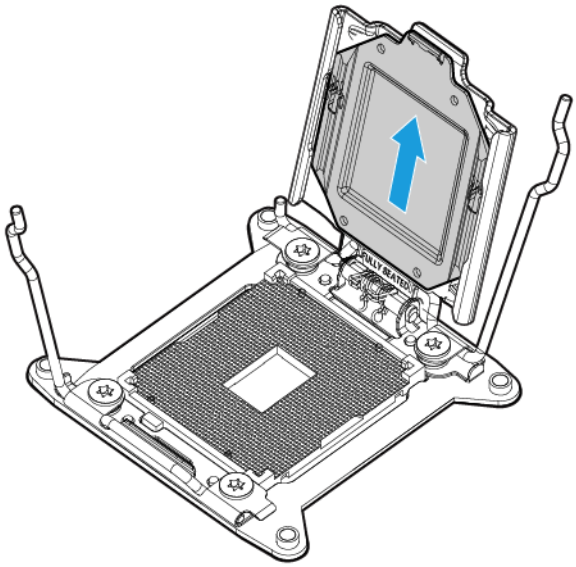
9. Detach the blanks from fan 2 and retain the blanks for future use.



10. Open each of the processor locking levers in the order indicated in the following illustration, and then open the processor retaining bracket.

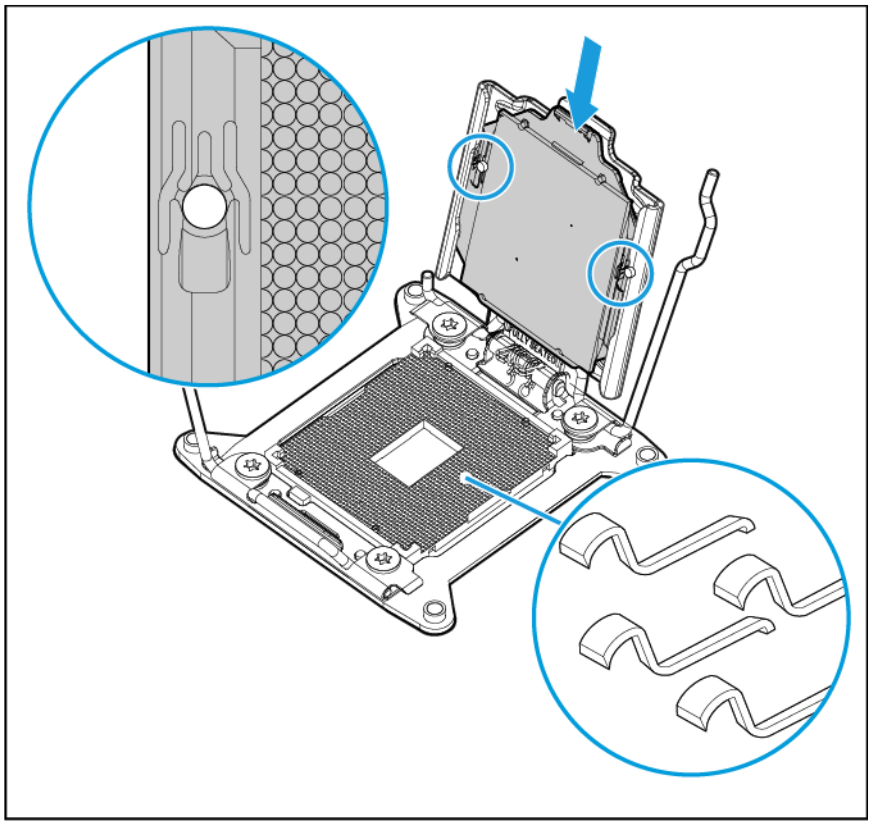


11. Remove the clear processor socket cover. Retain the processor socket cover for future use.



△ **CAUTION: THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED.** To avoid damage to the system board, do not touch the processor or the processor socket contacts.

12. Install the processor. Verify that the processor is fully seated in the processor retaining bracket by visually inspecting the processor installation guides on either side of the processor. **THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED.**

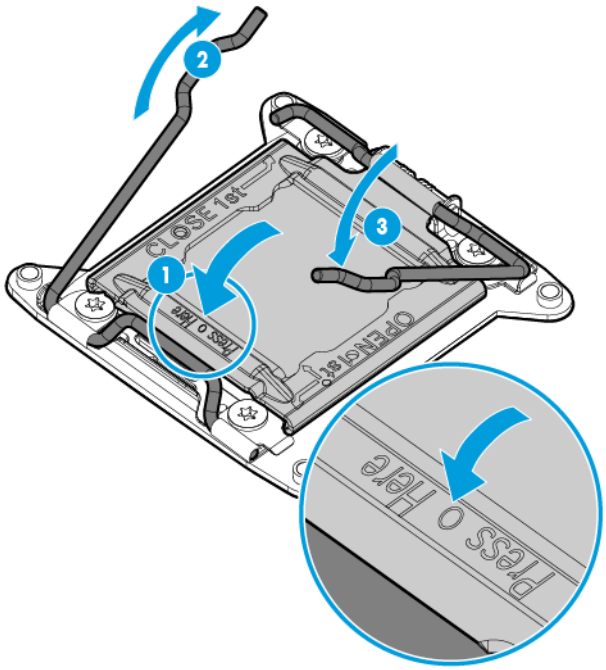


13. Close the processor retaining bracket. When the processor is installed properly inside the processor retaining bracket, the processor retaining bracket clears the flange on the front of the socket.

△ **CAUTION:** Do not press down on the processor. Pressing down on the processor may cause damage to the processor socket and the system board. Press only in the area indicated on the processor retaining bracket.

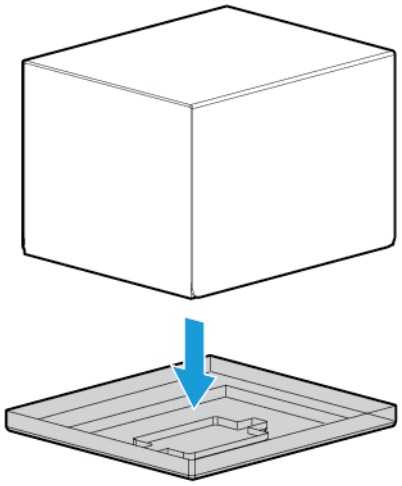
△ **CAUTION:** Close and hold down the processor cover socket while closing the processor locking levers. The levers should close without resistance. Forcing the levers closed can damage the processor and socket, requiring system board replacement.

14. Press and hold the processor retaining bracket in place, and then close each processor locking lever. Press only in the area indicated on the processor retaining bracket.



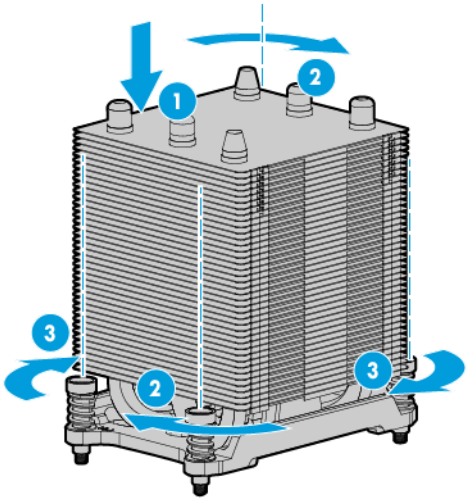
△ **CAUTION:** After the cover is removed, do not touch the thermal interface media.

15. Remove the heatsink cover.



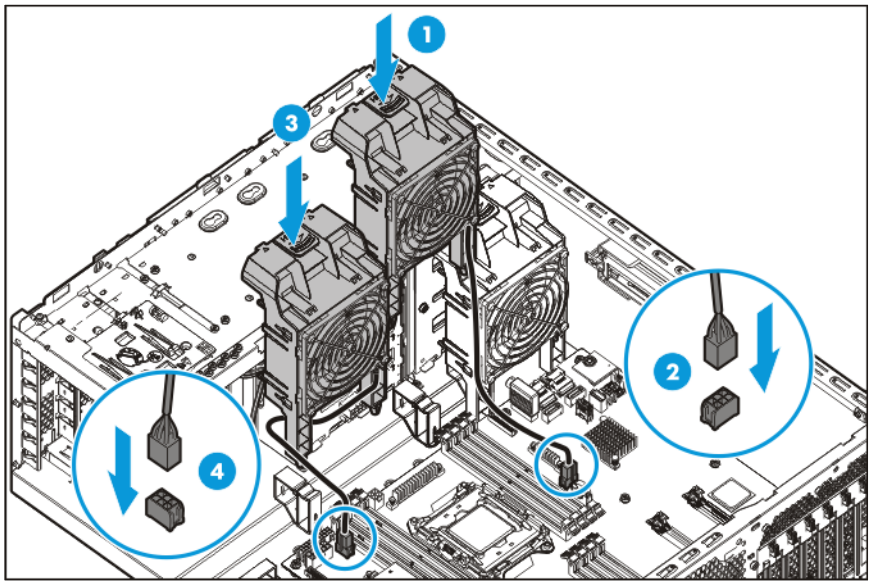
16. Install the heatsink:
    a. Position the heatsink on the processor backplate.
    b. Tighten one pair of diagonally opposite screws halfway, and then tighten the other pair of screws.

c. Finish the installation by completely tightening the screws in the same sequence.



CAUTION: To prevent damage to the server, ensure that all DIMM latches are in closed and locked position before installing the fans.

17. Install the fans:
    a. Install fan 2.
    b. Connect the fan 2 cable to the connector.
    c. Install fan 3.
    d. Connect the fan 3 cable to the connector.



18. Install the system air baffle (on page 23).
19. If removed, install the PCI air baffle ("PCI air baffle option" on page 53).
20. Install the access panel (on page 20).
21. Return the server to an upright position.

22. Connect each power cord to the server.
23. Connect each power cord to the power source.
24. Power up the server (on page 18).
25. Install and lock the tower bezel ("Install the tower bezel" on page 19).

Drive options

When adding drives to the server, observe the following general guidelines:

- The system automatically sets all device numbers.
- If only one drive is used, install it in the bay with the lowest device number.

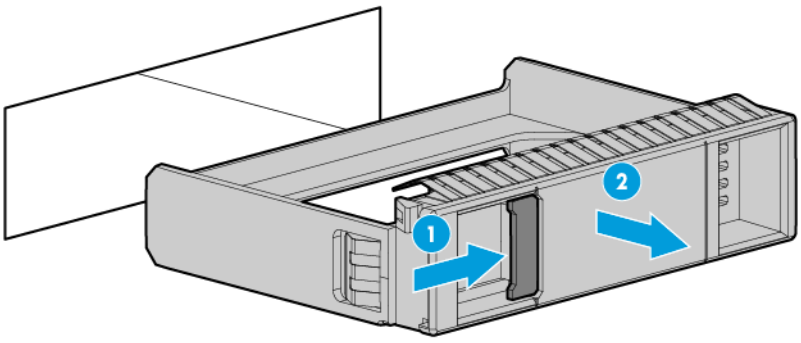
Drives must be the same capacity to provide the greatest storage space efficiency when drives are grouped together into the same drive array.

Installing a hot-plug drive

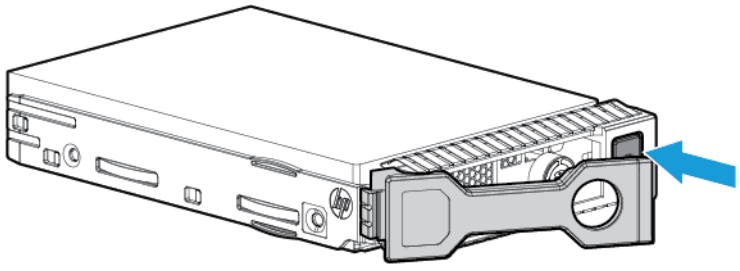
CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

To install the component:

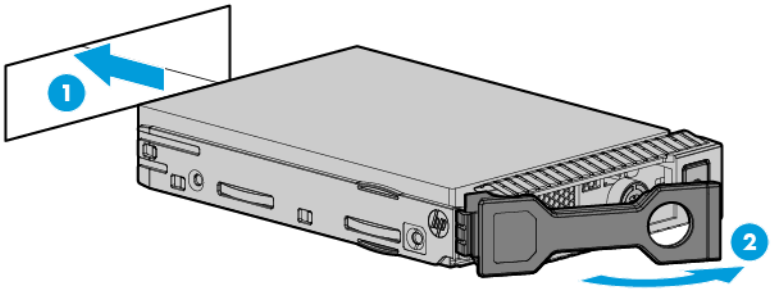
1. Remove the drive blank.



2. Prepare the drive.



3. Install the drive.



4. Determine the status of the drive from the drive LED definitions ("Hot-plug drive LED definitions" on page 16).

To configure arrays, see the *HP Smart Storage Administrator User Guide* on the HP website (http://www.hp.com/go/smartstorage/docs).

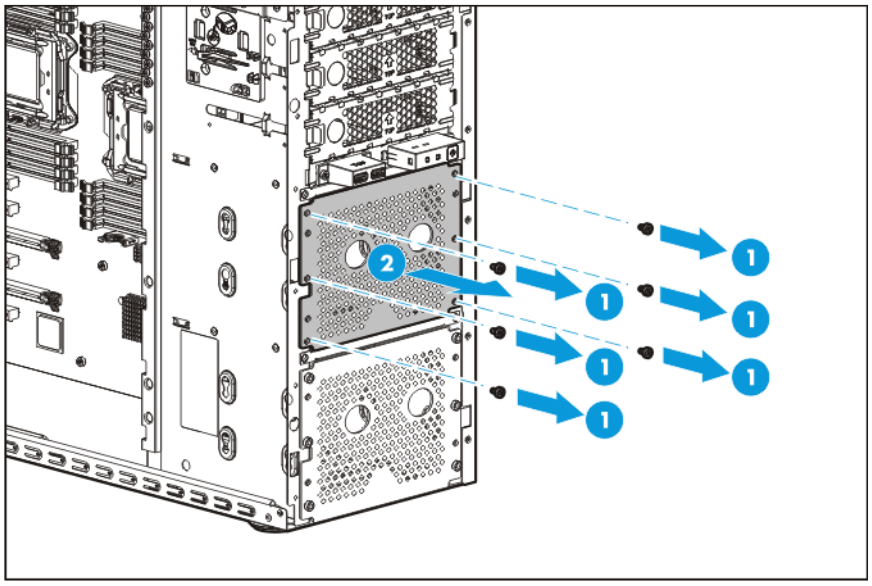
Installing a non-hot-plug drive

CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

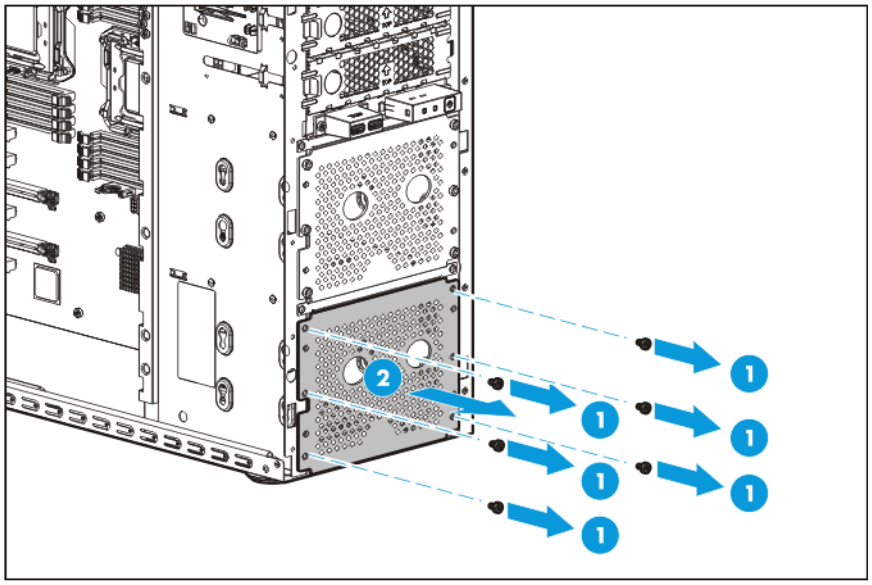
To install the component:

1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the access panel (on page 19).
6. If installed, remove the PCI air baffle (on page 21).
7. Remove the system air baffle (on page 22).
8. Remove the fans (on page 23).
9. If already installed, disconnect the drive cables from the rear of the drives.
10. Remove the non-hot-plug drive cage from the chassis:

- Box 2

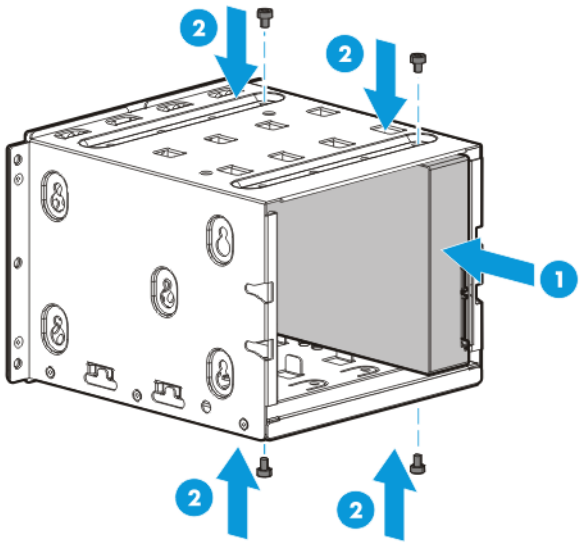


- Box 1

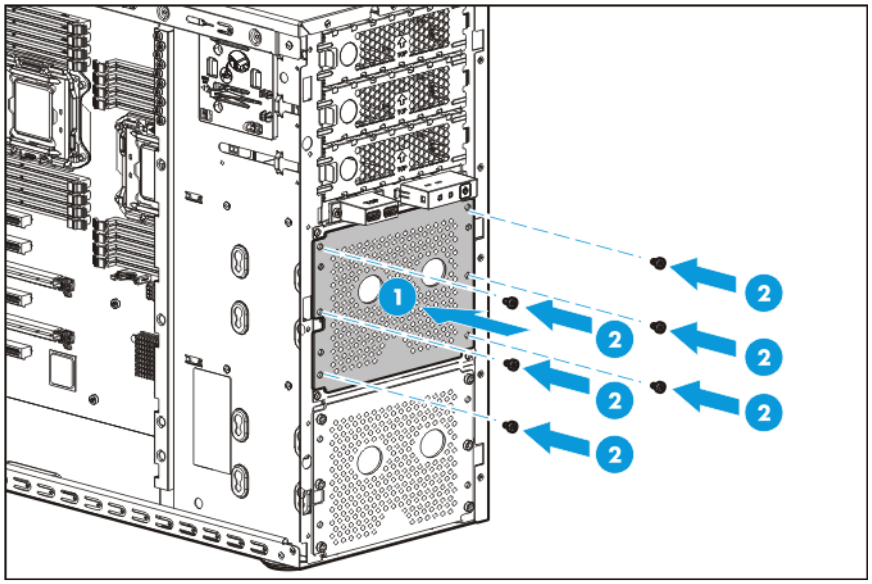


11. Use the screws on the drive cage to install the drives.

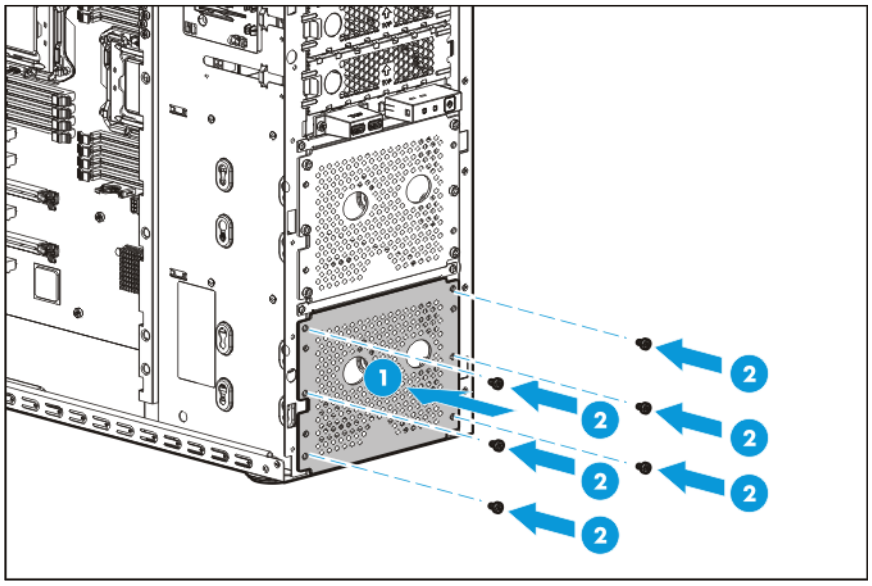
12. Install the drive into the non-hot-plug drive cage.



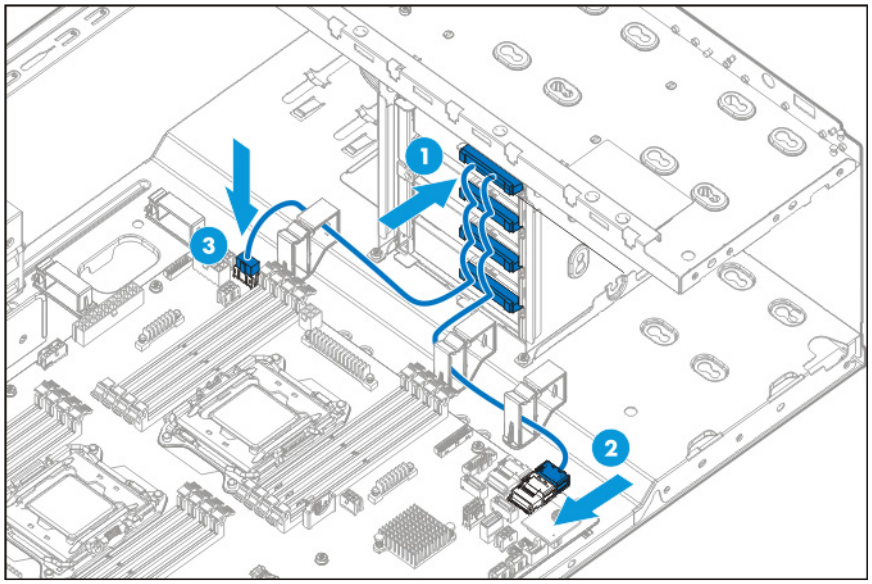
13. Install the drive cage into the chassis:
    - Box 2



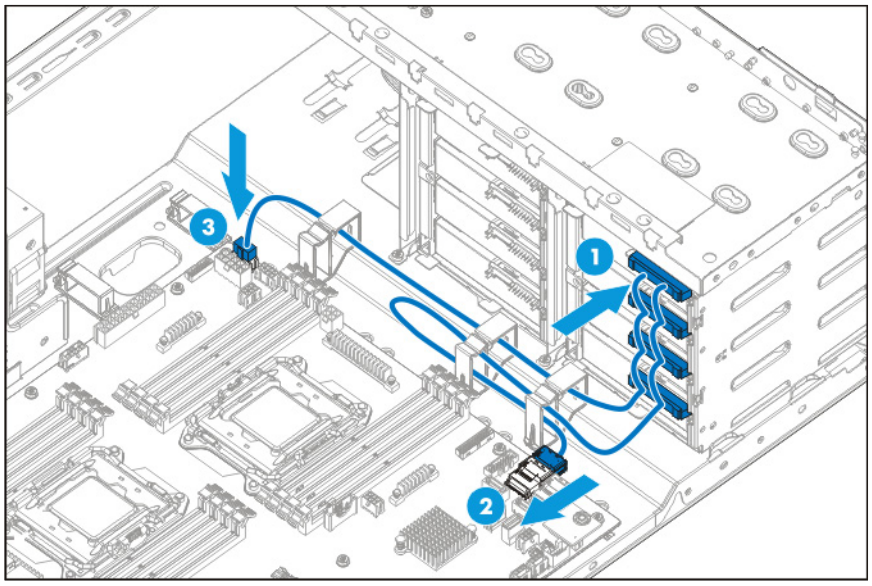
- Box 1



14. Connect all the drive cables:
    - Box 2



- Box 1



15. Install the fans (on page 24).
16. Install the system air baffle (on page 23).
17. If removed, install the PCI air baffle ("PCI air baffle option" on page 53).
18. Install the access panel (on page 20).
19. Return the server to an upright position.
20. Connect each power cord to the server.
21. Connect each power cord to the power source.
22. Power up the server (on page 18).
23. Install and lock the tower bezel ("Install the tower bezel" on page 19).

Memory options

IMPORTANT: This server does not support mixing LRDIMMs or RDIMMs. Attempting to mix any combination of these DIMMs can cause the server to halt during BIOS initialization.

The memory subsystem in this server can support LRDIMMs and RDIMMs:

- RDIMMs offer address parity protection.
- LRDIMMs support higher densities than single- and dual-rank RDIMMs, and higher speeds than quad-rank RDIMMs. This support enables you to install more high capacity DIMMs, resulting in higher system capacities and higher bandwidth.

All types are referred to as DIMMs when the information applies to all types. When specified as LRDIMM or RDIMM, the information applies to that type only. All memory installed in the server must be the same type.

The server supports the following RDIMM and LRDIMM speeds:

- Single- and dual-rank PC4-2133 (DDR4-2133) RDIMMs and LRDIMMs operating at up to 2133 MT/s

Speed and capacity

DIMM type	DIMM rank	DIMM capacity	Native speed (MT/s)
RDIMM	Single-rank	4 GB	2133
RDIMM	Single-rank	8 GB	2133
RDIMM	Dual-rank	8 GB	2133
RDIMM	Dual-rank	16 GB	2133
LRDIMM	Dual-rank	16 GB	2133

Populated DIMM speed (MT/s)

DIMM type	DIMM rank	1 DIMM per channel	2 DIMMs per channel
RDIMM	Single-rank	2133	2133
RDIMM	Dual-rank	2133	2133
LRDIMM	Dual-rank	2133	2133

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP website (http://www.hp.com/go/qs).

HP SmartMemory

HP SmartMemory authenticates and unlocks certain features available only on HP Qualified memory and verifies whether installed memory has passed HP qualification and test processes. Qualified memory is performance-tuned for HP ProLiant and BladeSystem servers and provides future enhanced support through HP Active Health and manageability software.

Memory subsystem architecture

The memory subsystem in this server is divided into channels. Each processor supports four channels, and each channel supports two DIMM slots, as shown in the following tables:

- Processor 1

Channel	Population order	Slot number
1	A E	8 7
2	B F	6 5
3	C G	1 2
4	D H	3 4

- Processor 2

Channel	Population order	Slot number
1	A E	1 2
2	B F	3 4

Channel	Population order	Slot number
3	C G	8 7
4.	D H	6 5

For the location of the slot numbers, see "DIMM slot locations (on page 13)."

This multi-channel architecture provides enhanced performance in Advanced ECC mode. This architecture also enables Online Spare Memory mode.

DIMM slots in this server are identified by number and by letter. Letters identify the population order. Slot numbers indicate the DIMM slot ID for spare replacement.

Single-, dual-, and quad-rank DIMMs

To understand and configure memory protection modes properly, an understanding of single-, dual-, and quad-rank DIMMs is helpful. Some DIMM configuration requirements are based on these classifications.

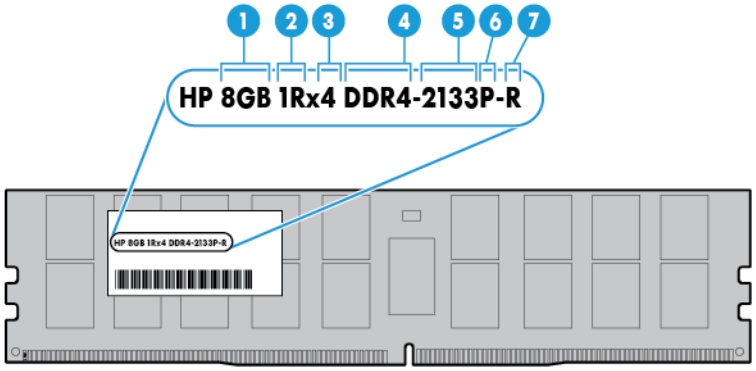
A single-rank DIMM has one set of memory chips that is accessed while writing to or reading from the memory. A dual-rank DIMM is similar to having two single-rank DIMMs on the same module, with only one rank accessible at a time. A quad-rank DIMM is, effectively, two dual-rank DIMMs on the same module. Only one rank is accessible at a time. The server memory control subsystem selects the proper rank within the DIMM when writing to or reading from the DIMM.

Dual- and quad-rank DIMMs provide the greatest capacity with the existing memory technology. For example, if current DRAM technology supports 8-GB single-rank DIMMs, a dual-rank DIMM would be 16 GB, and a quad-rank DIMM would be 32 GB.

LRDIMMs are labeled as quad-rank DIMMs. There are four ranks of DRAM on the DIMM, but the LRDIMM buffer creates an abstraction that allows the DIMM to appear as a dual-rank DIMM to the system. The LRDIMM buffer isolates the electrical loading of the DRAM from the system to allow for faster operation. This allows higher memory operating speed compared to quad-rank RDIMMs.

DIMM identification

To determine DIMM characteristics, use the label attached to the DIMM and the following illustration and table.



	Description	Definition
1	Capacity	4 GB 8 GB 16 GB 32 GB
2	Rank	1R = Single-rank 2R = Dual-rank 4R = Quad-rank
3	Data width	x4 = 4-bit x8 = 8-bit
4	Memory generation	DDR4
5	Maximum memory speed	2133 MT/s
6	CAS latency	P=15
7	DIMM type	R = RDIMM (registered) L = LRDIMM (load reduced)

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP website (http://www.hp.com/go/qs).

Memory configurations

To optimize server availability, the server supports the following AMP modes:

- Advanced ECC—Provides up to 4-bit error correction and enhanced performance over Lockstep mode. This mode is the default option for this server.
- Online spare memory—Provides protection against failing or degraded DIMMs. Certain memory is reserved as spare, and automatic failover to spare memory occurs when the system detects a DIMM that is degrading. This allows DIMMs that have a higher probability of receiving an uncorrectable memory error (which would result in system downtime) to be removed from operation.

Advanced Memory Protection options are configured in the BIOS/Platform Configuration (RBSU). If the requested AMP mode is not supported by the installed DIMM configuration, the server boots in Advanced ECC mode. For more information, see the *HP UEFI System Utilities User Guide for HP ProLiant Gen9 Servers* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).

Maximum capacity

DIMM type	DIMM rank	One processor	Two processors
RDIMM	Single-rank (4 GB)	32 GB	64 GB
RDIMM	Single-rank (8 GB)	64GB	128 GB
RDIMM	Dual-rank (8 GB)	64 GB	128 GB
RDIMM	Dual-rank (16 GB)	128 GB	256 GB
LRDIMM	Dual-rank (16 GB)	128 GB	256 GB

For the latest memory configuration information, see the QuickSpecs on the HP website (http://www.hp.com/go/qs).

Advanced ECC memory configuration

Advanced ECC memory is the default memory protection mode for this server. Standard ECC can correct single-bit memory errors and detect multi-bit memory errors. When multi-bit errors are detected using Standard ECC, the error is signaled to the server and causes the server to halt.

Advanced ECC protects the server against some multi-bit memory errors. Advanced ECC can correct both single-bit memory errors and 4-bit memory errors if all failed bits are on the same DRAM device on the DIMM.

Advanced ECC provides additional protection over Standard ECC because it is possible to correct certain memory errors that would otherwise be uncorrected and result in a server failure. Using HP Advanced Memory Error Detection technology, the server provides notification when a DIMM is degrading and has a higher probability of uncorrectable memory error.

Online Spare memory configuration

Online spare memory provides protection against degraded DIMMs by reducing the likelihood of uncorrected memory errors. This protection is available without any operating system support.

Online spare memory protection dedicates one rank of each memory channel for use as spare memory. The remaining ranks are available for OS and application use. If correctable memory errors occur at a rate higher than a specific threshold on any of the non-spare ranks, the server automatically copies the memory contents of the degraded rank to the online spare rank. The server then deactivates the failing rank and automatically switches over to the online spare rank.

General DIMM slot population guidelines

Observe the following guidelines for all AMP modes:

- Install DIMMs only if the corresponding processor is installed.
- When two processors are installed, balance the DIMMs across the two processors.
- White DIMM slots denote the first slot of a channel (Ch 1-A, Ch 2-B, Ch 3-C, Ch 4-D)
- Do not mix RDIMMs and LRDIMMs.

- When one processor is installed, install DIMMs in sequential alphabetic order: A, B, C, D, E, F, and so forth.
- When two processors are installed, install the DIMMs in sequential alphabetic order balanced between the two processors: P1-A, P2-A, P1-B, P2-B, P1-C, P2-C, and so forth.
- When single-rank, dual-rank, and quad-rank DIMMs are populated for two DIMMs per channel or three DIMMs per channel, always populate the higher number rank DIMM first (starting from the farthest slot). For example, first quad-rank DIMM, then dual-rank DIMM, and then lastly single-rank DIMM.
- DIMMs should be populated starting farthest from the processor on each channel.
- For DIMM spare replacement, install the DIMMs per slot number as instructed by the system software.

For more information about server memory, see the HP website (http://www.hp.com/go/memory).

DIMM speeds are supported as indicated in the following table.

Populated slots (per channel)	Rank	Speeds supported (MT/s)
1	Single-, dual-, or quad-rank	2133
2	Single- or dual-rank	2133

Advanced ECC population guidelines

For Advanced ECC mode configurations, observe the following guidelines:

- Observe the general DIMM slot population guidelines.
- DIMMs may be installed individually.

Online spare population guidelines

For Online Spare memory mode configurations, observe the following guidelines:

- Observe the general DIMM slot population guidelines.
- Each channel must have a valid online spare configuration.
- Each channel can have a different valid online spare configuration.
- Each populated channel must have a spare rank. A single dual-rank DIMM is not a valid configuration.

Population order

For memory configurations with a single processor or multiple processors, DIMMs must be populated sequentially in alphabetical order (A through H).

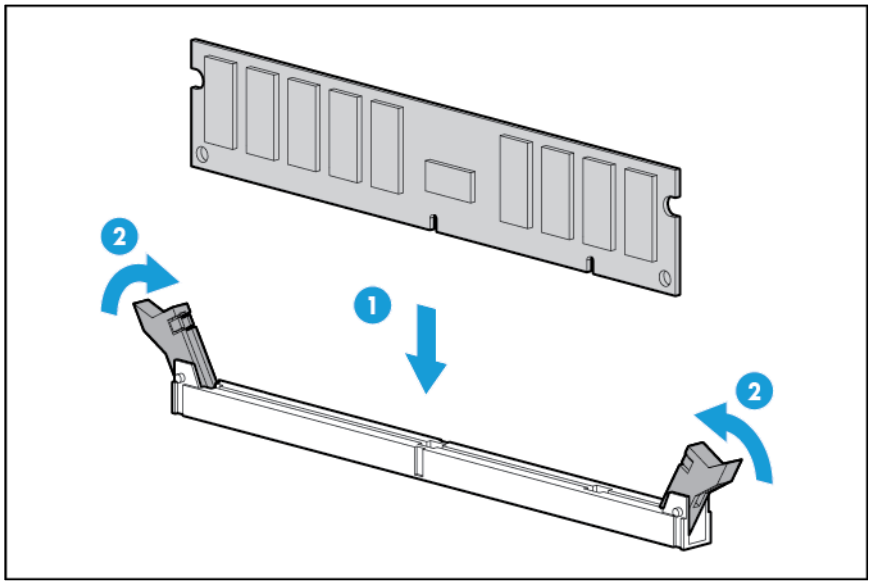
After installing the DIMMs, use the BIOS/Platform Configuration (RBSU) in the UEFI System Utilities to configure supported AMP modes.

Installing a DIMM

The server supports up to 16 DIMMs. To install a DIMM:

1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).

2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Remove the access panel (on page 19).
5. If installed, remove the PCI air baffle (on page 21).
6. Remove the system air baffle (on page 22).
7. Remove the fans (on page 23).
8. Open the DIMM slot latches.
9. Install the DIMM.



△ **CAUTION:** To prevent damage to the server, ensure that all DIMM latches are in closed and locked position before installing the fans.

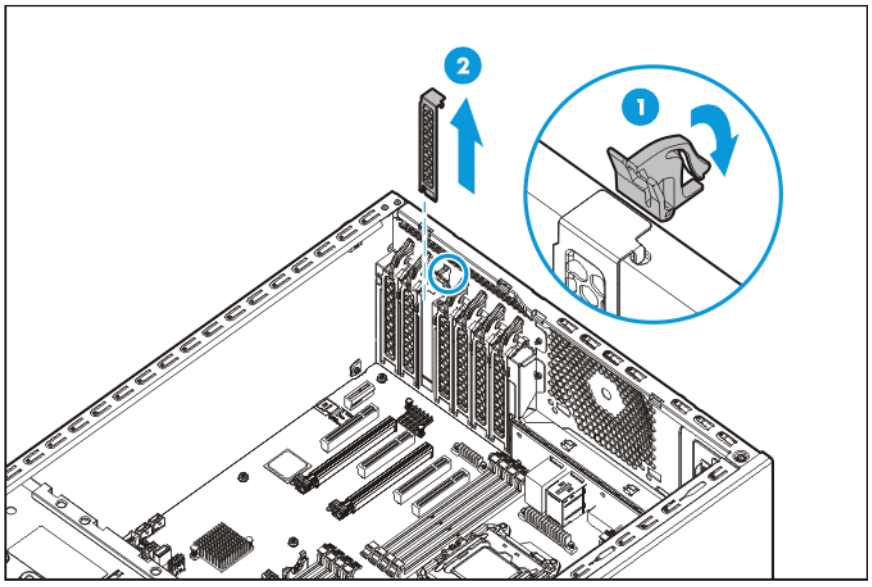
10. Install the fans (on page 24).
11. Install the system air baffle (on page 23).
12. If removed, install the PCI air baffle ("PCI air baffle option" on page 53).
13. Install the access panel (on page 20).
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. Power up the server (on page 18).
17. Install and lock the tower bezel ("Install the tower bezel" on page 19).

Graphic card option

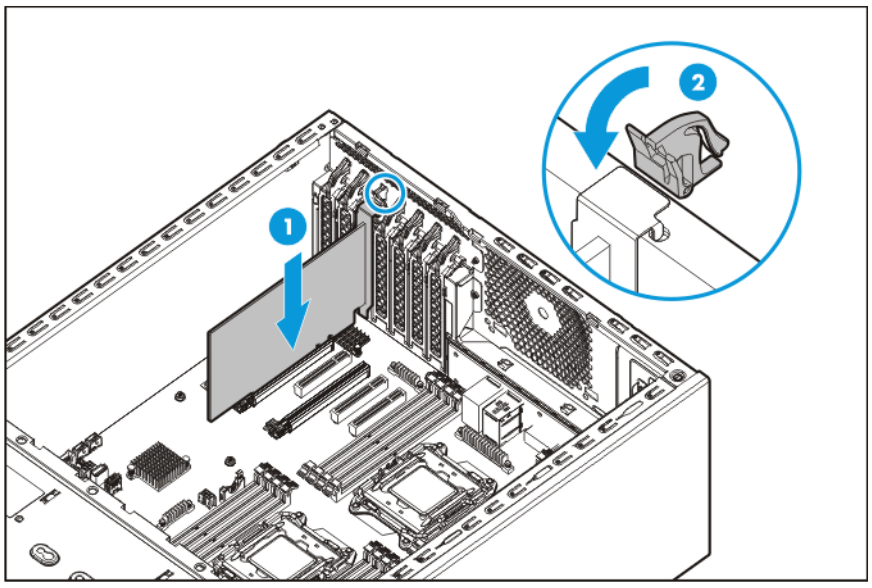
NOTE: A second processor option is required to install a graphic card in PCIe slot 1 or 3.

To install the component:

1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the access panel (on page 19).
6. If installed, remove the PCI air baffle (on page 21).
7. Remove the system air baffle (on page 22).
8. Select the appropriate PCIe slot to install the graphic card.
9. Remove the PCIe blank.



10. Install the graphic card and close the slot latch.



NOTE: For more information about installing a graphic card, see the documentation that ships with the option.

11. Install the system air baffle (on page 23).
12. If removed, install the PCI air baffle ("PCI air baffle option" on page 53).
13. Install the access panel (on page 20).
14. Return the server to an upright position.
15. Connect each power cord to the server.
16. Connect each power cord to the power source.
17. Power up the server (on page 18).
18. Install and lock the tower bezel ("Install the tower bezel" on page 19).

PCI air baffle option

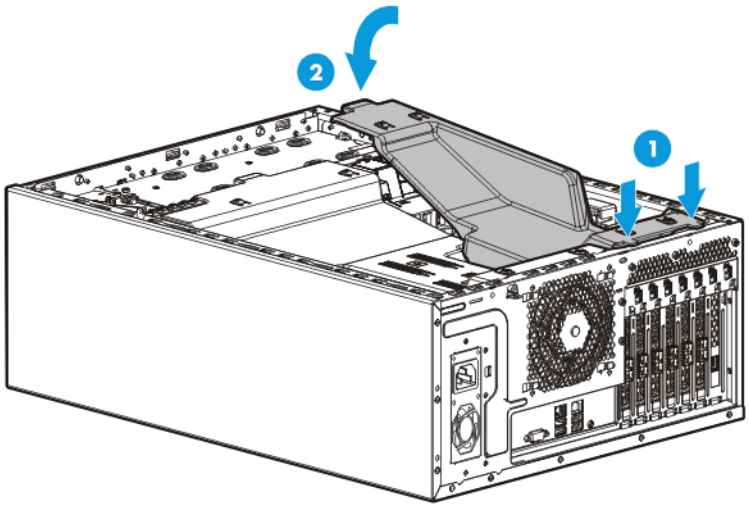
Install the PCI air baffle option when a PCI expansion card is installed in the server.

To install the component:

1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the access panel (on page 19).

CAUTION: For proper cooling do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed.

6. Install the PCI air baffle.



7. Install the access panel (on page 20).
8. Return the server to an upright position.
9. Connect each power cord to the server.
10. Connect each power cord to the power source.
11. Power up the server (on page 18).
12. Install and lock the tower bezel ("Install the tower bezel" on page 19).

Storage controller options

IMPORTANT: Before using the S7 switch to change to Legacy BIOS Boot Mode, be sure the HP Dynamic Smart Array B140i Controller is disabled. Do not use the B140i controller when the server is in Legacy BIOS Boot Mode.

The server ships with an embedded HP Dynamic Smart Array B140i Controller. For more information about the storage controller and its features, select the relevant controller user documentation on the HP website (http://www.hp.com/go/smartstorage/docs).

To configure arrays, see the *HP Smart Storage Administrator User Guide* on the HP website (http://www.hp.com/go/smartstorage/docs).

Upgrade options exist for the integrated array controller. For a list of supported options, see the QuickSpecs on the HP website (http://www.hp.com/support).

NOTE: For more information about installing a storage controller, see the documentation that ships with the storage controller option kit.

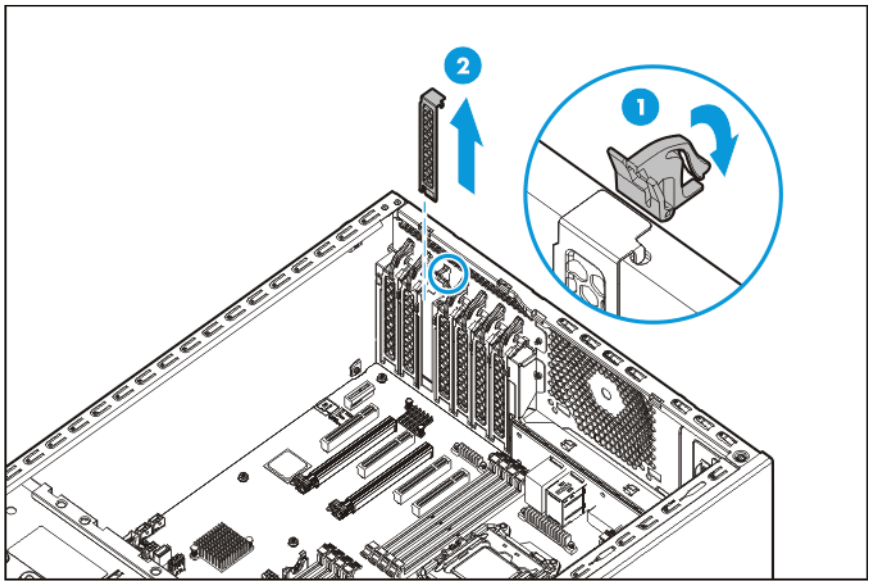
Installing a storage controller

NOTE: Install a storage controller in PCIe slot 2, 3, 4, 5, or 6. A second processor option is required to install a storage controller in PCIe slot 3.

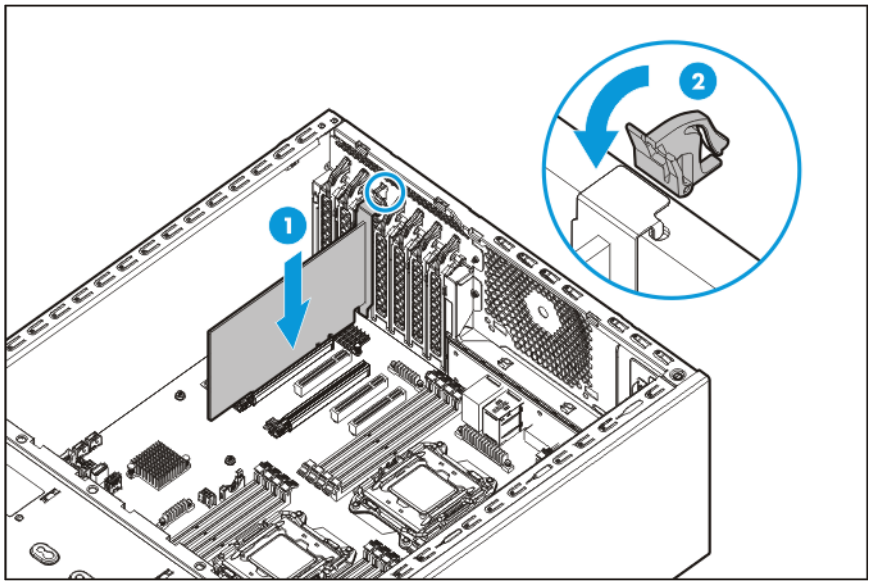
To install the component:

1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the access panel (on page 19).
6. If installed, remove the PCI air baffle (on page 21).
7. Remove the system air baffle (on page 22).
8. Remove the fans (on page 23).
9. Select the appropriate PCIe slot to install the storage controller.

10. Remove the PCIe blank.



11. Install the storage controller and close the slot latch.



12. Connect all necessary cables to the storage controller and drive cage backplane. For internal drive cabling information, see "Storage cabling (on page 88)."
13. Install the fans (on page 24).
14. Install the system air baffle (on page 23).
15. If removed, install the PCI air baffle ("PCI air baffle option" on page 53).
16. Install the access panel (on page 20).
17. Return the server to an upright position.
18. Connect each power cord to the server.
19. Connect each power cord to the power source.
20. Power up the server (on page 18).
21. Install and lock the tower bezel ("Install the tower bezel" on page 19).

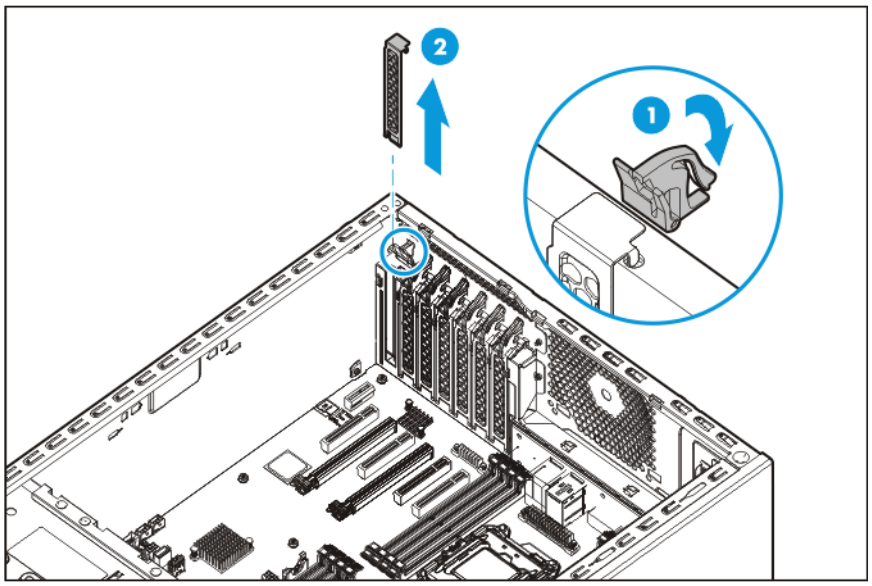
Dedicated iLO port management module option

To install the component:

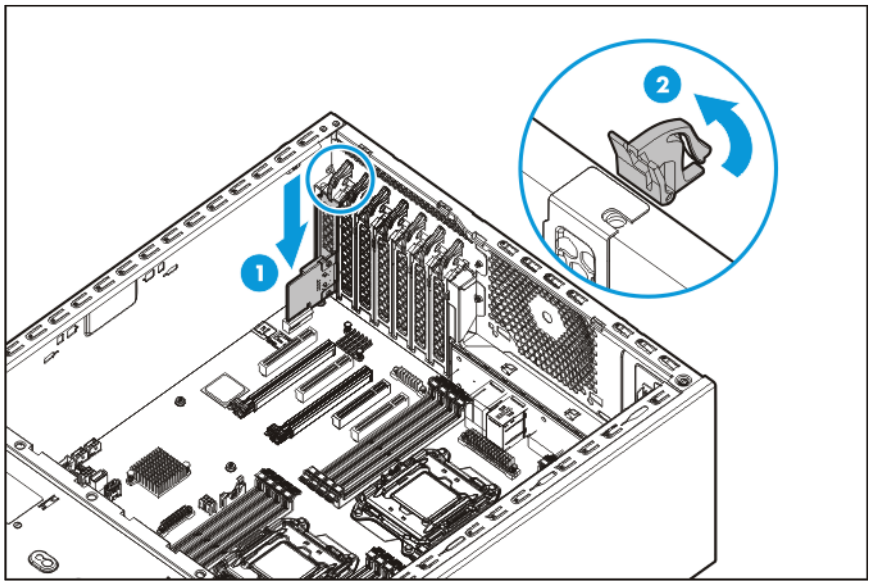
1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the access panel (on page 19).
6. If installed, remove the PCI air baffle (on page 21).
7. Remove the system air baffle (on page 22).

IMPORTANT: The dedicated iLO port management module is installed in PCIe expansion slot 7.

8. Open the slot latch and remove the PCIe blank.



9. Install the dedicated iLO management port module and close the slot latch.



10. Install the system air baffle (on page 23).
11. If removed, install the PCI air baffle ("PCI air baffle option" on page 53).
12. Install the access panel (on page 20).
13. Return the server to an upright position.
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. Power up the server (on page 18).
17. Install and lock the tower bezel ("Install the tower bezel" on page 19).

Enabling the dedicated iLO management module

To enable the dedicated iLO management module:

1. During the server startup sequence after installing the module, press **F9** in the POST screen.

   The System Utilities screen appears.
2. Select **System Configuration** | **iLO 4 Configuration Utility**.

   The iLO 4 Configuration Utility screen appears.
3. Select **Network Options**, and then press **Enter**.

   The Network Options screen appears.
4. Set the **Network Interface Adapter** field to **ON**, and then press **Enter**.
5. Press **F10** to save your changes.

   A message prompt to confirm the iLO settings reset appears.
6. Press **Enter** to reboot the iLO settings.
7. Press **Esc** until the main menu is displayed.
8. Select **Reboot the System** to exit the utility and resume the boot process.

   The IP address of the enabled dedicated iLO connector appears on the POST screen on the subsequent boot-up. Access the Network Options screen again to view this IP address for later reference.

HP Redundant power supply option

Install the RPS backplane option to improve power efficiency and enable power redundancy. Power redundancy requires the installation of two power input modules. This module is a separately purchased option and is not part of the RPS backplane option kit.

When this RPS backplane and a single power input module are installed in the server, you can install or remove a second power input module without powering down the server.

WARNING: To reduce the risk of electric 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.
- Unplug the power cord from the power supply to disconnect power to the equipment.
- Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the equipment.

WARNING: To reduce the risk of injury from electric shock hazards, do not open power supplies. Refer all maintenance, upgrades, and servicing to qualified personnel.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

CAUTION: To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

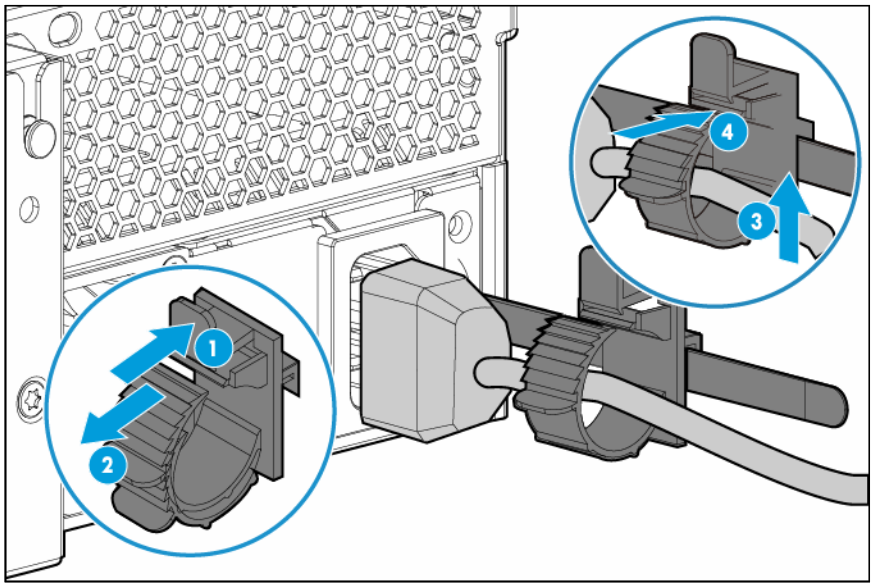
CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP website (http://www.hp.com/go/qs).

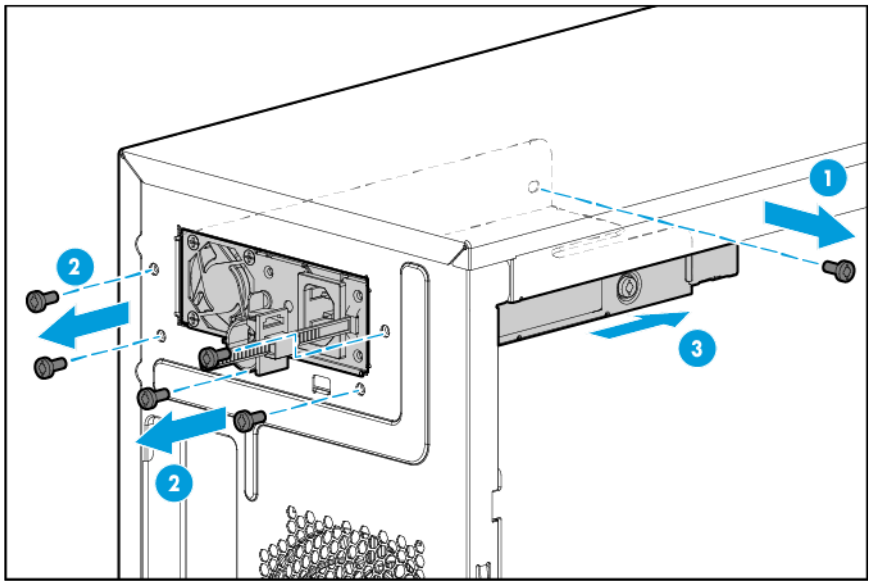
To install the component:

1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Access the product rear panel.

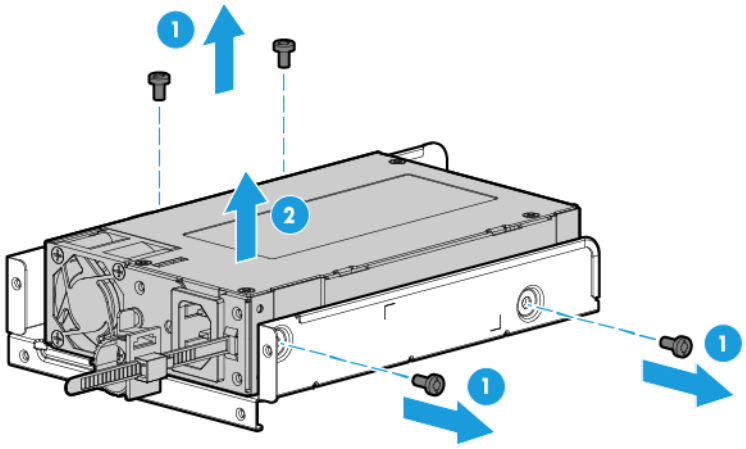
4. Release the power cord from the strain relief clip.



5. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
6. Place the server on a sturdy, level surface.
7. Remove the access panel (on page 19).
8. Prepare the server for removal of the existing power supply:
   a. Remove all server components that block access to the power supply cables and screws.
   b. Disconnect all server cables that block access to the power supply cables and screws.
   c. Disconnect all power supply cables from the system board and drive cage.
9. In a tower server, remove the existing power supply:
   a. Remove the power supply assembly from the server.

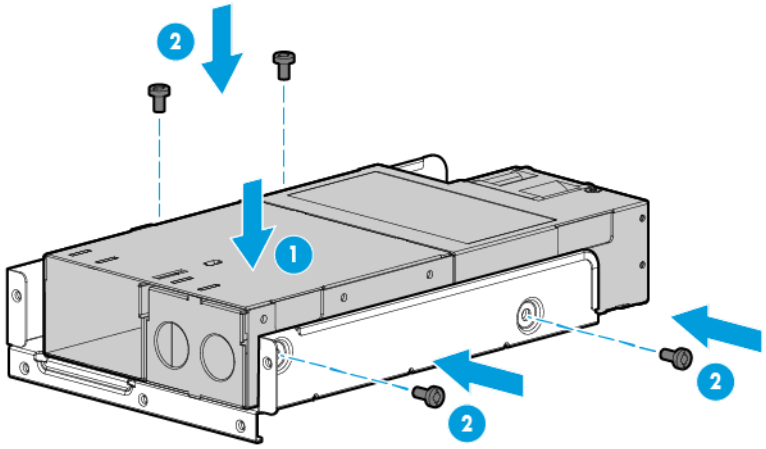


b. Remove the power supply from its tray.

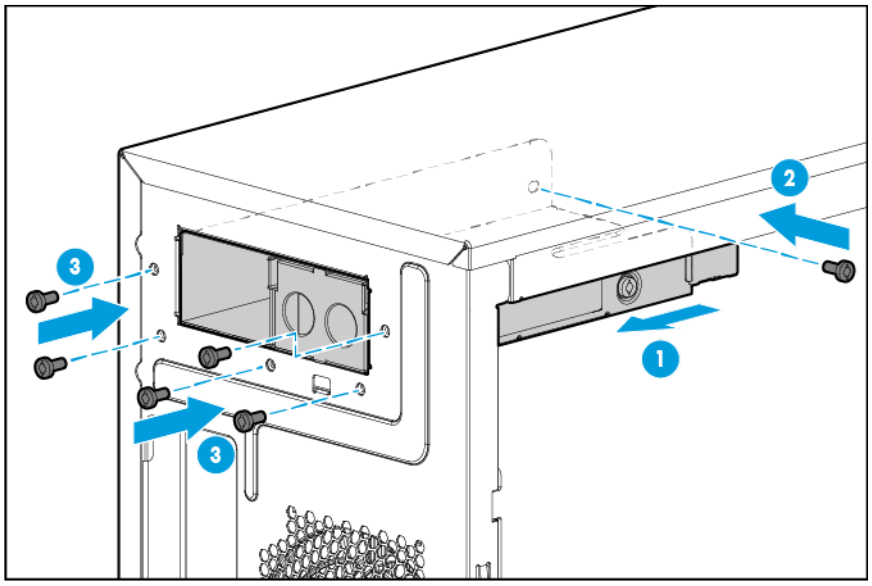


c. Keep the power supply tray and screws. You are going to use these to install the RPS backplane in the server.

10. Remove all other components specifically associated with the removed power supply.
11. In a tower server, install the RPS backplane:
    a. Install the RPS backplane in its tray.

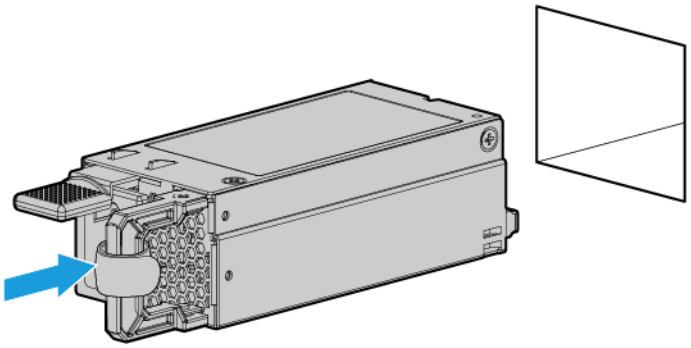


b. Install the RPS backplane in the server.



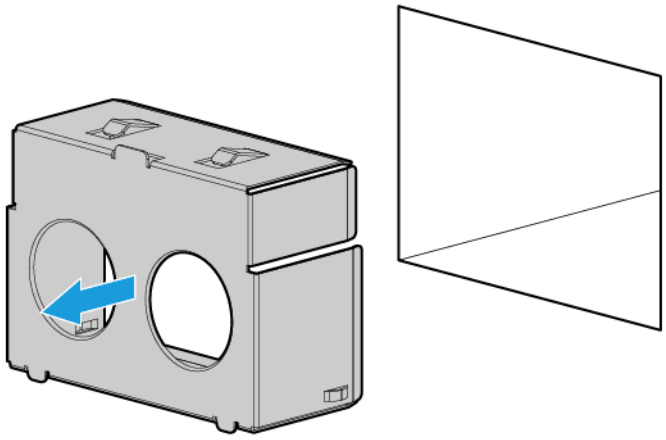
For information on the location of these system board connectors and the applicable power supply cable routing in your server, see the server user guide.

1. Install a hot-plug power input module in the power supply bay 1.



2. If you intend to enable power redundancy in the server, install a second power input module in the power supply bay 2:

a. Remove the power supply blank.

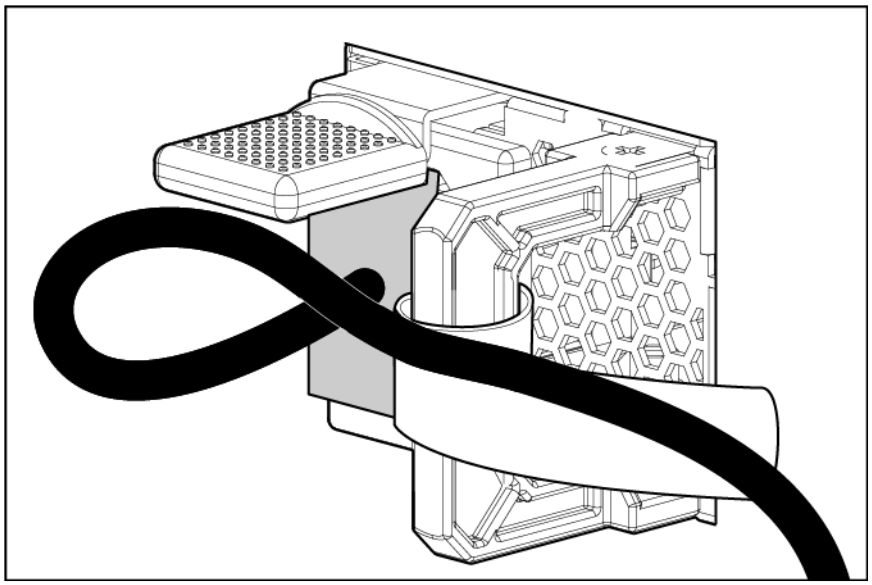


b. Install a hot-plug power input module in the power supply bay 2.

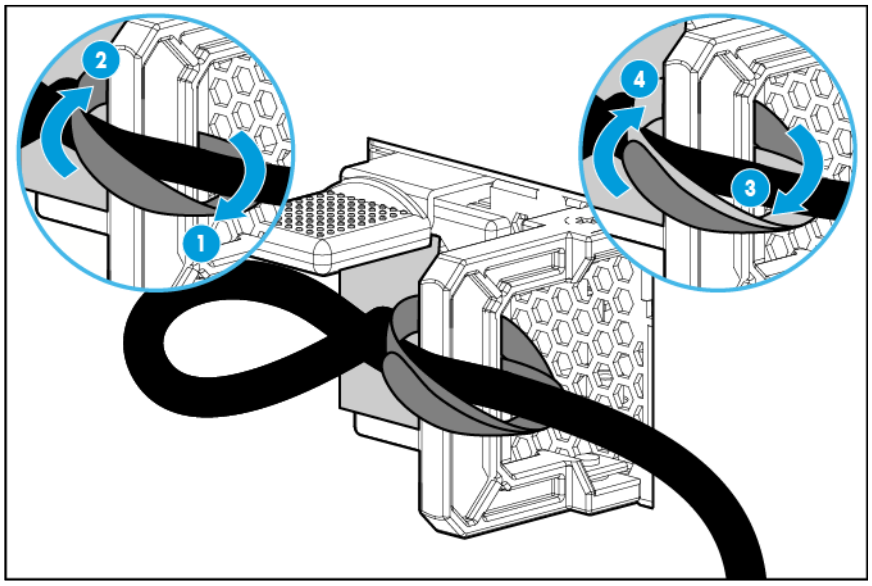
3. Install the access panel (on page 20).
4. Connect the power cords to the power supplies.
5. To prevent accidental power cord disconnection when sliding the server in and out of the chassis, secure the power cord in the hook-and-loop strap attached to the power input module handle:
   a. Unwrap the hook-and-loop strap from the power input module handle.

> **CAUTION:** Avoid tight bend radii to prevent damaging the internal wires of a power cord or a server cable. Never bend power cords and server cables tight enough to cause a crease in the sheathing.

   b. Bend the plug end of the power cord in the position shown in the following image.



c. Secure the power cord in the hook-and-loop strap as shown in the following image.



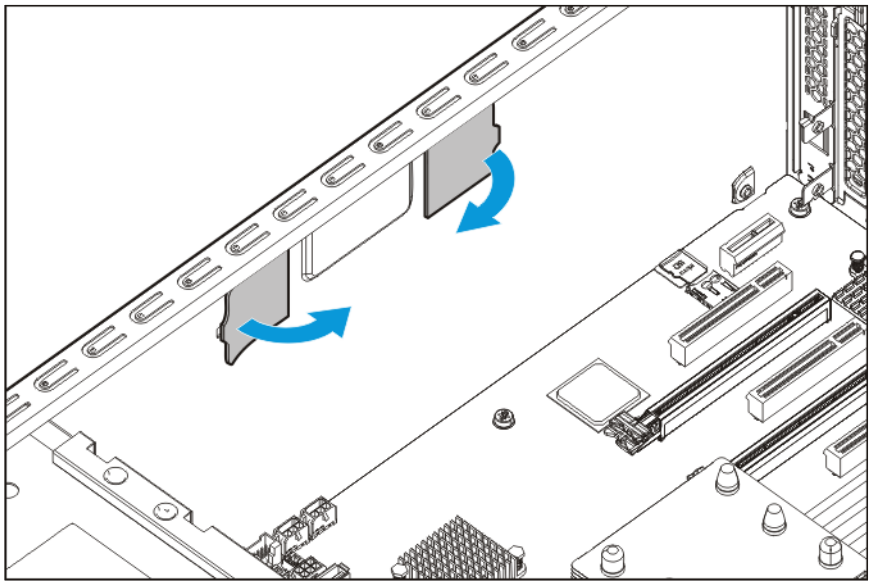
6. Connect the power cords to the AC power source.
7. Employ best practices to route and manage the power cords and other cables in the server rear panel.
8. Power up the server (on page 18).
9. Install and lock the tower bezel ("Install the tower bezel" on page 19).

HP Smart Storage Battery holder option

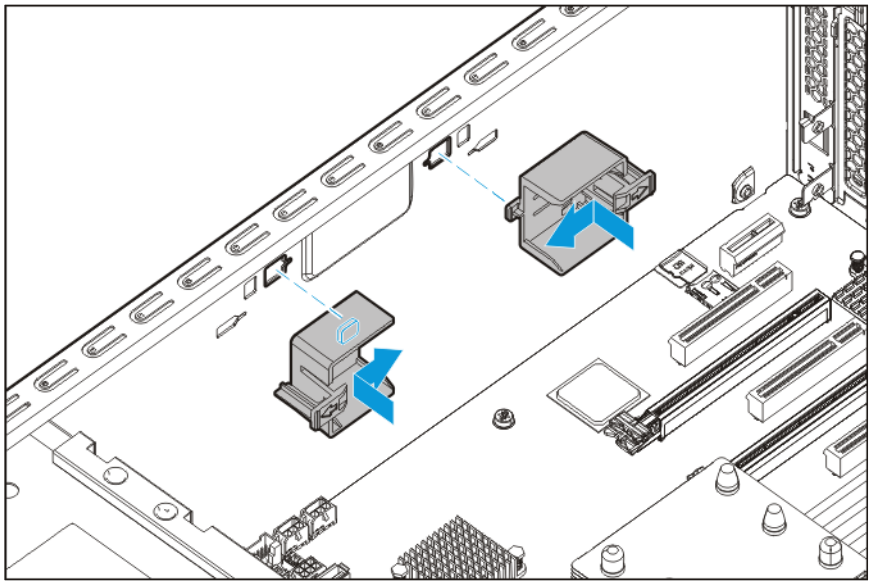
To install the component:

1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the access panel (on page 19).
6. If installed, remove the PCI air baffle (on page 21).
7. Remove the system air baffle (on page 22).

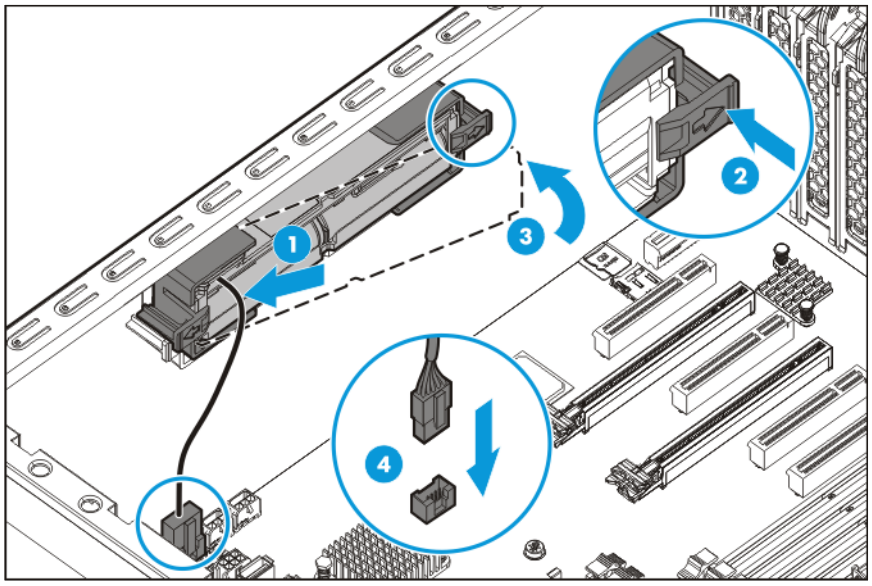
8. Remove the slot covers.



9. Install the HP Smart Storage Battery holders.



10. Install the HP Smart Storage Battery, and then connect the battery cable to the system board connector.



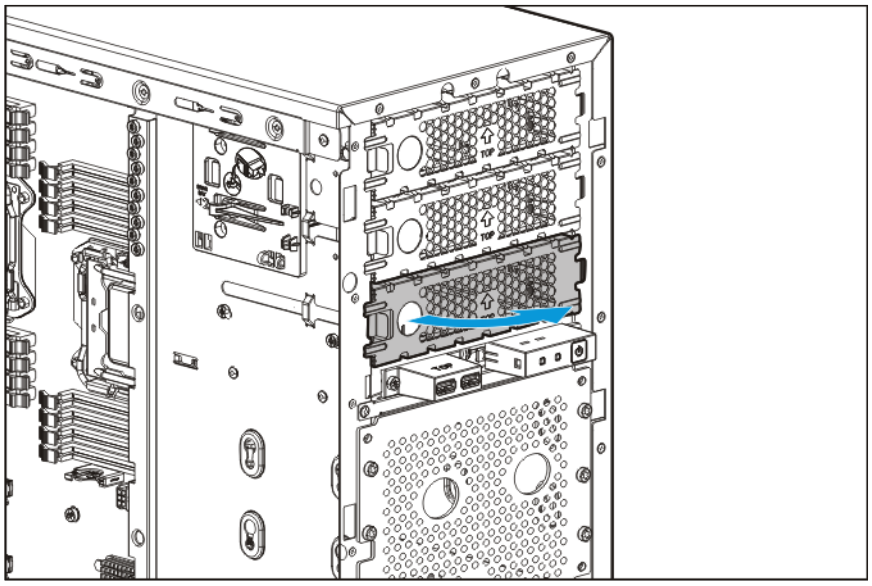
11. Install the system air baffle (on page 23).
12. If removed, install the PCI air baffle ("PCI air baffle option" on page 53).
13. Install the access panel (on page 20).
14. Return the server to an upright position.
15. Connect each power cord to the server.
16. Connect each power cord to the power source.
17. Power up the server (on page 18).
18. Install and lock the tower bezel ("Install the tower bezel" on page 19).

Optical drive option

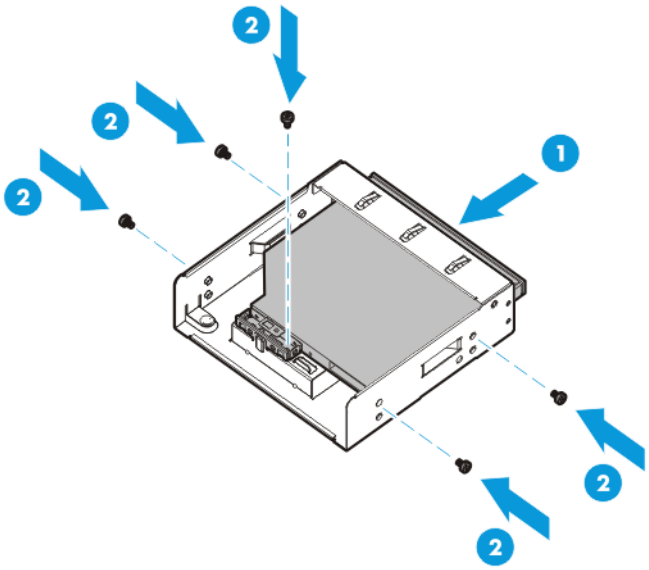
To install the component:

1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the access panel (on page 19).
6. If installed, remove the PCI air baffle (on page 21).
7. Remove the system air baffle (on page 22).
8. Remove the fans (on page 23).

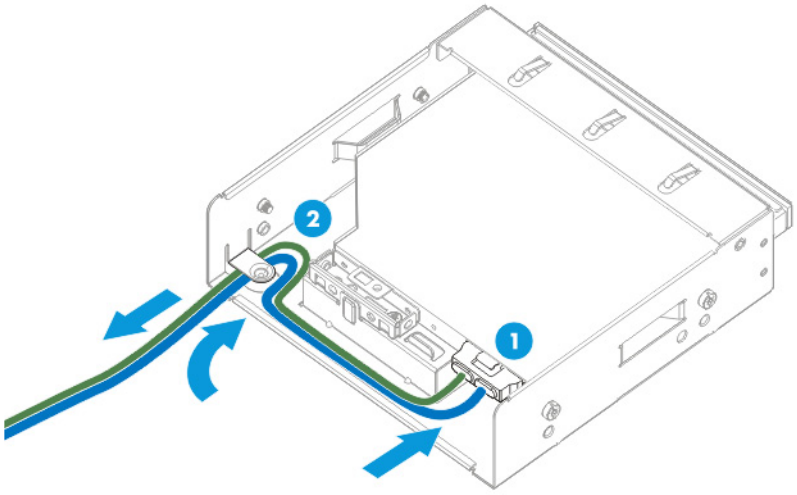
9. Remove the media bay blank and retain it for later use.



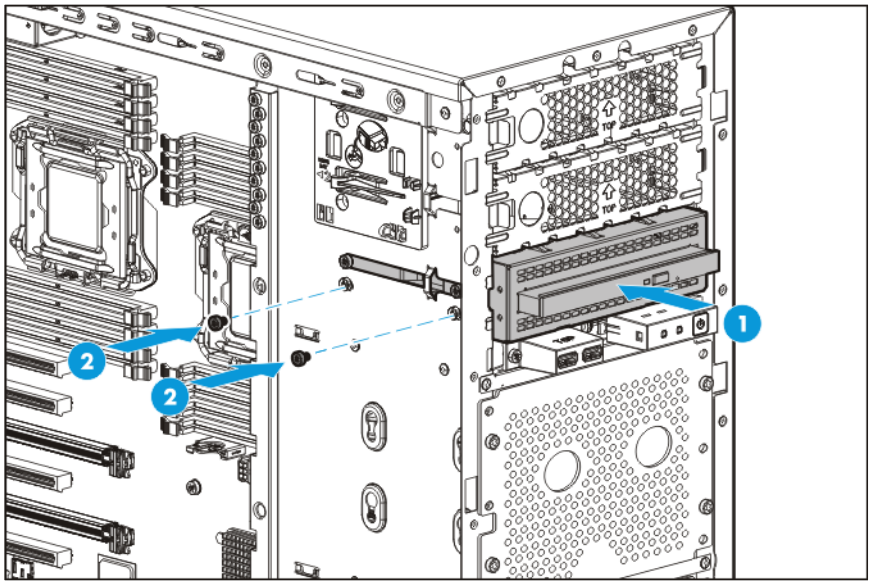
10. Install the slim optical disk drive into the drive cage.



11. Connect the cable to the rear of the drive, and then route the cable through the clip on the drive cage.

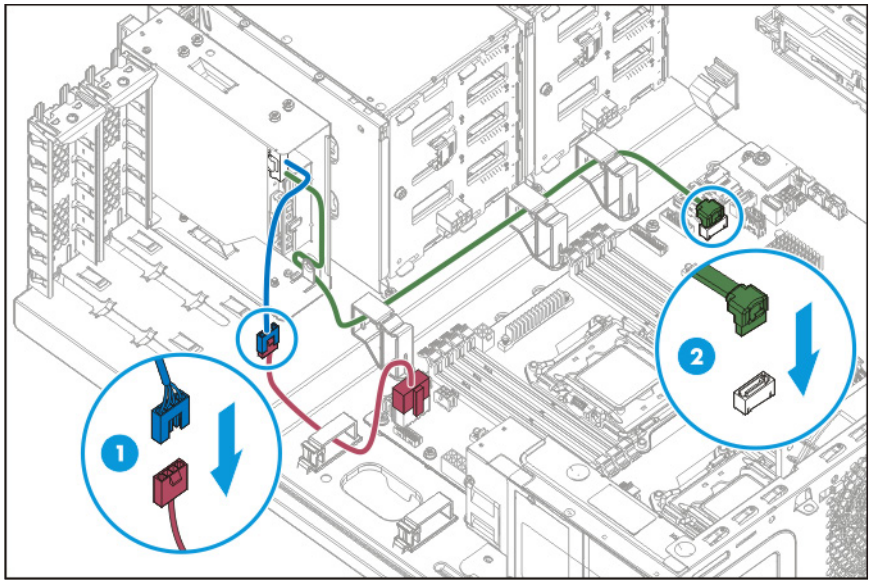


12. Install the drive cage into the chassis and then secure it with two screws.



13. Connect the power cable.

14. Route the SATA cable through the cable management clips, and connect the opposite end of the cable to the connector on the system board.



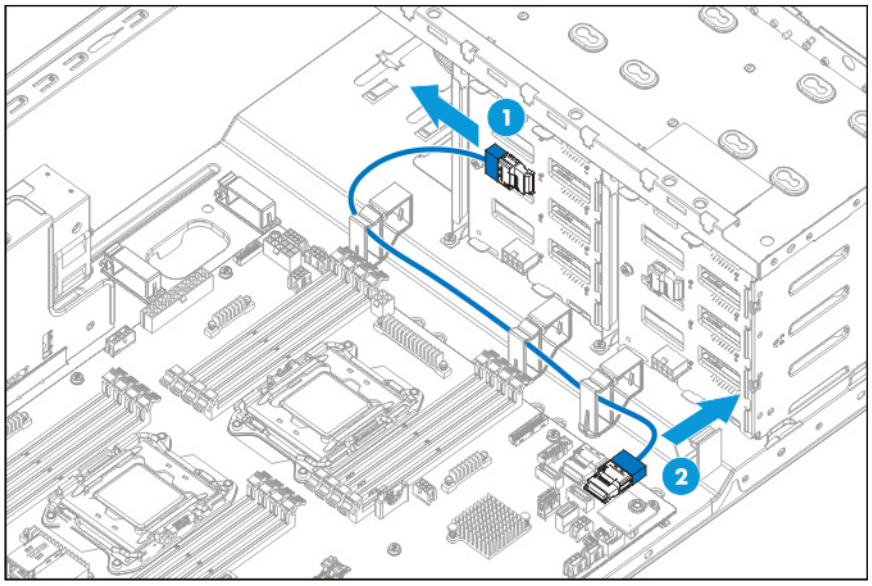
15. Install the fans (on page 24).
16. Install the system air baffle (on page 23).
17. If removed, install the PCI air baffle ("PCI air baffle option" on page 53).
18. Install the access panel (on page 20).
19. Return the server to an upright position.
20. Connect each power cord to the server.
21. Connect each power cord to the power source.
22. Power up the server (on page 18).
23. Install and lock the tower bezel ("Install the tower bezel" on page 19).

Mini-SAS H240 cable option

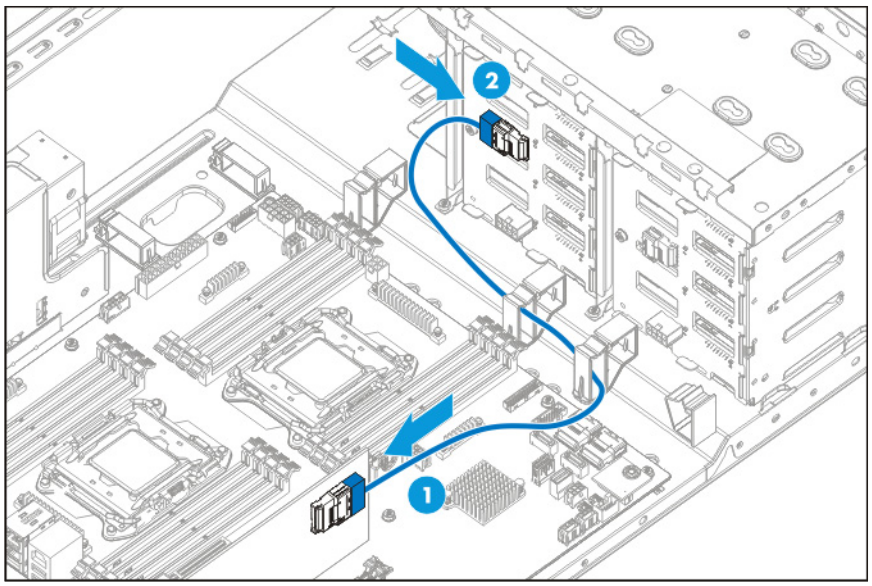
To install the component:

1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the access panel (on page 19).
6. If installed, remove the PCI air baffle (on page 21).
7. Remove the system air baffle (on page 22).
8. Remove the fans (on page 23).

9. Disconnect and remove the existing Mini-SAS cable.



10. Install the HP H-Series Host Bus Adapter.
11. Connect the 670-mm Mini-SAS cable:
    a. Connect one end of the Mini-SAS cable to the host bus adapter.
    b. Route the Mini-SAS cable through the cable management clips, and then connect the other end to the drive backplane.



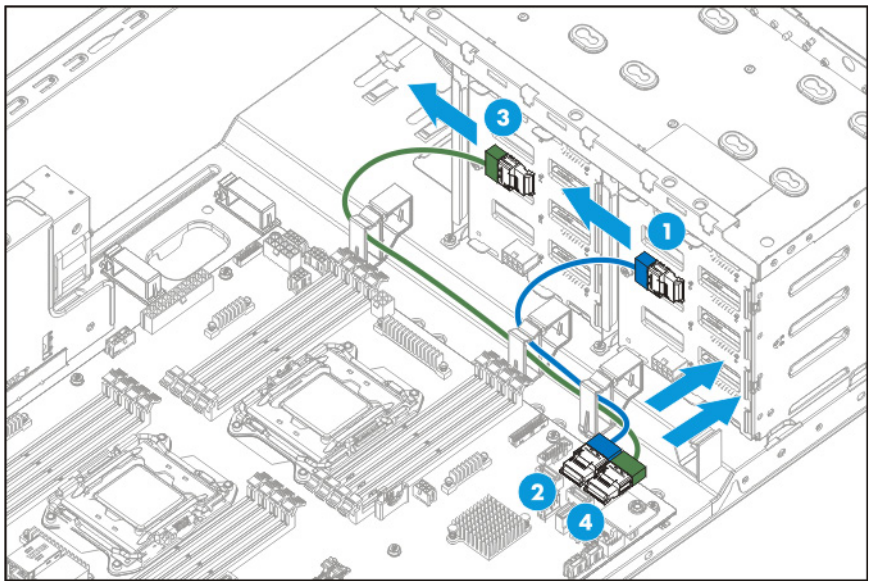
12. Install the fans (on page 24).
13. Install the system air baffle (on page 23).
14. If removed, install the PCI air baffle ("PCI air baffle option" on page 53).
15. Install the access panel (on page 20).
16. Return the server to an upright position.
17. Connect each power cord to the server.
18. Connect each power cord to the power source.

19. Power up the server (on page 18).
20. Install and lock the tower bezel ("Install the tower bezel" on page 19).

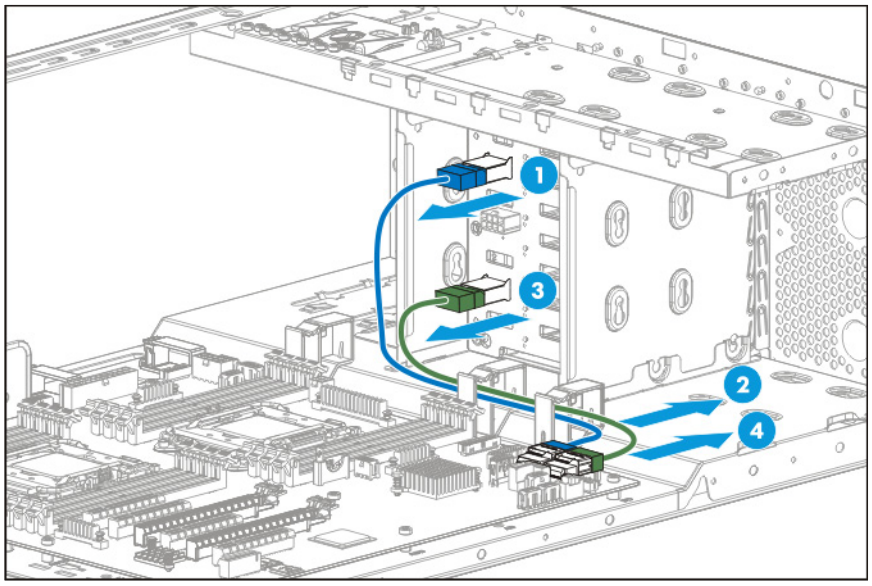
Mini-SAS P440/P840 cable option

To install the component:

1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the access panel (on page 19).
6. If installed, remove the PCI air baffle (on page 21).
7. Remove the system air baffle (on page 22).
8. Remove the fans (on page 23).
9. Disconnect and remove the existing Mini-SAS cables:
   - Two 4 LFF hot-plug drive cages

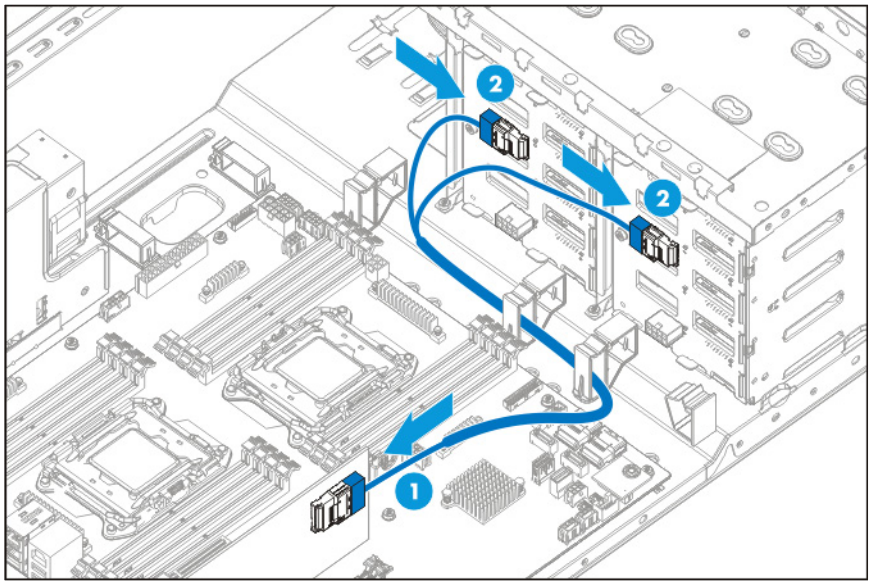


- One 8 SFF hot-plug drive cage

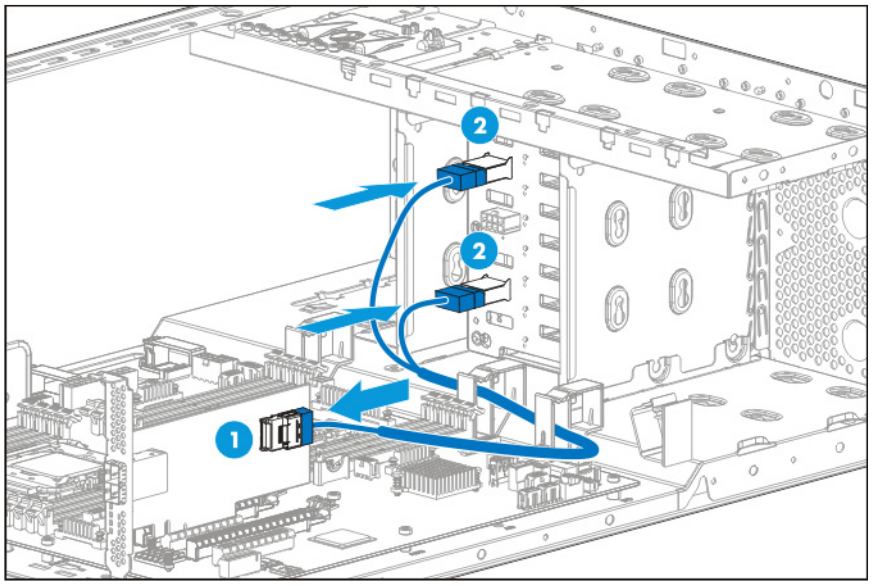


10. Install the storage controller ("Storage controller options" on page 54).
11. Connect the 670-mm Mini-SAS Y cable:
    a. Connect the common end of the Mini-SAS Y-cable to the storage controller.
    b. Route the split ends of the Mini-SAS Y-cable through the cable management clips, and then connect the cables.

Two 4 LFF hot-plug drive cages



One 8 SFF hot-plug drive cage



12. Install the fans (on page 24).
13. Install the system air baffle (on page 23).
14. If removed, install the PCI air baffle ("PCI air baffle option" on page 53).
15. Install the access panel (on page 20).
16. Return the server to an upright position.
17. Connect each power cord to the server.
18. Connect each power cord to the power source.
19. Power up the server (on page 18).
20. Install and lock the tower bezel ("Install the tower bezel" on page 19).

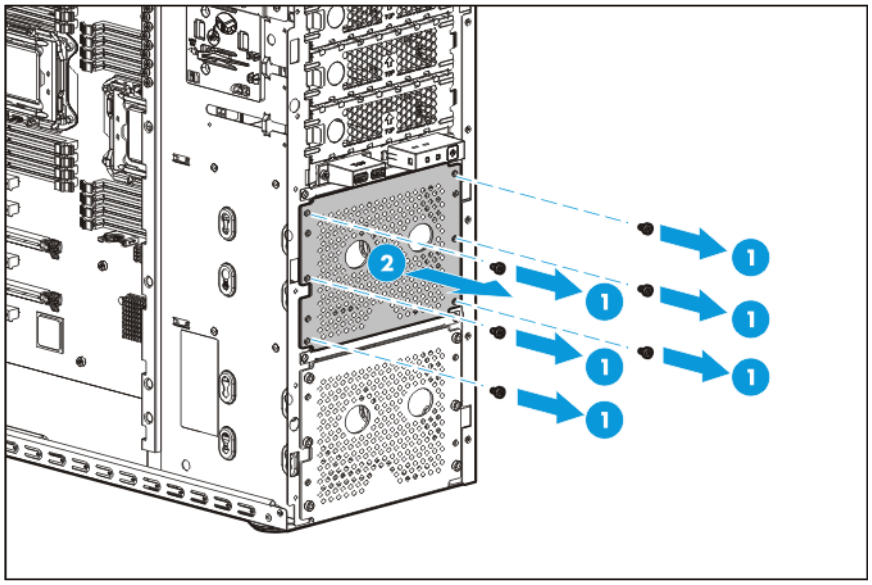
Eight-bay SFF hot-plug drive cage option

To install the component:

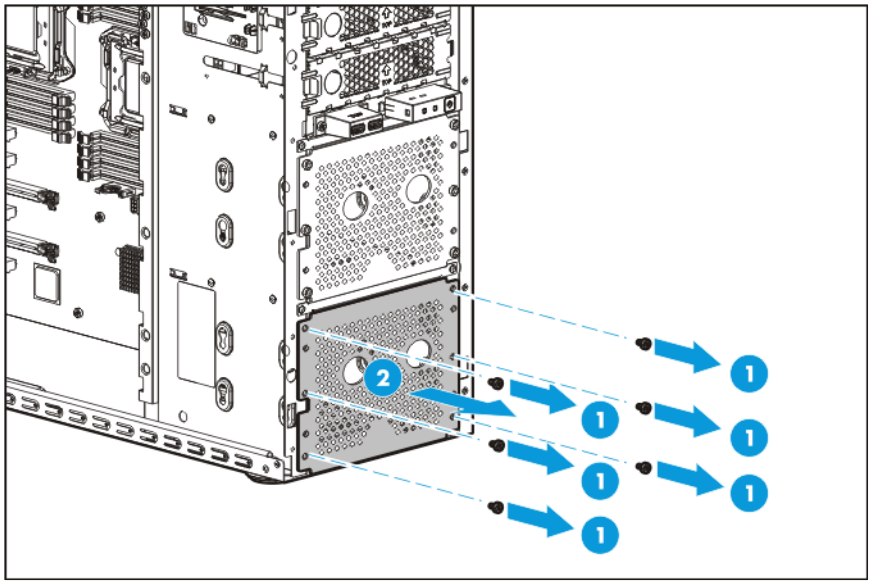
1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the access panel (on page 19).
6. If installed, remove the PCI air baffle (on page 21).
7. Remove the system air baffle (on page 22).
8. Remove the fans (on page 23).
9. Disconnect and remove the drive cage cable assembly:
   a. Disconnect the Mini-SAS cables and the power cable from the system board.

b. Disconnect the drive cables from the rear of the drives.

10. Remove the non-hot-plug drive cage.

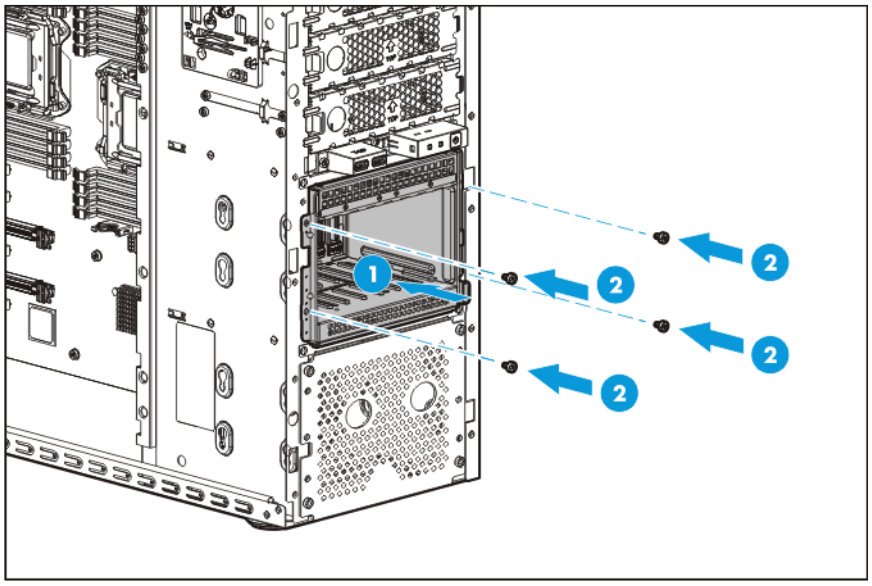


11. If installing a drive cage in box 1, remove the drive cage cover blank.

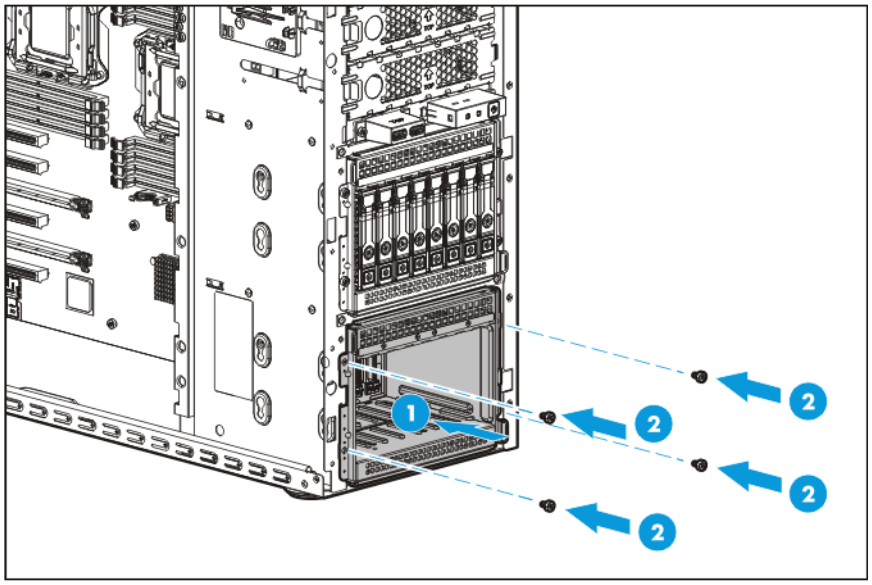


12. Install the SFF hot-plug drive cage assembly.

- Box 2

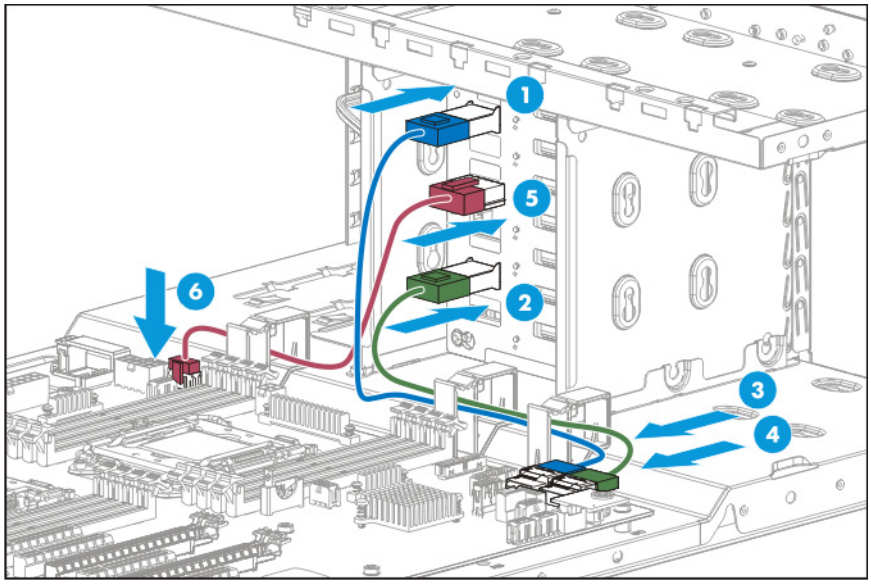


- Box 1



13. Connect the drive cage cables for one eight-bay SFF drive cage installed in box 2:
    a. Connect the Mini-SAS cables to the drive cage backplane.
    b. Route the Mini-SAS cables through the cable management clip, and then connect the opposite ends of the Mini-SAS cables to the connectors on the system board.
    c. Connect the power cable to the drive cage backplane.

d. Route the power cable through the cable management clip, and then connect the opposite end of the power cable to the connector on the system board.



14. Install the storage controller ("Storage controller options" on page 54), if two eight-bay SFF drive cages are installed.
15. Connect all necessary cables to the storage controller. For internal drive cabling information, see "Storage cabling (on page 88)."
16. Remove the drive blanks.
17. Install the hot-plug drives ("Installing a hot-plug drive" on page 40).

> **CAUTION:** To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

18. Install the fans (on page 24).
19. Install the system air baffle (on page 23).
20. If removed, install the PCI air baffle ("PCI air baffle option" on page 53).
21. Install the access panel (on page 20).
22. Return the server to an upright position.
23. Connect each power cord to the server.
24. Connect each power cord to the power source.
25. Power up the server (on page 18).
26. Install and lock the tower bezel ("Install the tower bezel" on page 19).

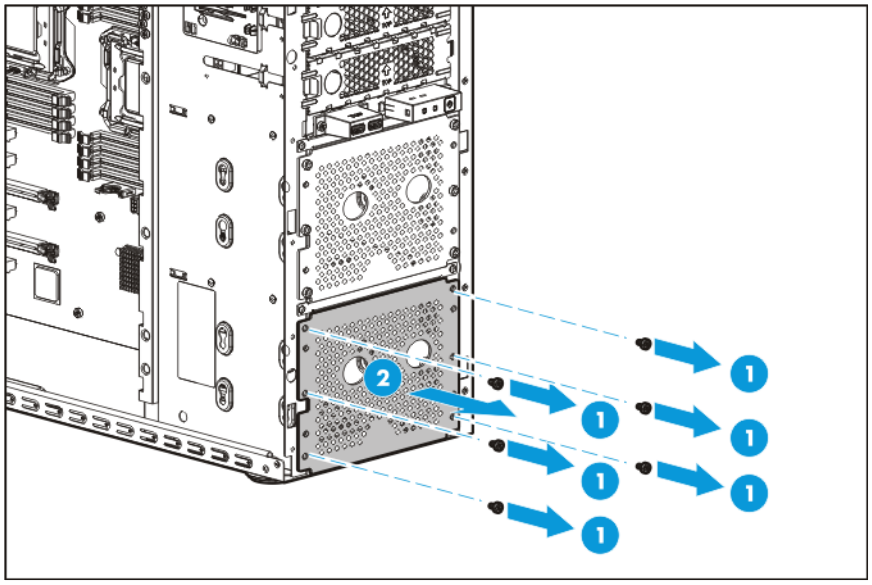
Four-bay LFF non-hot-plug drive cage option

To install the component:

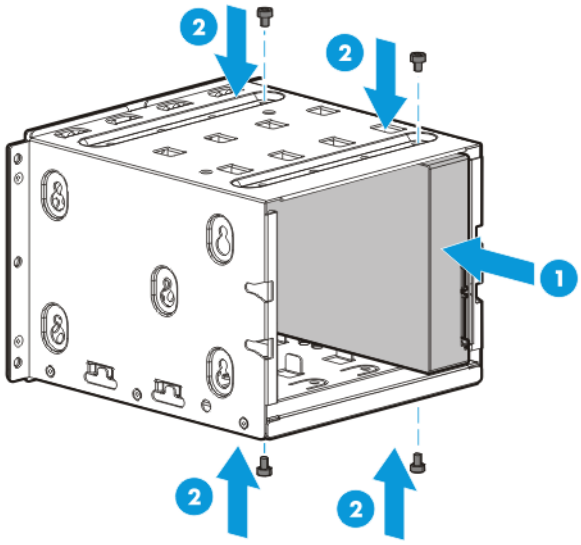
1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.

b. Disconnect each power cord from the server.

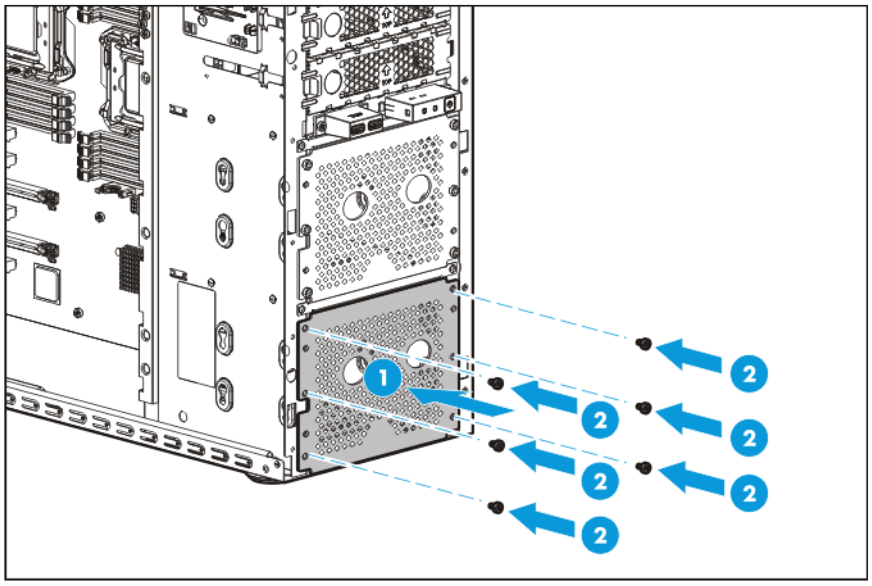
4. Place the server on its side.
5. Remove the access panel (on page 19).
6. If installed, remove the PCI air baffle (on page 21).
7. Remove the system air baffle (on page 22).
8. Remove the fans (on page 23).
9. Remove the drive cage cover blank.



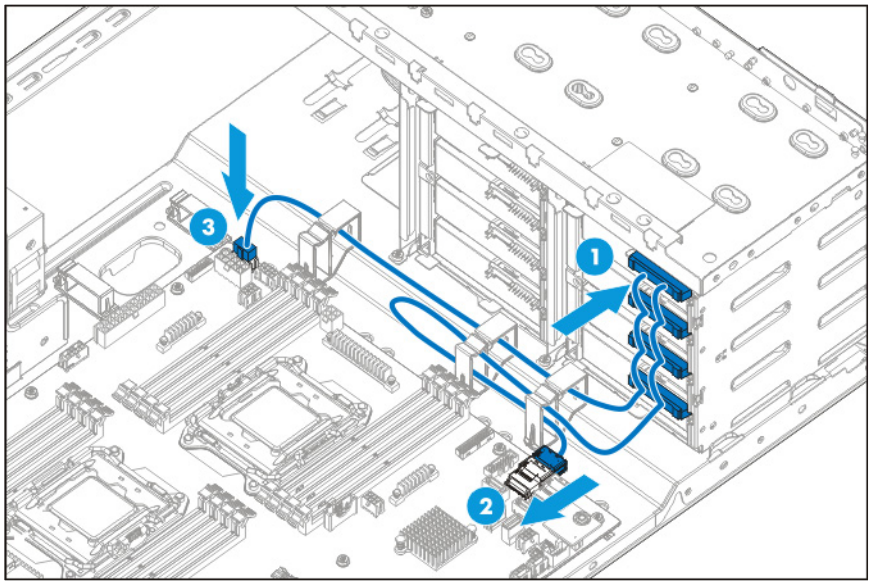
10. Use the screws on the drive cage to install the drives.



11. Install the drive cage into the chassis.



12. Connect all drive cables.

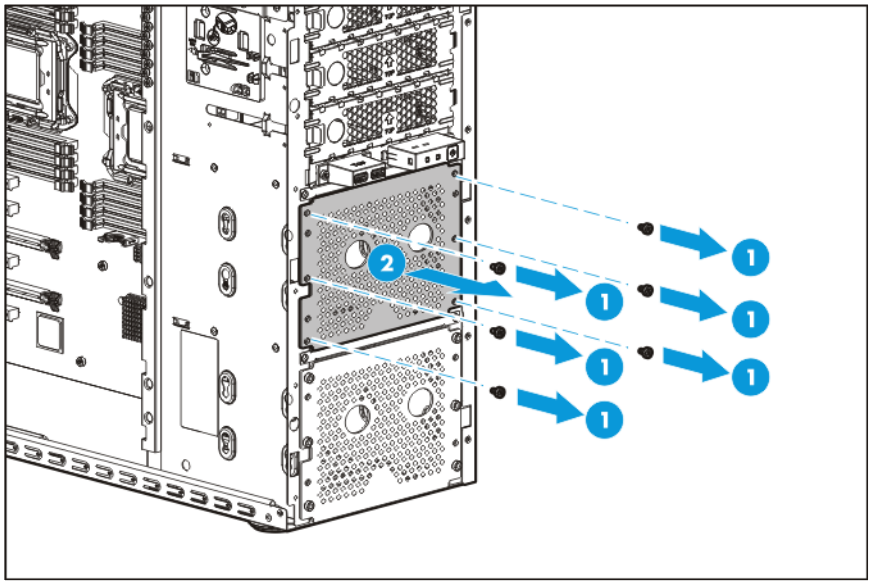


13. Install the fans (on page 24).
14. Install the system air baffle (on page 23).
15. If removed, install the PCI air baffle ("PCI air baffle option" on page 53).
16. Install the access panel (on page 20).
17. Return the server to an upright position.
18. Connect each power cord to the server.
19. Connect each power cord to the power source.
20. Power up the server (on page 18).
21. Install and lock the tower bezel ("Install the tower bezel" on page 19).

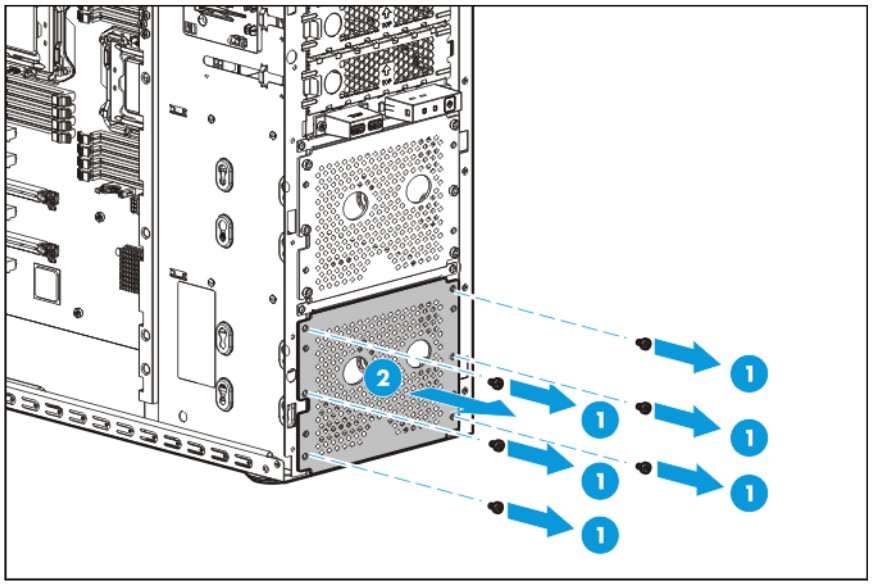
Four-bay LFF hot-plug drive cage option

To install the component:

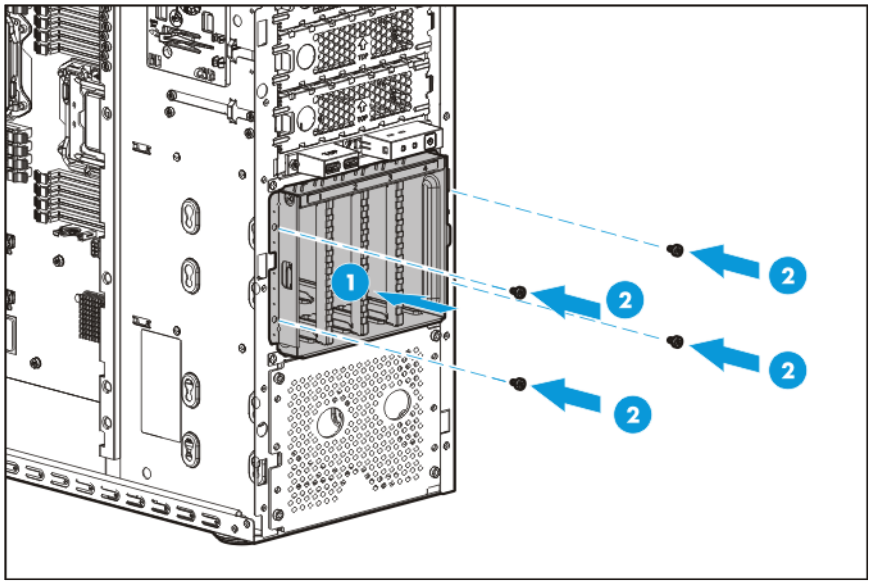
1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the access panel (on page 19).
6. If installed, remove the PCI air baffle (on page 21).
7. Remove the system air baffle (on page 22).
8. Remove the fans (on page 23).
9. Disconnect and remove the drive cage cable assembly:
   a. Disconnect the Mini-SAS cables and the power cable from the system board.
   b. Disconnect the drive cables from the rear of the drives.
10. Remove the non-hot-plug drive cage.



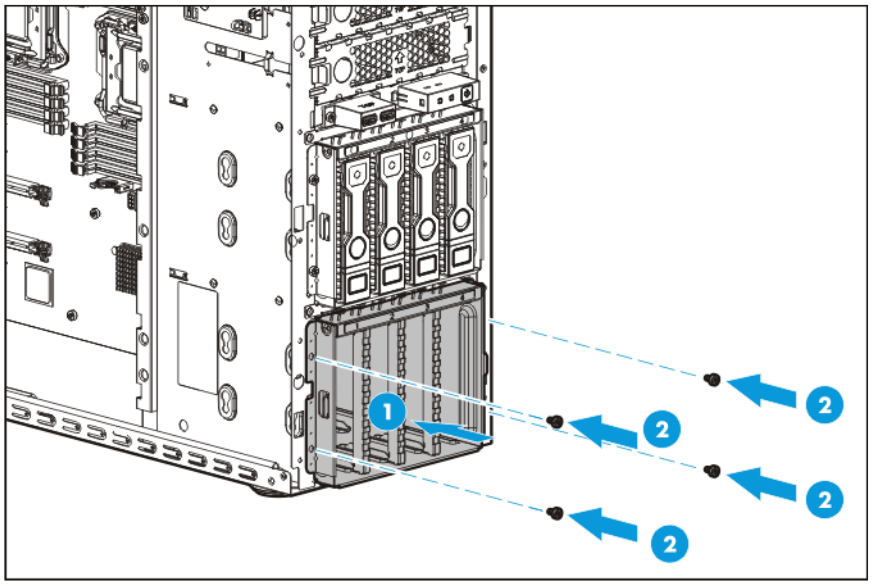
11. If installing a drive cage in box 1, remove the drive cage cover blank.



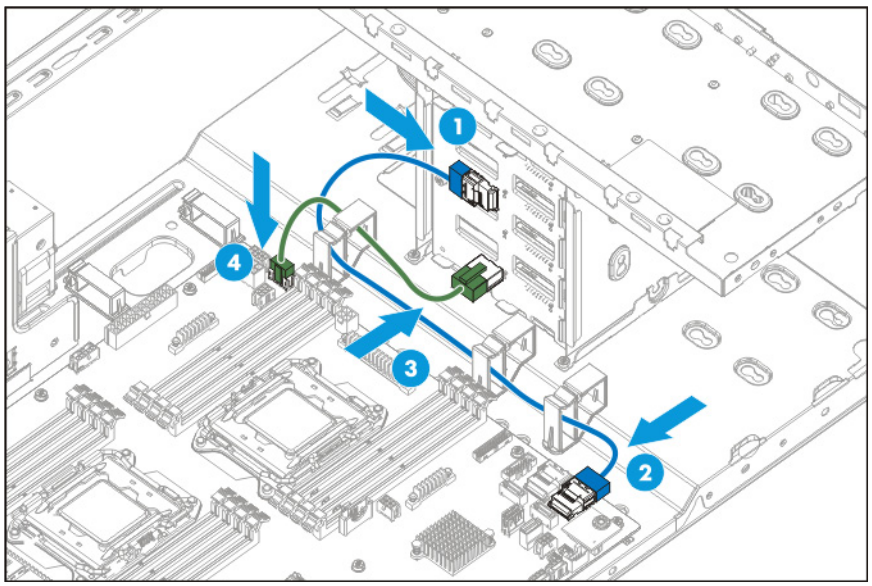
12. Install the LFF hot-plug drive cage assembly.
    - Box 2



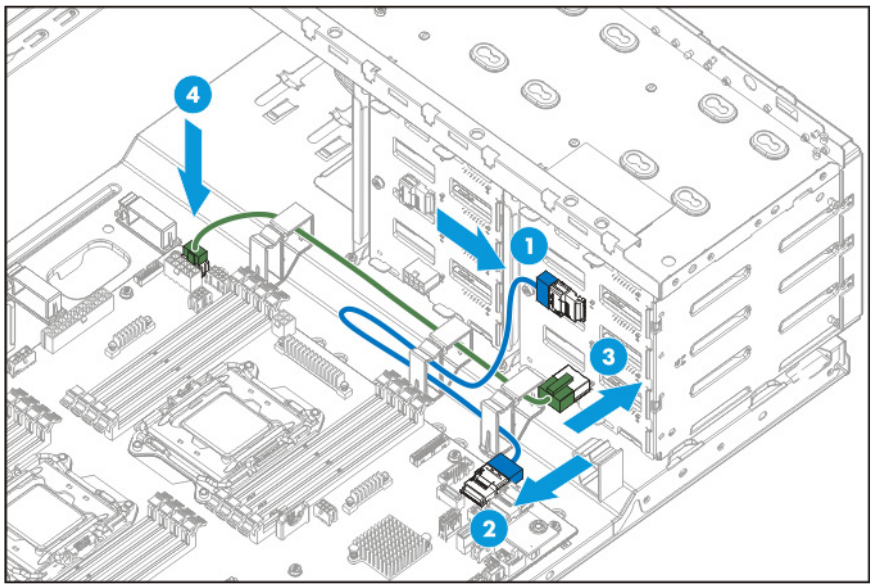
- Box 1



13. Connect the drive cage cables:
    a. Connect the Mini-SAS cable to the drive cage backplane.
    b. Route the Mini-SAS cable through the cable management clip, and then connect the opposite end of the Mini-SAS cable to the connector on the system board.
    c. Connect the power cable to the drive cage backplane.
    d. Route the power cable through the cable management clip, and then connect the opposite end of the power cable to the connector on the system board.
        - Box 2



— Box 1



14. Remove the drive blanks.
15. Install the hot-plug drives ("Installing a hot-plug drive" on page 40).

IMPORTANT: Populate drive bays based on the drive numbering sequence. Start from the drive bay with the lowest device number. For device numbering information, see "Drive numbering (on page 15)".

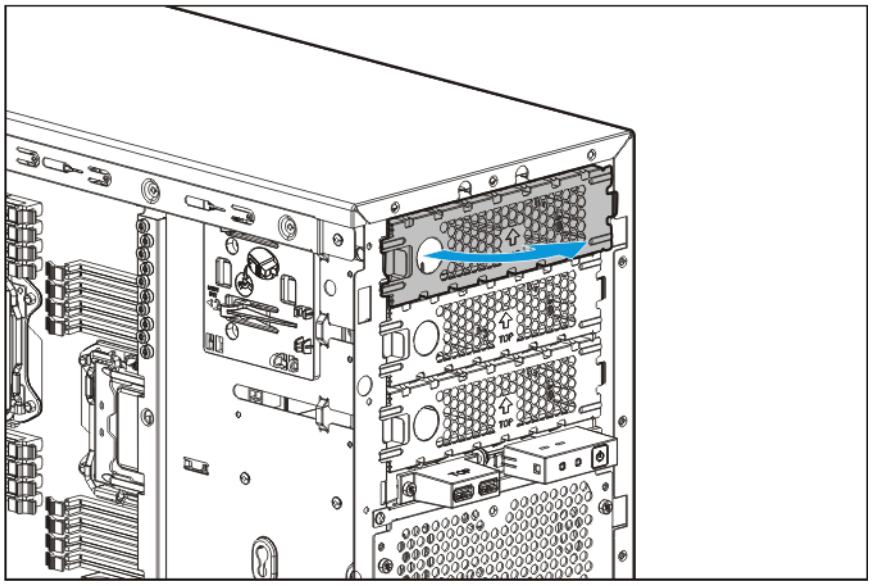
16. Install the fans (on page 24).
17. Install the system air baffle (on page 23).
18. If removed, install the PCI air baffle ("PCI air baffle option" on page 53).
19. Install the access panel (on page 20).
20. Return the server to an upright position.
21. Connect each power cord to the server.
22. Connect each power cord to the power source.
23. Power up the server (on page 18).
24. Install and lock the tower bezel ("Install the tower bezel" on page 19).

LFF drive enablement option

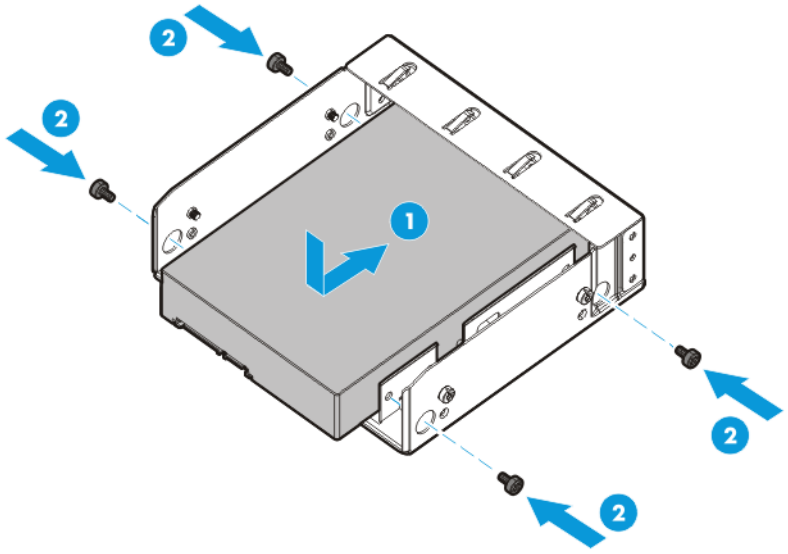
To install the component:

1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the access panel (on page 19).

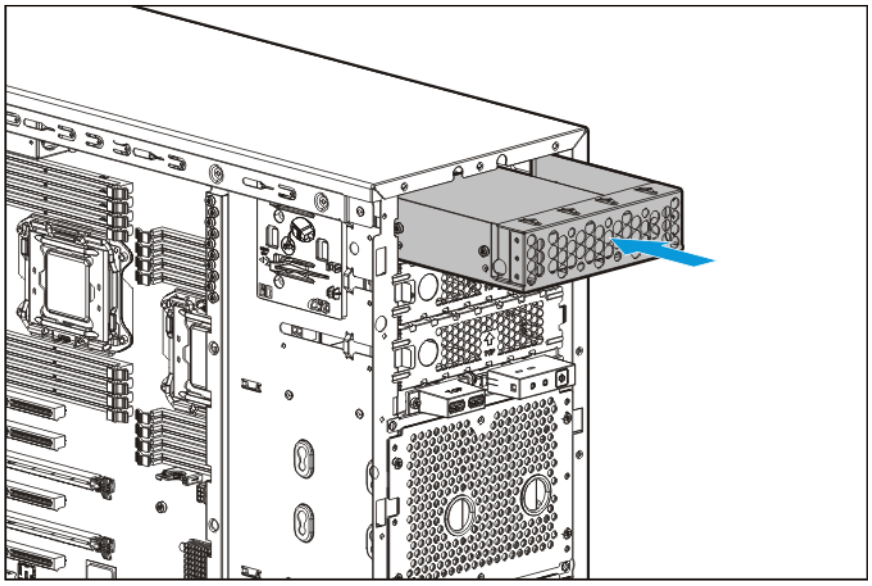
6. If installed, remove the PCI air baffle (on page 21).
7. Remove the system air baffle (on page 22).
8. Remove the fans (on page 23).
9. Remove the media bay blank.



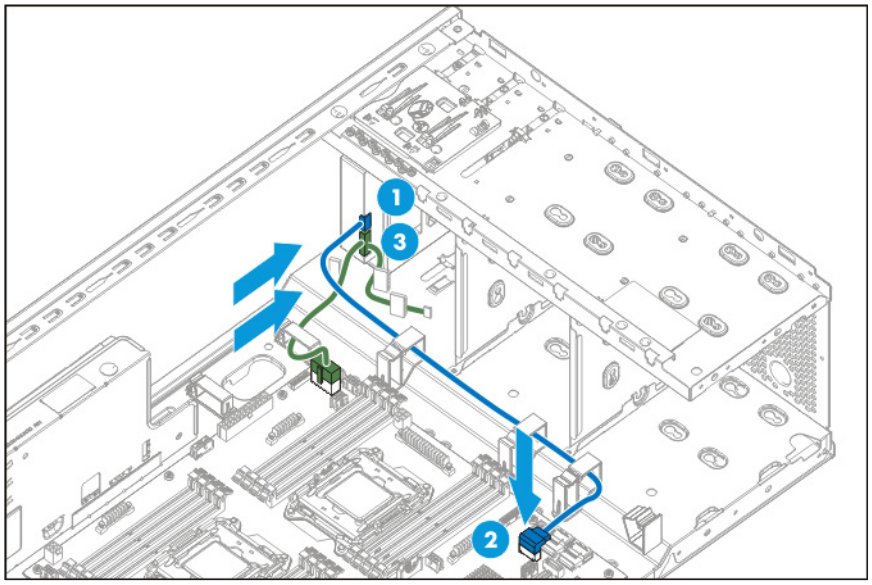
10. Install the non-hot-plug drive into the drive carrier, and then secure it with four T-15 screws.
    Be sure to install the drive with the sticker facing up and the connectors facing toward the rear.



11. Insert the drive carrier into the media bay until the drive carrier is in locked position.



12. Connect one end of the SATA cable to the rear of the drive and other end of the cable to the system board.
13. Connect the power cable to the rear of the drive.



14. Install the fans (on page 24).
15. Install the system air baffle (on page 23).
16. If removed, install the PCI air baffle ("PCI air baffle option" on page 53).
17. Install the access panel (on page 20).
18. Return the server to an upright position.
19. Connect each power cord to the server.
20. Connect each power cord to the power source.
21. Power up the server (on page 18).
22. Install and lock the tower bezel ("Install the tower bezel" on page 19).

HP Trusted Platform Module option

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP website (http://www.hp.com/go/qs).

Use these instructions to install and enable a TPM on a supported server. This procedure includes three sections:

1. Installing the Trusted Platform Module board.
2. Retaining the recovery key/password (on page 86).
3. Enabling the Trusted Platform Module (on page 86).

   Enabling the TPM requires accessing BIOS/Platform Configuration (RBSU) in HP UEFI System Utilities (on page 103).

TPM installation requires the use of drive encryption technology, such as the Microsoft Windows BitLocker Drive Encryption feature. For more information on BitLocker, see the Microsoft website (http://www.microsoft.com).

CAUTION: Always observe the guidelines in this document. Failure to follow these guidelines can cause hardware damage or halt data access.

When installing or replacing a TPM, observe the following guidelines:

- Do not remove an installed TPM. Once installed, the TPM becomes a permanent part of the system board.
- When installing or replacing hardware, HP service providers cannot enable the TPM or the encryption technology. For security reasons, only the customer can enable these features.
- When returning a system board for service replacement, do not remove the TPM from the system board. When requested, HP Service provides a TPM with the spare system board.
- Any attempt to remove an installed TPM from the system board breaks or disfigures the TPM security rivet. Upon locating a broken or disfigured rivet on an installed TPM, administrators should consider the system compromised and take appropriate measures to ensure the integrity of the system data.
- When using BitLocker, always retain the recovery key/password. The recovery key/password is required to enter Recovery Mode after BitLocker detects a possible compromise of system integrity.
- HP is not liable for blocked data access caused by improper TPM use. For operating instructions, see the encryption technology feature documentation provided by the operating system.

Installing the Trusted Platform Module board

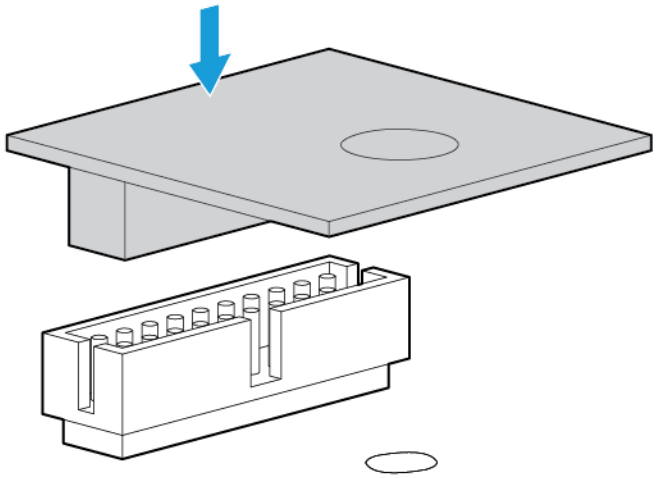
WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.

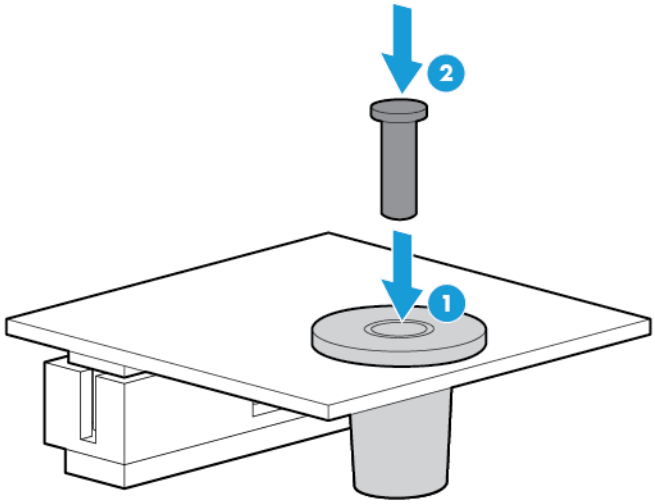
5. Remove the access panel (on page 19).
6. If installed, remove the PCI air baffle (on page 21).
7. Remove the system air baffle (on page 22).

> **CAUTION:** Any attempt to remove an installed TPM from the system board breaks or disfigures the TPM security rivet. Upon locating a broken or disfigured rivet on an installed TPM, administrators should consider the system compromised and take appropriate measures to ensure the integrity of the system data.

8. Install the TPM board. Press down on the connector to seat the board ("System board components" on page 11).



9. Install the TPM security rivet by pressing the rivet firmly into the system board.



10. Install the system air baffle (on page 23).
11. If removed, install the PCI air baffle ("PCI air baffle option" on page 53).
12. Install the access panel (on page 20).

13. Return the server to an upright position.
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. Power up the server (on page 18).
17. Install and lock the tower bezel ("Install the tower bezel" on page 19).

Retaining the recovery key/password

The recovery key/password is generated during BitLocker setup, and can be saved and printed after BitLocker is enabled. When using BitLocker, always retain the recovery key/password. The recovery key/password is required to enter Recovery Mode after BitLocker detects a possible compromise of system integrity.

To help ensure maximum security, observe the following guidelines when retaining the recovery key/password:

- Always store the recovery key/password in multiple locations.
- Always store copies of the recovery key/password away from the server.
- Do not save the recovery key/password on the encrypted hard drive.

Enabling the Trusted Platform Module

1. During the server startup sequence, press the **F9** key to access System Utilities.
2. From the System Utilities screen, select **System Configuration** > **BIOS/Platform Configuration (RBSU)** > **Server Security**.
3. Select **Trusted Platform Module Options** and press the **Enter** key**.**
4. Select **Enabled** to enable the TPM and BIOS secure startup. The TPM is fully functional in this mode.
5. Press the **F10** key to save your selection.
6. When prompted to save the change in System Utilities, press the **Y** key.
7. Press the **ESC** key to exit System Utilities. Then, press the **Enter** key when prompted to reboot the server.

The server then reboots a second time without user input. During this reboot, the TPM setting becomes effective.

You can now enable TPM functionality in the OS, such as Microsoft Windows BitLocker or measured boot.

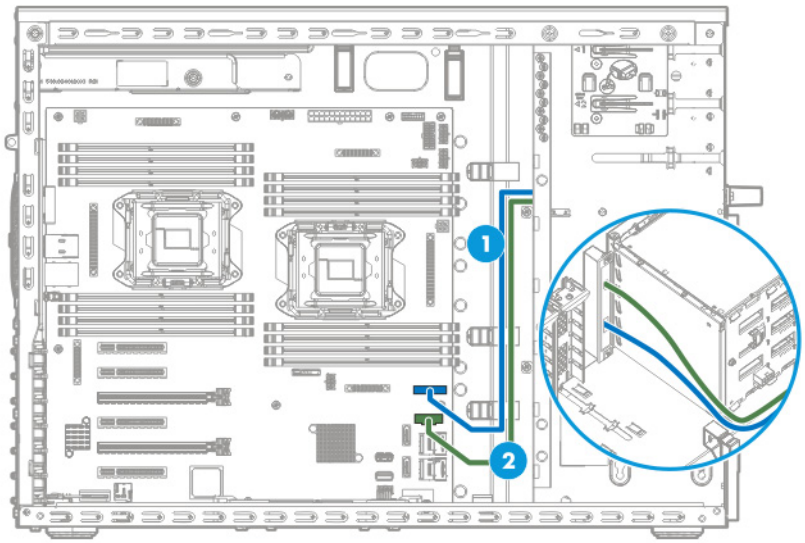
△ **CAUTION:** When a TPM is installed and enabled on the server, data access is locked if you fail to follow the proper procedures for updating the system or option firmware, replacing the system board, replacing a hard drive, or modifying OS application TPM settings.

For more information on firmware updates and hardware procedures, see the *HP Trusted Platform Module Best Practices White Paper* on the HP website (http://www.hp.com/support).

For more information on adjusting TPM usage in BitLocker, see the Microsoft website (http://technet.microsoft.com/en-us/library/cc732774.aspx).

Cabling

Front panel cabling

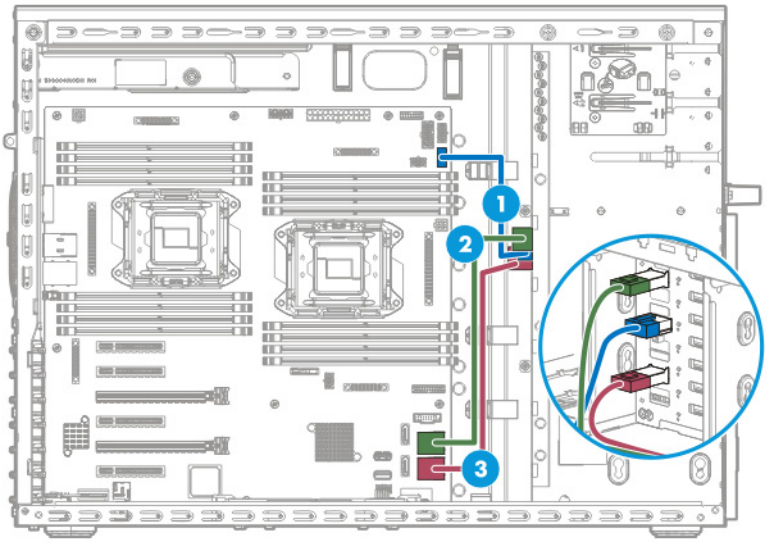


Item	Description
1	Front I/O cable
2	USB 3.0 connector cable

Storage cabling

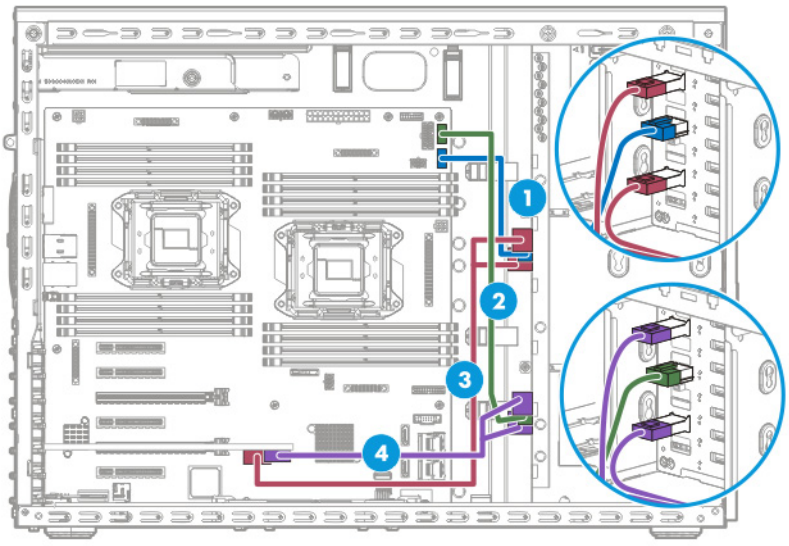
Hot-plug SFF drive cabling

- Eight-bay SFF hot-plug drive cage (box 2)



Item	Description
1	Box 2 power cable
2	Mini-SAS cable to system board SAS port 1
3.	Mini-SAS cable to system board SAS port 2

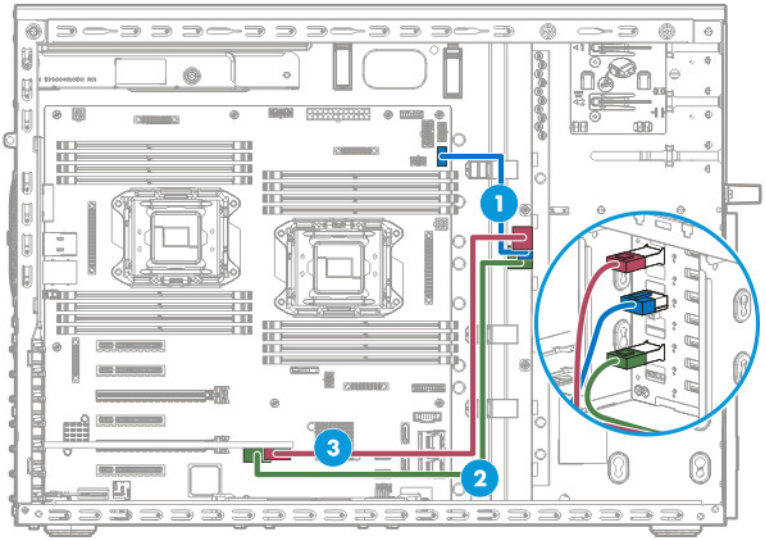
- Two eight-bay SFF drive cages connected to a HP P840 Smart Array controller



Item	Description
1	Box 2 power cable

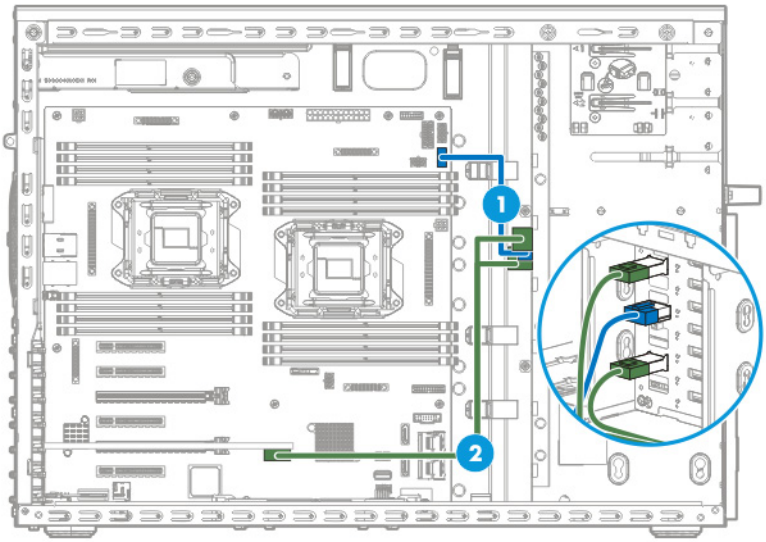
Item	Description
2	Box 1 power cable
3	Box 2 Mini-SAS Y-cable
4	Box 1 Mini-SAS Y-cable

- Eight-bay SFF hot-plug drive cage connected to HP H240 host bus adapter (box 2)



Item	Description
1	Box 2 power cable
2	Mini-SAS cable to H240 port 2
3.	Mini-SAS cable to H240 port 1

- Eight-bay SFF hot-plug drive cage connected to HP P440 Smart Array controller (box 2)

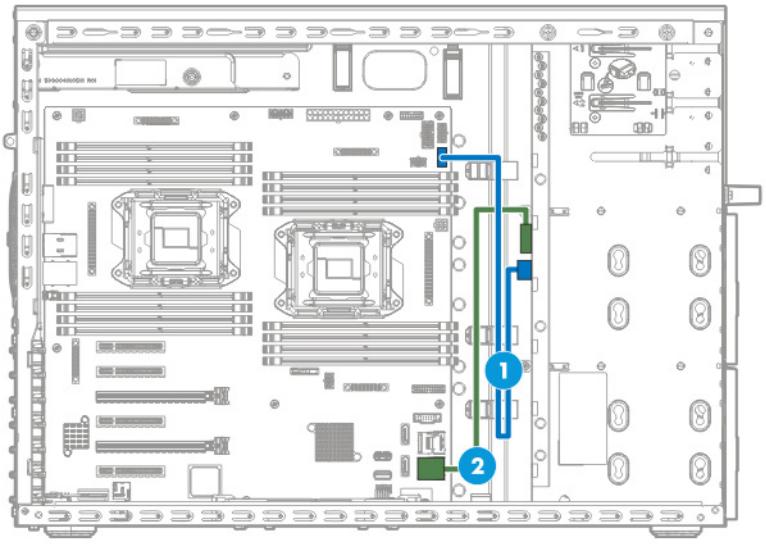


Item	Description
1	Box 2 power cable

Item	Description
2	Mini-SAS Y-cable

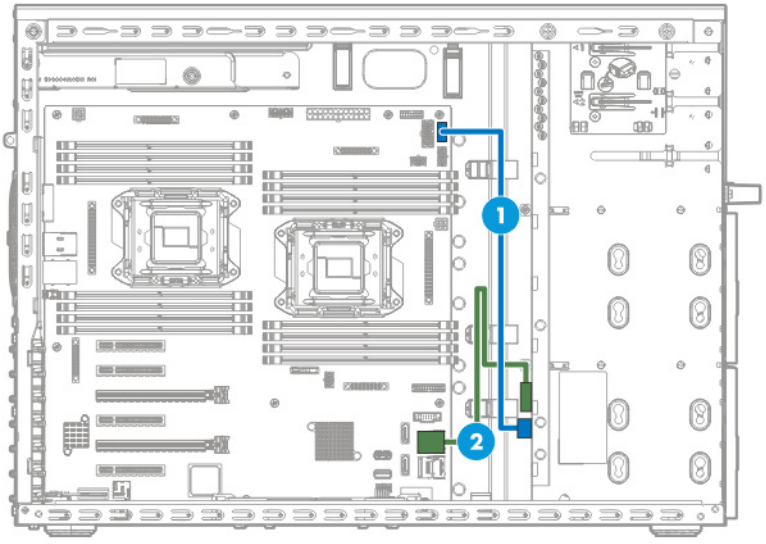
Hot-plug LFF drive cabling

- Four-bay LFF hot-plug drive cabling (box 2)



Item	Description
1	Box 2 power cable
2	Mini-SAS cable to system board SAS port 2

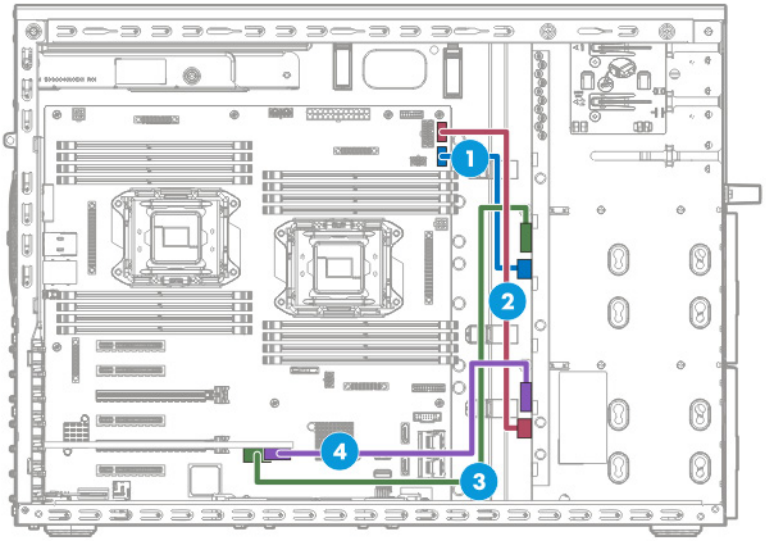
- Four-bay LFF hot-plug drive cabling (box 1)



Item	Description
1	Box 1 power cable

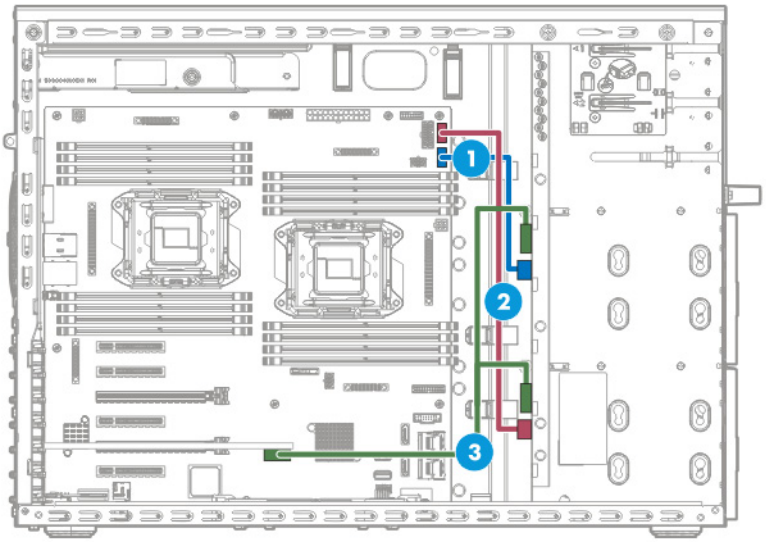
Item	Description
2	Mini-SAS cable to system board SAS port 1

- Two four-bay LFF hot-plug drive cages connected to HP H240 host bus adapter



Item	Description
1	Box 2 power cable
2	Box 2 Mini-SAS cable to HP H240 host bus adapter
3	Box 1 power cable
4	Box 1 Mini-SAS cable to HP H240 host bus adapter

- Two four-bay LFF hot-plug drive cages connected to HP P440 Smart Array controller

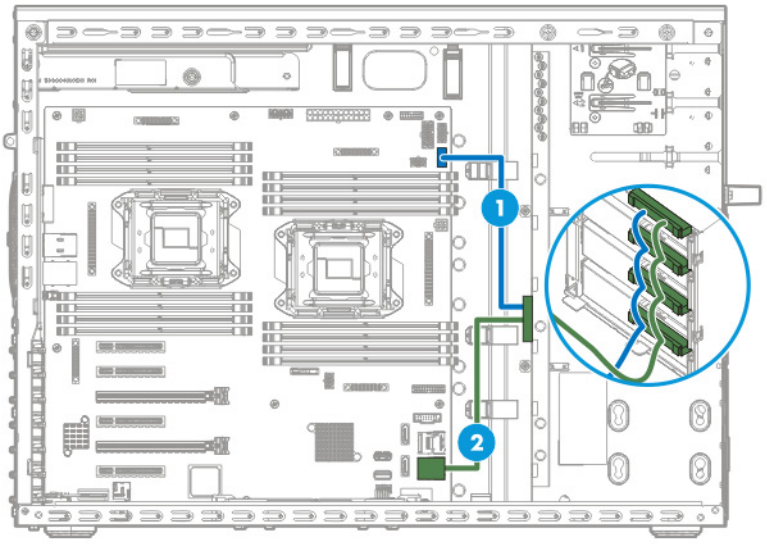


Item	Description
1	Box 2 power cable
2	Mini-SAS Y-cable

Item	Description
3	Box 1 power cable

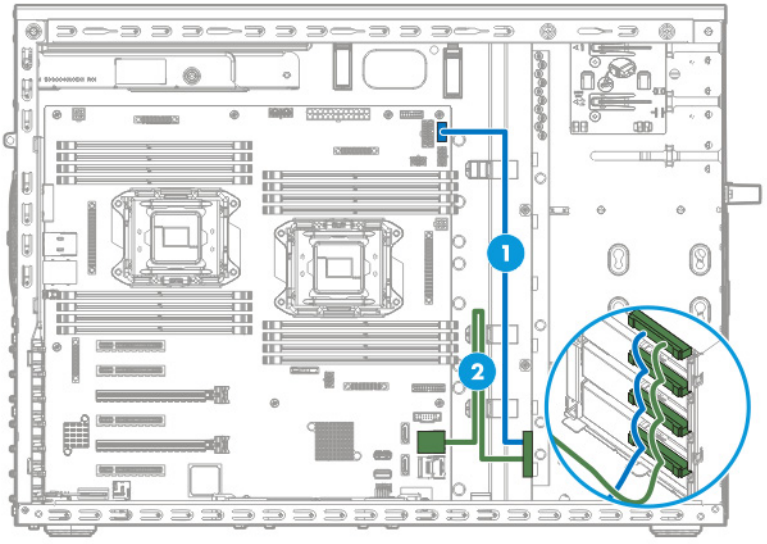
Non-hot plug LFF drive cabling

- Four-bay LFF non-hot-plug drive cabling (box 2)



Item	Description
1	Box 2 power cable
2	SATA to Mini-SAS cable assembly

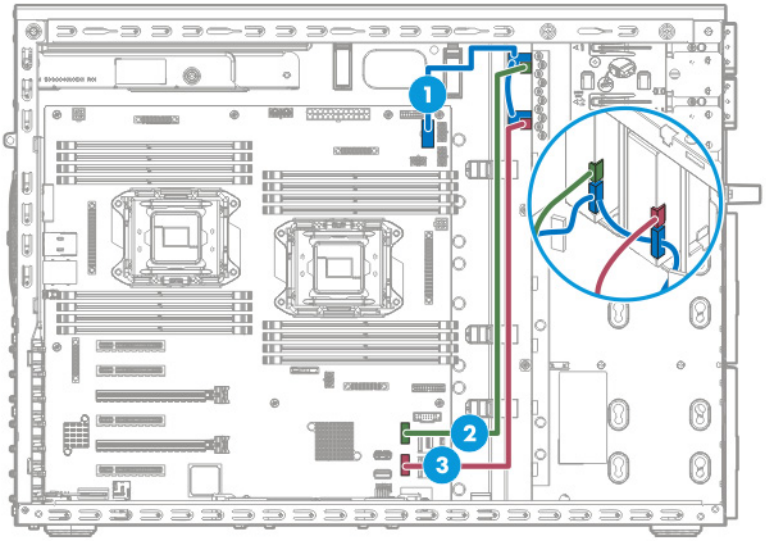
- Four-bay LFF non-hot-plug drive cabling (box 1)



Item	Description
1	Box 1 power cable

Item	Description
2	SATA to Mini-SAS cable assembly

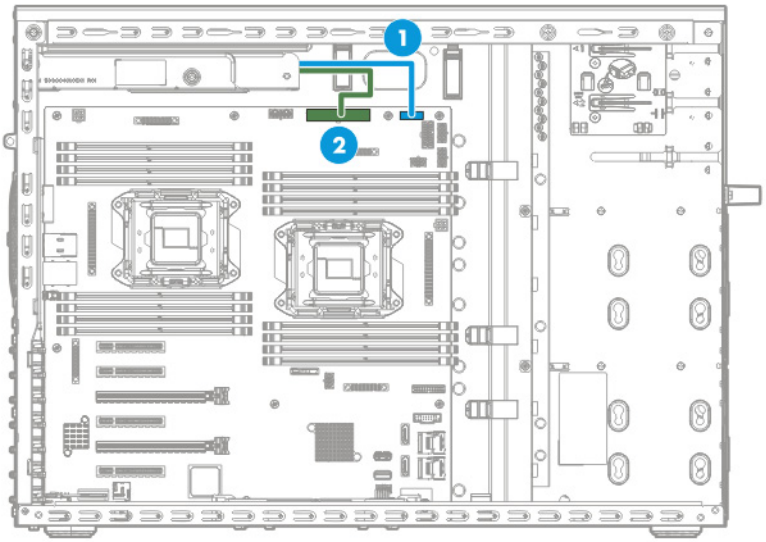
- LFF drive enablement cabling



Item	Description
1	System board power cable
2	Media bay 1 SATA cable to system board
3	Media bay 2 SATA cable to system board

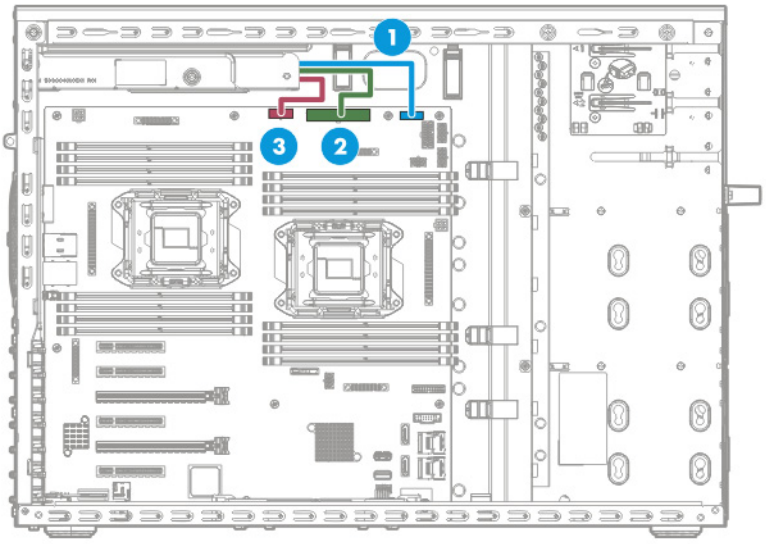
Power cabling

HP 550-W Power Supply cabling (non-hot-plug)



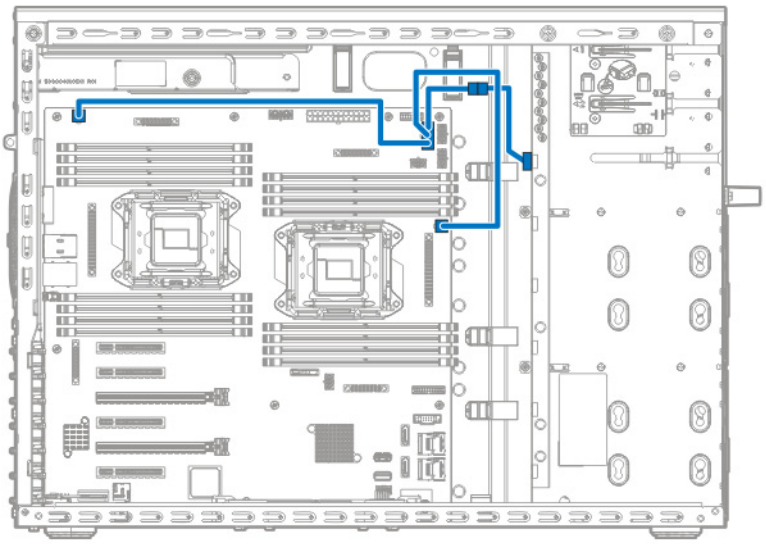
Item	Description
1	16-pin power supply sideband signal cable
2	24-pin power supply cable

HP Redundant Power Supply cabling (hot-plug)

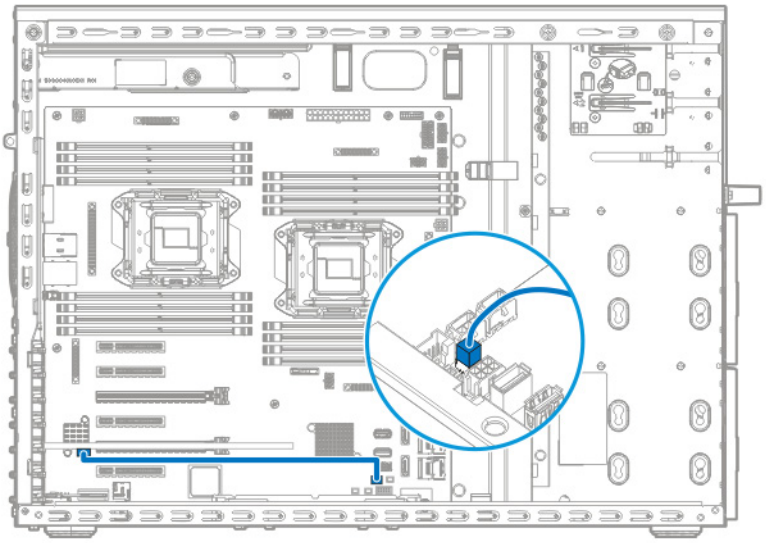


Item	Description
1	16-pin power supply sideband signal cable
2	24-pin power supply cable
3	10-pin RPS cable

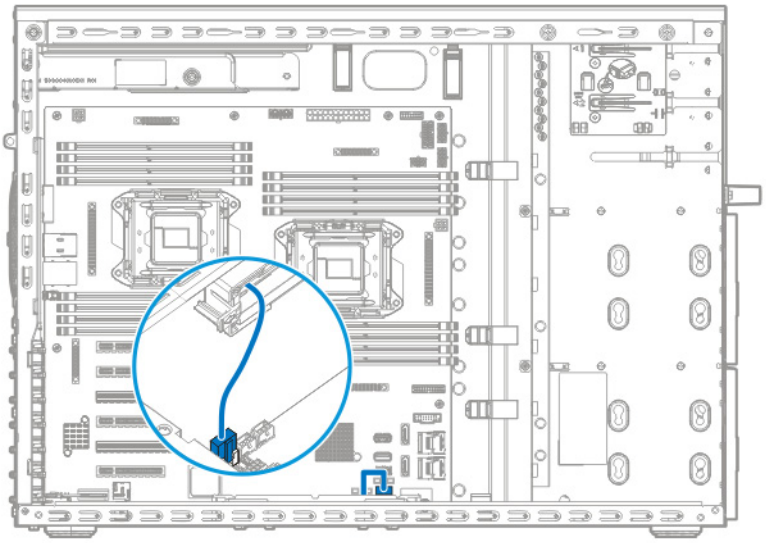
System board power cabling



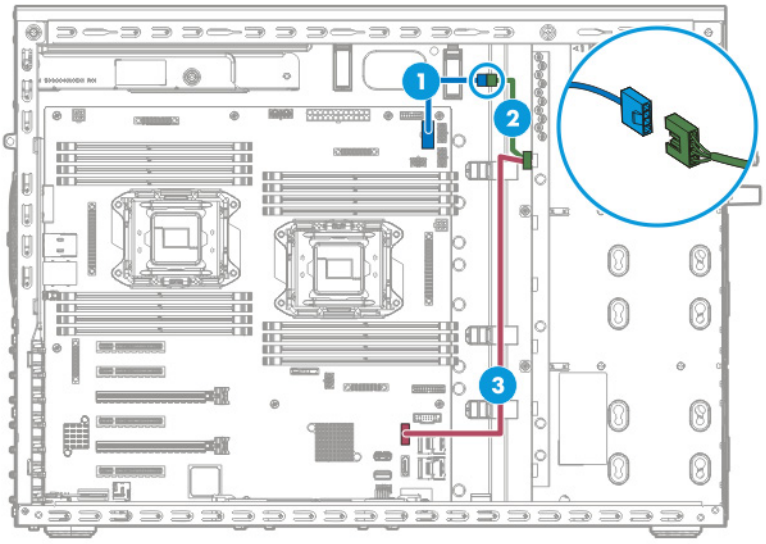
Cache module backup power cabling



HP Smart Storage Battery cabling



Optical drive cabling



Item	Description
1	System board power cable
2	Optical drive power cable
3	SATA cable

Software and configuration utilities

Server mode

The software and configuration utilities presented in this section operate in online mode, offline mode, or in both modes.

Software or configuration utility	Server mode
HP iLO (on page 97)	Online and Offline
Active Health System (on page 98)	Online and Offline
HP RESTful API support for HP iLO (on page 99)	Online and Offline
Integrated Management Log (on page 99)	Online and Offline
HP Insight Remote Support (on page 100)	Online
HP Insight Online (on page 100)	Online
Intelligent Provisioning (on page 100)	Offline
HP Insight Diagnostics (on page 101)	Online and Offline
Erase Utility (on page 101)	Offline
Scripting Toolkit for Windows and Linux (on page 102)	Online
HP Service Pack for ProLiant (on page 102)	Online and Offline
HP Smart Update Manager (on page 102)	Online and Offline
HP UEFI System Utilities (on page 103)	Offline
HP Smart Storage Administrator (on page 106)	Online and Offline
FWUPDATE utility (on page 108)	Offline

Product QuickSpecs

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the HP website (http://www.hp.com/go/qs).

HP iLO

The iLO 4 subsystem is a standard component of HP ProLiant servers that simplifies initial server setup, server health monitoring, power and thermal optimization, and remote server administration. The iLO 4 subsystem includes an intelligent microprocessor, secure memory, and a dedicated network interface. This design makes iLO 4 independent of the host server and its operating system.

iLO 4 enables and manages the Active Health System (on page 98) and also features Agentless Management. All key internal subsystems are monitored by iLO 4. If enabled, SNMP alerts are sent directly by iLO 4 regardless of the host operating system or even if no host operating system is installed.

Embedded remote support software is available on HP ProLiant Gen8 and later servers with iLO 4, regardless of the operating system software and without installing OS agents on the server.

Using iLO 4, you can do the following:

- Access a high-performance and secure Integrated Remote Console to the server from anywhere in the world if you have a network connection to the server.
- Use the shared .NET Integrated Remote Console to collaborate with up to four server administrators.
- Remotely mount high-performance Virtual Media devices to the server.
- Securely and remotely control the power state of the managed server.
- Implement true Agentless Management with SNMP alerts from HP iLO, regardless of the state of the host server.
- Download the Active Health System log.
- Register for HP Insight Remote Support.
- Use iLO Federation to manage multiple servers from one system running the iLO web interface.
- Use Virtual Power and Virtual Media from the GUI, the CLI, or the iLO scripting toolkit for many tasks, including the automation of deployment and provisioning.
- Control iLO by using a remote management tool.

For more information about iLO 4 features, see the iLO 4 documentation on the HP website (http://www.hp.com/go/ilo/docs).

The HP iLO 4 hardware and firmware features and functionality, such as NAND size and embedded user partition, vary depending on the server model. For a complete list of supported features and functionality, see the HP iLO 4 QuickSpecs on the HP website (http://h18000.www1.hp.com/products/quickspecs/14276_div/14276_div.pdf).

Active Health System

HP Active Health System provides the following features:

- Combined diagnostics tools/scanners
- Always on, continuous monitoring for increased stability and shorter downtimes
- Rich configuration history
- Health and service alerts
- Easy export and upload to Service and Support

The HP Active Health System monitors and records changes in the server hardware and system configuration. The Active Health System assists in diagnosing problems and delivering rapid resolution if server failures occur.

The Active Health System collects the following types of data:

- Server model
- Serial number
- Processor model and speed
- Storage capacity and speed
- Memory capacity and speed
- Firmware/BIOS

HP Active Health System does not collect information about Active Health System users' operations, finances, customers, employees, partners, or data center, such as IP addresses, host names, user names, and passwords. HP Active Health System does not parse or change operating system data from third-party error event log activities, such as content created or passed through by the operating system.

The data that is collected is managed according to the HP Data Privacy policy. For more information see the HP website (http://www.hp.com/go/privacy).

The Active Health System, in conjunction with the system monitoring provided by Agentless Management or SNMP Pass-thru, provides continuous monitoring of hardware and configuration changes, system status, and service alerts for various server components.

The Agentless Management Service is available in the SPP, which can be downloaded from the HP website (http://www.hp.com/go/spp/download). The Active Health System log can be downloaded manually from iLO 4 or HP Intelligent Provisioning and sent to HP.

For more information, see the following documents:

- *HP iLO User Guide* on the HP website (http://www.hp.com/go/ilo/docs)
- *HP Intelligent Provisioning User Guide* on the HP website (http://www.hp.com/go/intelligentprovisioning/docs)

HP RESTful API support for HP iLO

HP iLO 4 firmware version 2.00 and later includes the HP RESTful API. The HP RESTful API is a management interface that server management tools can use to perform configuration, inventory, and monitoring of an HP ProLiant server via iLO. A REST client sends HTTPS operations to the iLO web server to GET and PATCH JSON-formatted data, and to configure supported iLO and server settings, such as the UEFI BIOS settings.

HP iLO 4 supports the HP RESTful API with HP ProLiant Gen8 and later servers. For more information about the HP RESTful API, see the HP website (http://www.hp.com/support/restfulinterface/docs).

Integrated Management Log

The IML records hundreds of events and stores them in an easy-to-view form. The IML timestamps each event with 1-minute granularity.

You can view recorded events in the IML in several ways, including the following:

- From within HP SIM
- From within HP UEFI System Utilities (on page 103)
- From within the Embedded UEFI shell (on page 105)
- From within operating system-specific IML viewers:
  - For Windows: IML Viewer
  - For Linux: IML Viewer Application
- From within the iLO 4 web interface
- From within HP Insight Diagnostics (on page 101)

HP Insight Remote Support

HP strongly recommends that you register your device for remote support to enable enhanced delivery of your HP Warranty, HP Care Pack Service, or HP contractual support agreement. HP Insight Remote Support supplements your monitoring continuously to ensure maximum system availability by providing intelligent event diagnosis, and automatic, secure submission of hardware event notifications to HP, which will initiate a fast and accurate resolution, based on your product's service level. Notifications can be sent to your authorized HP Channel Partner for onsite service, if configured and available in your country.

For more information, see *HP Insight Remote Support and Insight Online Setup Guide for ProLiant Servers and BladeSystem c-Class Enclosures* on the HP website (http://www.hp.com/go/insightremotesupport/docs). HP Insight Remote Support is available as part of HP Warranty, HP Care Pack Service, or HP contractual support agreement.

HP Insight Remote Support central connect

When you use the embedded Remote Support functionality with HP ProLiant Gen8 and later server models and HP BladeSystem c-Class enclosures, you can register a server or chassis to communicate to HP through an HP Insight Remote Support centralized Hosting Device in your local environment. All configuration and service event information is routed through the Hosting Device. This information can be viewed by using the local HP Insight Remote Support user interface or the web-based view in HP Insight Online.

For more information, see *HP Insight Remote Support Release Notes* on the HP website (http://www.hp.com/go/insightremotesupport/docs).

HP Insight Online direct connect

When you use the embedded Remote Support functionality with HP ProLiant Gen8 and later server models and HP BladeSystem c-Class enclosures, you can register a server or chassis to communicate directly to HP Insight Online without the need to set up an HP Insight Remote Support centralized Hosting Device in your local environment. HP Insight Online will be your primary interface for remote support information.

For more information, see the product documentation on the HP website (http://www.hp.com/go/insightremotesupport/docs).

HP Insight Online

HP Insight Online is a capability of the HP Support Center portal. Combined with HP Insight Remote Support central connect or HP Insight Online direct connect, it automatically aggregates device health, asset, and support information with contract and warranty information, and then secures it in a single, personalized dashboard that is viewable from anywhere at any time. The dashboard organizes your IT and service data to help you understand and respond to that information more quickly. With specific authorization from you, an authorized HP Channel Partner can also view your IT environment remotely using HP Insight Online.

For more information about using HP Insight Online, see the *HP Insight Online User's Guide* on the HP website (http://www.hp.com/go/insightremotesupport/docs).

Intelligent Provisioning

Intelligent Provisioning is a single-server deployment tool embedded in HP ProLiant Gen8 and later servers that simplifies HP ProLiant server setup, providing a reliable and consistent way to deploy HP ProLiant server configurations:

- Intelligent Provisioning assists with the OS installation process by preparing the system for installing "off-the-shelf" and HP branded versions of operating system software and integrating optimized HP ProLiant server support software.
- Intelligent Provisioning provides maintenance-related tasks using the Perform Maintenance window.
- Intelligent Provisioning provides installation help for Microsoft Windows, Red Hat and SUSE Linux, and VMware operating systems. For specific OS support, see the *HP Intelligent Provisioning Release Notes* on the HP website (http://www.hp.com/go/intelligentprovisioning/docs).

For more information about Intelligent Provisioning software, see the HP website (http://www.hp.com/go/intelligentprovisioning). For Intelligent Provisioning recovery media downloads, see the Resources tab on the HP website (http://www.hp.com/go/ilo). For consolidated drive and firmware update packages, see the HP Smart Update: Server Firmware and Driver Updates page on the HP website (http://www.hp.com/go/SmartUpdate).

HP Insight Diagnostics

HP Insight Diagnostics is a proactive server management tool, available in both offline and online versions, that provides diagnostics and troubleshooting capabilities to assist IT administrators who verify server installations, troubleshoot problems, and perform repair validation.

HP Insight Diagnostics Offline Edition performs various in-depth system and component testing while the OS is not running. To run this utility, boot the server using Intelligent Provisioning (on page 100).

HP Insight Diagnostics Online Edition is a web-based application that captures system configuration and other related data needed for effective server management. Available in Microsoft Windows and Linux versions, the utility helps to ensure proper system operation.

For more information or to download the utility, see the HP website (http://www.hp.com/servers/diags). HP Insight Diagnostics Online Edition is also available in the SPP ("HP Service Pack for ProLiant" on page 102).

HP Insight Diagnostics survey functionality

HP Insight Diagnostics (on page 101) provides survey functionality that gathers critical hardware and software information on ProLiant servers.

This functionality supports operating systems that are supported by the server. For operating systems supported by the server, see the HP website (http://www.hp.com/go/supportos).

If a significant change occurs between data-gathering intervals, the survey function marks the previous information and overwrites the survey data files to reflect the latest changes in the configuration.

Survey functionality is installed with every Intelligent Provisioning-assisted HP Insight Diagnostics installation, or it can be installed through the SPP ("HP Service Pack for ProLiant" on page 102).

Erase Utility

△ **CAUTION:** Perform a backup before running the Erase Utility. The utility sets the system to its original factory state, deletes the current hardware configuration information, including array setup and disk partitioning, and erases all connected hard drives completely. Before using this utility, see the instructions in the *HP Intelligent Provisioning User Guide*.

Use the Erase Utility to erase drives and Active Health System logs, and to reset UEFI System Utilities settings. Run the Erase Utility if you must erase the system for the following reasons:

- You want to install a new operating system on a server with an existing operating system.
- You encounter an error when completing the steps of a factory-installed operating system installation.

To access the Erase Utility, click the Perform Maintenance icon from the Intelligent Provisioning home screen, and then select **Erase**.

For more information about the Erase Utility, see the *HP Intelligent Provisioning User Guide* on the HP website (http://www.hp.com/go/intelligentprovisioning/docs).

Scripting Toolkit for Windows and Linux

The Scripting Toolkit for Windows and Linux is a server deployment product that delivers an unattended automated installation for high-volume server deployments. The Scripting Toolkit is designed to support ProLiant BL, ML, DL, and SL servers. The toolkit includes a modular set of utilities and important documentation that describes how to apply these tools to build an automated server deployment process.

The Scripting Toolkit provides a flexible way to create standard server configuration scripts. These scripts are used to automate many of the manual steps in the server configuration process. This automated server configuration process cuts time from each deployment, making it possible to scale rapid, high-volume server deployments.

For more information, and to download the Scripting Toolkit, see the HP website (http://www.hp.com/go/ProLiant/STK).

HP Service Pack for ProLiant

SPP is a comprehensive systems software (drivers and firmware) solution delivered as a single package with major server releases. This solution uses HP SUM as the deployment tool and is tested on all supported HP ProLiant servers including HP ProLiant Gen8 and later servers.

SPP can be used in an online mode on a Windows or Linux hosted operating system, or in an offline mode where the server is booted to an operating system included on the ISO file so that the server can be updated automatically with no user interaction or updated in interactive mode.

For more information or to download SPP, see one of the following pages on the HP website:

- HP Service Pack for ProLiant download page (http://www.hp.com/go/spp)
- HP Smart Update: Server Firmware and Driver Updates page (http://www.hp.com/go/SmartUpdate)

HP Smart Update Manager

HP SUM is a product used to install and update firmware, drivers, and systems software on HP ProLiant servers. HP SUM provides a GUI and a command-line scriptable interface for deployment of systems software for single or one-to-many HP ProLiant servers and network-based targets, such as iLOs, OAs, and VC Ethernet and Fibre Channel modules.

For more information about HP SUM, see the product page on the HP website (http://www.hp.com/go/hpsum).

To download HP SUM, see the HP website (http://www.hp.com/go/hpsum/download).

To access the *HP Smart Update Manager User Guide*, see the HP SUM Information Library (http://www.hp.com/go/hpsum/documentation).

HP UEFI System Utilities

The HP UEFI System Utilities is embedded in the system ROM. The UEFI System Utilities enable you to perform a wide range of configuration activities, including:

- Configuring system devices and installed options
- Enabling and disabling system features
- Displaying system information
- Selecting the primary boot controller
- Configuring memory options
- Selecting a language
- Launching other pre-boot environments such as the Embedded UEFI Shell and Intelligent Provisioning

For more information on the HP UEFI System Utilities, see the *HP UEFI System Utilities User Guide for HP ProLiant Gen9 Servers* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).

Scan the QR code located at the bottom of the screen to access mobile-ready online help for the UEFI System Utilities and UEFI Shell. For on-screen help, press **F1**.

Using HP UEFI System Utilities

To use the System Utilities, use the following keys.

Action	**Key**
Access System Utilities	F9 during server POST
Navigate menus	Up and Down arrows
Select items	Enter
Save selections	F10
Access Help for a highlighted configuration option*	F1

*Scan the QR code on the screen to access online help for the UEFI System Utilities and UEFI Shell.

Default configuration settings are applied to the server at one of the following times:

- Upon the first system power-up
- After defaults have been restored

Default configuration settings are sufficient for typical server operations; however, you can modify configuration settings as needed. The system prompts you for access to the System Utilities each time the system is powered up.

Flexible boot control

This feature enables you to do the following:

- Add Boot Options
  - Browse all FAT16 and FAT32 file systems.
  - Select an X64 UEFI application with an .EFI extension to add as a new UEFI boot option, such as an OS boot loader or other UEFI application.

The new boot option is appended to the boot order list. When you select a file, you are prompted to enter the boot option description (which is then displayed in the Boot menu), as well as any optional data to be passed to an .EFI application.

- Boot to System Utilities

  After pre-POST, the boot options screen appears. During this time, you can access the System Utilities by pressing the **F9** key.

- Choose between supported modes: Legacy BIOS Boot Mode or UEFI Boot Mode

IMPORTANT: If the default boot mode settings are different than the user defined settings, the system may not boot the OS installation if the defaults are restored. To avoid this issue, use the User Defined Defaults feature in UEFI System Utilities to override the factory default settings.

For more information, see the *HP UEFI System Utilities User Guide for HP ProLiant Gen9 Servers* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).

Restoring and customizing configuration settings

You can reset all configuration settings to the factory default settings, or you can restore system default configuration settings, which are used instead of the factory default settings.

You can also configure default settings as necessary, and then save the configuration as the custom default configuration. When the system loads the default settings, it uses the custom default settings instead of the factory defaults.

Secure Boot configuration

Secure Boot is integrated in the UEFI specification on which the HP implementation of UEFI is based. Secure Boot is completely implemented in the BIOS and does not require special hardware. It ensures that each component launched during the boot process is digitally signed and that the signature is validated against a set of trusted certificates embedded in the UEFI BIOS. Secure Boot validates the software identity of the following components in the boot process:

- UEFI drivers loaded from PCIe cards
- UEFI drivers loaded from mass storage devices
- Pre-boot UEFI shell applications
- OS UEFI boot loaders

Once enabled, only firmware components and operating systems with boot loaders that have an appropriate digital signature can execute during the boot process. Only operating systems that support Secure Boot and have an EFI boot loader signed with one of the authorized keys can boot when Secure Boot is enabled. For more information about supported operating systems, see the *HP UEFI System Utilities and Shell Release Notes* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).

A physically present user can customize the certificates embedded in the UEFI BIOS by adding/removing their own certificates.

Embedded UEFI shell

The system BIOS in all HP ProLiant Gen9 servers includes an Embedded UEFI Shell in the ROM. The UEFI Shell environment provides an API, a command line prompt, and a set of CLIs that allow scripting, file manipulation, and system information. These features enhance the capabilities of the UEFI System Utilities.

For more information, see the following documents:

- *HP UEFI Shell User Guide for HP ProLiant Gen9 Servers* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs)
- *UEFI Shell Specification* on the UEFI website (http://www.uefi.org/specifications)

Embedded Diagnostics option

The system BIOS in all HP ProLiant Gen9 servers includes an Embedded Diagnostics option in the ROM. The Embedded Diagnostics option can run comprehensive diagnostics of the server hardware, including processors, memory, drives, and other server components.

For more information on the Embedded Diagnostics option, see the *HP UEFI System Utilities User Guide for HP ProLiant Gen9 Servers* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).

HP RESTful API support for UEFI

HP ProLiant Gen9 servers include support for a UEFI compliant System BIOS, along with UEFI System Utilities and Embedded UEFI Shell pre-boot environments. HP ProLiant Gen9 servers also support configuring the UEFI BIOS settings using the HP RESTful API, a management interface that server management tools can use to perform configuration, inventory, and monitoring of an HP ProLiant server. A REST client uses HTTPS operations to configure supported server settings, such as UEFI BIOS settings.

For more information about the HP RESTful API and the HP RESTful Interface Tool, see the HP website (http://www.hp.com/support/restfulinterface/docs).

Re-entering the server serial number and product ID

After you replace the system board, you must re-enter the server serial number and the product ID.

1. During the server startup sequence, press the **F9** key to access UEFI System Utilities.
2. Select the **System Configuration** > **BIOS/Platform Configuration (RBSU)** > **Advanced Options** > **Advanced System ROM Options** > **Serial Number**, and then press the **Enter** key.
3. Enter the serial number and press the **Enter** key. The following message appears:

   ```
   The serial number should only be modified by qualified service personnel.
   This value should always match the serial number located on the chassis.
   ```
4. Press the **Enter** key to clear the warning.
5. Enter the serial number and press the **Enter** key.
6. Select **Product ID**. The following warning appears:

   ```
   Warning: The Product ID should ONLY be modified by qualified service
   personnel. This value should always match the Product ID located on the
   chassis.
   ```
7. Enter the product ID and press the **Enter** key.
8. Press the **F10** key to confirm exiting System Utilities. The server automatically reboots.

Utilities and features

HP Smart Storage Administrator

HP SSA is a configuration and management tool for HP Smart Array controllers. Starting with HP ProLiant Gen8 servers, HP SSA replaces ACU with an enhanced GUI and additional configuration features.

HP SSA exists in three interface formats: the HP SSA GUI, the HP SSA CLI, and HP SSA Scripting. Although all formats provide support for configuration tasks, some of the advanced tasks are available in only one format.

Some HP SSA features include the following:

- Supports online array capacity expansion, logical drive extension, assignment of online spares, and RAID or stripe size migration
- Suggests the optimal configuration for an unconfigured system
- Provides diagnostic and SmartSSD Wear Gauge functionality on the Diagnostics tab
- For supported controllers, provides access to additional features.

For more information about HP SSA, see the HP website (http://www.hp.com/go/hpssa).

Automatic Server Recovery

ASR is a feature that causes the system to restart when a catastrophic operating system error occurs, such as a blue screen, ABEND, or panic. A system fail-safe timer, the ASR timer, starts when the System Management driver, also known as the Health Driver, is loaded. When the operating system is functioning properly, the system periodically resets the timer. However, when the operating system fails, the timer expires and restarts the server.

ASR increases server availability by restarting the server within a specified time after a system hang. You can disable ASR from the System Management Homepage or through UEFI System Utilities.

USB support

HP servers support both USB 2.0 ports and USB 3.0 ports. Both types of ports support installing all types of USB devices (USB 1.0, USB 2.0, and USB 3.0), but may run at lower speeds in specific situations:

- USB 3.0 capable devices operate at USB 2.0 speeds when installed in a USB 2.0 port.
- When the server is configured for UEFI Boot Mode, HP provides legacy USB support in the pre-boot environment prior to the operating system loading for USB 1.0, USB 2.0 , and USB 3.0 speeds.
- When the server is configured for Legacy BIOS Boot Mode, HP provides legacy USB support in the pre-boot environment prior to the operating system loading for USB 1.0 and USB 2.0 speeds. While USB 3.0 ports can be used with all devices in Legacy BIOS Boot Mode, they are not available at USB 3.0 speeds in the pre-boot environment. Standard USB support (USB support from within the operating system) is provided by the OS through the appropriate USB device drivers. Support for USB 3.0 varies by operating system.

For maximum compatibility of USB 3.0 devices with all operating systems, HP provides a configuration setting for USB 3.0 Mode. Auto is the default setting. This setting impacts USB 3.0 devices when connected to USB 3.0 ports in the following manner:

- **Auto (default)**—If configured in Auto Mode, USB 3.0 capable devices operate at USB 2.0 speeds in the pre-boot environment and during boot. When a USB 3.0 capable OS USB driver loads, USB 3.0 devices transition to USB 3.0 speeds. This mode provides compatibility with operating systems that do not support USB 3.0 while still allowing USB 3.0 devices to operate at USB 3.0 speeds with state-of-the art operating systems.
- **Enabled**—If Enabled, USB 3.0 capable devices operate at USB 3.0 speeds at all times (including the pre-boot environment) when in UEFI Boot Mode. This mode should not be used with operating systems that do not support USB 3.0. If operating in Legacy Boot BIOS Mode, the USB 3.0 ports cannot function in the pre-boot environment and are not bootable.
- **Disabled**—If configured for Disabled, USB 3.0 capable devices function at USB 2.0 speeds at all times.

The pre-OS behavior of the USB ports is configurable in System Utilities, so that the user can change the default operation of the USB ports. For more information, see the *HP UEFI System Utilities User Guide for HP ProLiant Gen9 Servers* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).

External USB functionality

HP provides external USB support to enable local connection of USB devices for server administration, configuration, and diagnostic procedures.

For additional security, external USB functionality can be disabled through USB options in UEFI System Utilities.

Redundant ROM support

The server enables you to upgrade or configure the ROM safely with redundant ROM support. The server has a single ROM that acts as two separate ROM images. In the standard implementation, one side of the ROM contains the current ROM program version, while the other side of the ROM contains a backup version.

NOTE: The server ships with the same version programmed on each side of the ROM.

Safety and security benefits

When you flash the system ROM, the flashing mechanism writes over the backup ROM and saves the current ROM as a backup, enabling you to switch easily to the alternate ROM version if the new ROM becomes corrupted for any reason. This feature protects the existing ROM version, even if you experience a power failure while flashing the ROM.

Keeping the system current

Access to HP Support Materials

Access to some updates for HP ProLiant Servers may require product entitlement when accessed through the HP Support Center support portal. HP recommends that you have an HP Passport set up with relevant entitlements. For more information, see the HP website (http://h20564.www2.hp.com/portal/site/hpsc/public/kb/docDisplay/?docId=c03859703).

Updating firmware or System ROM

Multiple methods exist to update the firmware or System ROM:

- HP Service Pack for ProLiant (on page 102)
- FWUPDATE utility (on page 108)
- FWUpdate command from within the Embedded UEFI shell (on page 108)
- Firmware Update application in System Utilities (on page 109)
- Online Flash components (on page 109)

Product entitlement is required to perform updates. For more information, see "Access to HP Support Materials (on page 107)."

FWUPDATE utility

The FWUPDATE utility enables you to upgrade the system firmware (BIOS).

To use the utility to upgrade the firmware:

1. Download the FWUPDATE flash component from the HP website (http://www.hp.com/go/hpsc).
2. Save the FWUPDATE flash components to a USB key.
3. Set the boot order so the USB key will boot first using one of the following options:
   - Configure the boot order so the USB key is the first bootable device.
   - Press **F11** (Boot Menu) when prompted during system boot to access the **One-Time Boot Menu**. This menu allows you to select the boot device for a specific boot and does not modify the boot order configuration settings.
4. Insert the USB key into an available USB port.
5. Boot the system.

   The FWUPDATE utility checks the system and provides a choice (if more than one exists) of available firmware revisions.

To download the flash components, see the HP website (http://www.hp.com/go/hpsc).

For more information about the One-Time Boot Menu, see the *HP UEFI System Utilities User Guide for HP ProLiant Gen9 Servers* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).

FWUpdate command from within the Embedded UEFI Shell

For systems configured in either boot mode, update the firmware:

1. Access the System ROM Flash Binary component for your server from the HP Support Center (http://www.hp.com/go/hpsc). When searching for the component, always select **Cross operating system** to locate the binary file.
2. Copy the binary file to a USB media or iLO virtual media.
3. Attach the media to the server.
4. Boot to Embedded Shell.
5. To obtain the assigned file system volume for the USB key, enter `Map -r` . For more information about accessing a file system from the shell, see the *HP UEFI Shell User Guide for HP ProLiant Gen9 Servers* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).

6. Change to the file system that contains the System ROM Flash Binary component for your server. Enter one of the fsx file systems available, such as `fs0` or `fs1`, and press **Enter**.
7. Use the `cd` command to change from the current directory to the directory that contains the binary file.
8. Enter `fwupdate -d BIOS -f <filename>` to flash the system ROM.

   For help on the FWUPDATE command, enter the command:

   ```
   help fwupdate -b
   ```
9. Reboot the server. A reboot is required after the firmware update for the updates to take effect and for hardware stability to be maintained.

For more information about the commands used in this procedure, see the *HP UEFI Shell User Guide for HP ProLiant Gen9 Servers* on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).

Firmware Update application in System Utilities

For systems configured in either boot mode, update the firmware:

1. Access the System ROM Flash Binary component for your server from the HP Support Center (http://www.hp.com/go/hpsc). When searching for the component, always select **Cross Operating System** to find the component.
2. Copy the binary file to a USB media or iLO virtual media.
3. Attach the media to the server.
4. During POST, press **F9** to enter System Utilities.
5. Select **Embedded Applications** → **Firmware Update** → **System ROM** → **Select Firmware File**.
6. Select the device containing the flash file.
7. Select the flash file. This step may take a few moments to complete.
8. Select **Start firmware update** and allow the process to complete.
9. Reboot the server. A reboot is required after the firmware update for the updates to take effect and for hardware stability to be maintained.

Online Flash components

This component provides updated system firmware that can be installed directly on supported Operating Systems. Additionally, when used in conjunction with HP SUM ("HP Smart Update Manager" on page 102), this Smart Component allows the user to update firmware on remote servers from a central location. This remote deployment capability eliminates the need for the user to be physically present at the server to perform a firmware update.

Drivers

IMPORTANT: Always perform a backup before installing or updating device drivers.

The server includes new hardware that may not have driver support on all OS installation media.

If you are installing an Intelligent Provisioning-supported OS, use Intelligent Provisioning (on page 100) and its Configure and Install feature to install the OS and latest supported drivers.

If you do not use Intelligent Provisioning to install an OS, drivers for some of the new hardware are required. These drivers, as well as other option drivers, ROM images, and value-add software can be downloaded as part of an SPP.

If you are installing drivers from SPP, be sure that you are using the latest SPP version that your server supports. To verify that your server is using the latest supported version and for more information about SPP, see the HP website (http://www.hp.com/go/spp/download).

To locate the drivers for a particular server, go to the HP website (http://www.hp.com/go/hpsc) and click on **Drivers, Software & Firmware**. Then, enter your product name in the **Find an HP product** field and click **Go**.

Software and firmware

Software and firmware should be updated before using the server for the first time, unless any installed software or components require an older version.

For system software and firmware updates, use one of the following sources:

- Download the SPP ("HP Service Pack for ProLiant" on page 102) from the HP Service Pack for ProLiant download page (http://www.hp.com/go/spp).
- Download individual drivers, firmware, or other systems software components from the server product page in the HP Support Center (http://www.hp.com/go/hpsc).

Operating System Version Support

For information about specific versions of a supported operating system, refer to the operating system support matrix (http://www.hp.com/go/supportos).

Version control

The VCRM and VCA are web-enabled Insight Management Agents tools that HP SIM uses to schedule software update tasks to the entire enterprise.

- VCRM manages the repository for SPP. Administrators can view the SPP contents or configure VCRM to automatically update the repository with internet downloads of the latest software and firmware from HP.
- VCA compares installed software versions on the node with updates available in the VCRM managed repository. Administrators configure VCA to point to a repository managed by VCRM.

For more information about version control tools, see the *HP Systems Insight Manager User Guide,* the *HP Version Control Agent User Guide,* and the *HP Version Control Repository Manager User Guide* on the HP website (http://www.hp.com/go/enterprise/docs).

1. Select **HP Insight Management** from the available options in Products and Solutions.
2. Select **HP Version Control** from the available options in HP Insight Management.
3. Download the latest document.

HP operating systems and virtualization software support for ProLiant servers

For information about specific versions of a supported operating system, see the HP website (http://www.hp.com/go/ossupport).

HP Technology Service Portfolio

Connect to HP for assistance on the journey to the new style of IT. HP Technology Services delivers confidence and reduces risk to help you realize agility and stability in your IT infrastructure.

Utilize our consulting expertise in the areas of private or hybrid cloud computing, big data and mobility requirements, improving data center infrastructure and better use of today's server, storage and networking technology. For more information, see the HP website (http://www.hp.com/services/consulting).

Our support portfolio covers services for HP server, storage and networking hardware and software plus the leading industry standard operating systems. Let us work proactively with you to prevent problems. Our flexible choices of hardware and software support coverage windows and response times help resolve problems faster, reduce unplanned outages and free your staff for more important tasks. For more information, see the HP website (http://www.hp.com/services/support).

Tap into our knowledge, expertise, innovation and world-class services to achieve better results. Access and apply technology in new ways to optimize your operations and you'll be positioned for success.

Change control and proactive notification

HP offers Change Control and Proactive Notification to notify customers 30 to 60 days in advance of upcoming hardware and software changes on HP commercial products.

For more information, refer to the HP website (http://www.hp.com/go/pcn).

Troubleshooting

Troubleshooting resources

The *HP ProLiant Gen9 Troubleshooting Guide, Volume I: Troubleshooting* provides procedures for resolving common problems and comprehensive courses of action for fault isolation and identification, issue resolution, and software maintenance on ProLiant servers and server blades. To view the guide, select a language:

- English (http://www.hp.com/support/Gen9_TSG_en)
- French (http://www.hp.com/support/Gen9_TSG_fr)
- Spanish (http://www.hp.com/support/Gen9_TSG_es)
- German (http://www.hp.com/support/Gen9_TSG_de)
- Japanese (http://www.hp.com/support/Gen9_TSG_ja)
- Simplified Chinese (http://www.hp.com/support/Gen9_TSG_zh_cn)

The *HP ProLiant Gen9 Troubleshooting Guide, Volume II: Error Messages* provides a list of error messages and information to assist with interpreting and resolving error messages on ProLiant servers and server blades. To view the guide, select a language:

- English (http://www.hp.com/support/Gen9_EMG_en)
- French (http://www.hp.com/support/Gen9_EMG_fr)
- Spanish (http://www.hp.com/support/Gen9_EMG_es)
- German (http://www.hp.com/support/Gen9_EMG_de)
- Japanese (http://www.hp.com/support/Gen9_EMG_ja)
- Simplified Chinese (http://www.hp.com/support/Gen9_EMG_zh_cn)

System battery replacement

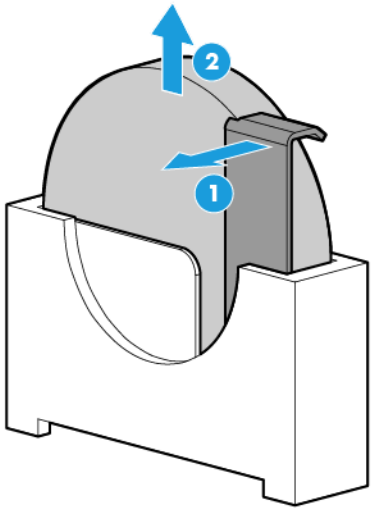
If the server no longer automatically displays the correct date and time, then replace the battery that provides power to the real-time clock. Under normal use, battery life is 5 to 10 years.

⚠ **WARNING:** The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose the battery to temperatures higher than 60°C (140°F).
- Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
- Replace only with the spare designated for this product.

To remove the component:

1. Unlock and remove the tower bezel ("Remove the tower bezel" on page 18).
2. Power down the server (on page 18).
3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
4. Place the server on its side.
5. Remove the access panel (on page 19).
6. If installed, remove the PCI air baffle (on page 21).
7. Remove the system air baffle (on page 22).
8. Locate the battery on the system board ("System board components" on page 11).
9. Remove the battery.



IMPORTANT: Replacing the system board battery resets the system ROM to its default configuration. After replacing the battery, reconfigure the system through RBSU.

To replace the component, reverse the removal procedure.

For more information about battery replacement or proper disposal, contact an authorized reseller or an authorized service provider.

Regulatory information

Safety and regulatory compliance

For safety, environmental, and regulatory information, see *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the HP website (http://www.hp.com/support/Safety-Compliance-EnterpriseProducts).

Belarus Kazakhstan Russia marking

Manufacturer

Hewlett-Packard Company, Address: 3000 Hanover Street, Palo Alto, California 94304, U.S.

Local representative information (Russian)

- HP Russia

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- HP Kazakhstan

  ТОО «Хьюлетт-Паккард (К), 050040, Казахстан, г. Алматы, Бостандыкский район, ул. Тимирязева, 28В, 1 этаж, тел./факс: +7 (727) 355 35 50, +7 (727) 355 35 51

Local representative information (Kazakh)

ЖШС «Хьюлетт-Паккард (К)», Қазақстан, Алматы қ., Бостандық ауданы, Тимирязев к-сі, 28В, тел./факс: +7 (727) 355 35 50, +7 (727) 355 35 51

Manufacturing date

The manufacturing date is defined by the serial number (HP serial number format for this product):
CCSYWWZZZZ

Valid date formats include the following:

- `YWW`, where `Y` indicates the year counting from within each new decade, with 2000 as the starting point. For example, 238: 2 for 2002 and 38 for the week of September 9. In addition, 2010 is indicated by 0, 2011 by 1, 2012 by 2, 2013 by 3, and so forth.
- `YYWW`, where `YY` indicates the year, using a base year of 2000. For example, 0238: 02 for 2002 and 38 for the week of September 9.

Turkey RoHS material content declaration

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Ukraine RoHS material content declaration

Обладнання відповідає вимогам Технічного регламенту щодо обмеження використання деяких небезпечних речовин в електричному та електронному обладнанні, затвердженого постановою Кабінету Міністрів України від 3 грудня 2008 № 1057

Warranty information

HP ProLiant and X86 Servers and Options (http://www.hp.com/support/ProLiantServers-Warranties)

HP Enterprise Servers (http://www.hp.com/support/EnterpriseServers-Warranties)

HP Storage Products (http://www.hp.com/support/Storage-Warranties)

HP Networking Products (http://www.hp.com/support/Networking-Warranties)

GS Gloss declaration

The product is not suitable for use at visual display workplaces according to §2 of the German Ordinance for Work with Visual Display Units.

Das Produkt ist nicht für den Einsatz an Bildschirmarbeitsplätzen im Sinne § 2 der Bild-schirmarbeitsverordnung geeignet.

Electrostatic discharge

Preventing electrostatic discharge

To prevent damaging 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:

- 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.
- Always be properly grounded when touching a static-sensitive component or assembly.

Grounding methods to prevent electrostatic discharge

Several methods are used 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 ±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 an authorized reseller install the part.

For more information on static electricity or assistance with product installation, contact an authorized reseller.

Specifications

Environmental specifications

Specification	Value
Temperature range*	—
Operating	10°C to 35°C (50°F to 95°F)
Nonoperating	-30°C to 60°C (-22°F to 140°F)
Relative humidity (noncondensing)	—
Operating	Minimum to be the higher (more moisture) of -12°C (10.4°F) dew point or 8% relative humidity Maximum to be 24°C (75.2°F) dew point or 90% relative humidity
Nonoperating	5% to 95% 38.7°C (101.7°F), maximum wet bulb temperature

* All temperature ratings shown are for sea level. An altitude derating of 1.0°C per 304.8 m (1.8°F per 1000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed. Maximum rate of change is 20°C per hour (36°F per hour). The upper limit and rate of change might be limited by the type and number of options installed.

For certain approved hardware configurations, the supported system inlet temperature range is extended:

- 5°C to 10°C (41°F to 50°F) and 35°C to 40°C (95°F to 104°F) at sea level with an altitude derating of 1.0°C per every 175 m (1.8°F per every 574 ft) above 900 m (2953 ft) to a maximum of 3048 m (10,000 ft).
- 40°C to 45°C (104°F to 113°F) at sea level with an altitude derating of 1.0°C per every 125 m (1.8°F per every 410 ft) above 900 m (2953 ft) to a maximum of 3048 m (10,000 ft).

The approved hardware configurations for this system are listed on the HP website (http://www.hp.com/servers/ASHRAE).

Server specifications

Specification	Value
Dimensions (with feet/bezel)	—
Height	43.26 cm (17.03 in)
Depth	62 cm (24.41 in)
Width	20 cm (7.87 in)
Weight (approximate)	—
Maximum (all drives, power supplies, and processors installed)	28 kg (61.73 lbs)

Specification	Value
Minimum (one drive, power supply, and processor installed)	16.9 kg (37.26 lbs)

Power supply specifications

Depending on the installed options and/or the regional location where the server was purchased, the server is configured with one of the following power supplies:

- HP 550 W Power Supply
- HP 800 W / 900 W Gold AC Power Input Module (PN 744689-B21)

  This is supported when the two-bay HP RPS Backplane option (PN 745813-B21) is installed.

These are Entry Level Power Supply products for HP ProLiant servers. For more information about the power supply features, specifications, and compatibility, see the HP website (http://www.hp.com/go/proliant/powersupply).

△ **CAUTION:** Check the system and power supply input ratings before powering up the server.

Hot-plug power supply calculations

For hot-plug power supply specifications and calculators to determine electrical and heat loading for the server, see the HP Power Advisor website (http://www.hp.com/go/hppoweradvisor).

Support and other resources

Before you contact HP

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

- Active Health System log (HP ProLiant Gen8 or later products)

  Download and have available an Active Health System log for 7 days before the failure was detected. For more information, see the *HP iLO 4 User Guide* or *HP Intelligent Provisioning User Guide* on the HP website (http://www.hp.com/go/ilo/docs).
- Onboard Administrator SHOW ALL report (for HP BladeSystem products only)

  For more information on obtaining the Onboard Administrator SHOW ALL report, see the HP website (http://www.hp.com/go/OAlog).
- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Product identification number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

HP contact information

For United States and worldwide contact information, see the Contact HP website (http://www.hp.com/go/assistance).

In the United States:

- To contact HP by phone, call 1-800-334-5144. For continuous quality improvement, calls may be recorded or monitored.
- If you have purchased a Care Pack (service upgrade), see the Support & Drivers website (http://www8.hp.com/us/en/support-drivers.html). If the problem cannot be resolved at the website, call 1-800-633-3600. For more information about Care Packs, see the HP website (http://pro-aq-sama.houston.hp.com/services/cache/10950-0-0-225-121.html).

Customer Self Repair

HP products are designed with many Customer Self Repair (CSR) parts to minimize repair time and allow for greater flexibility in performing defective parts replacement. If during the diagnosis period HP (or HP service

providers or service partners) identifies that the repair can be accomplished by the use of a CSR part, HP will ship that part directly to you for replacement. There are two categories of CSR parts:

- **Mandatory**—Parts for which customer self repair is mandatory. If you request HP to replace these parts, you will be charged for the travel and labor costs of this service.
- **Optional**—Parts for which customer self repair is optional. These parts are also designed for customer self repair. If, however, you require that HP replace them for you, there may or may not be additional charges, depending on the type of warranty service designated for your product.

NOTE: Some HP parts are not designed for customer self repair. In order to satisfy the customer warranty, HP requires that an authorized service provider replace the part. These parts are identified as "No" in the Illustrated Parts Catalog.

Based on availability and where geography permits, CSR parts will be shipped for next business day delivery. Same day or four-hour delivery may be offered at an additional charge where geography permits. If assistance is required, you can call the HP Technical Support Center and a technician will help you over the telephone. HP specifies in the materials shipped with a replacement CSR part whether a defective part must be returned to HP. In cases where it is required to return the defective part to HP, you must ship the defective part back to HP within a defined period of time, normally five (5) business days. The defective part must be returned with the associated documentation in the provided shipping material. Failure to return the defective part may result in HP billing you for the replacement. With a customer self repair, HP will pay all shipping and part return costs and determine the courier/carrier to be used.

For more information about HP's Customer Self Repair program, contact your local service provider. For the North American program, refer to the HP website (http://www.hp.com/go/selfrepair).

Réparation par le client (CSR)

Les produits HP comportent de nombreuses pièces CSR (Customer Self Repair = réparation par le client) afin de minimiser les délais de réparation et faciliter le remplacement des pièces défectueuses. Si pendant la période de diagnostic, HP (ou ses partenaires ou mainteneurs agréés) détermine que la réparation peut être effectuée à l'aide d'une pièce CSR, HP vous l'envoie directement. Il existe deux catégories de pièces CSR:

Obligatoire - Pièces pour lesquelles la réparation par le client est obligatoire. Si vous demandez à HP de remplacer ces pièces, les coûts de déplacement et main d'œuvre du service vous seront facturés.

Facultatif - Pièces pour lesquelles la réparation par le client est facultative. Ces pièces sont également conçues pour permettre au client d'effectuer lui-même la réparation. Toutefois, si vous demandez à HP de remplacer ces pièces, l'intervention peut ou non vous être facturée, selon le type de garantie applicable à votre produit.

REMARQUE: Certaines pièces HP ne sont pas conçues pour permettre au client d'effectuer lui-même la réparation. Pour que la garantie puisse s'appliquer, HP exige que le remplacement de la pièce soit effectué par un Mainteneur Agréé. Ces pièces sont identifiées par la mention "Non" dans le Catalogue illustré.

Les pièces CSR sont livrées le jour ouvré suivant, dans la limite des stocks disponibles et selon votre situation géographique. Si votre situation géographique le permet et que vous demandez une livraison le jour même ou dans les 4 heures, celle-ci vous sera facturée. Pour bénéficier d'une assistance téléphonique, appelez le Centre d'assistance technique HP. Dans les documents envoyés avec la pièce de rechange CSR, HP précise s'il est nécessaire de lui retourner la pièce défectueuse. Si c'est le cas, vous devez le faire dans le délai indiqué, généralement cinq (5) jours ouvrés. La pièce et sa documentation doivent être retournées dans l'emballage fourni. Si vous ne retournez pas la pièce défectueuse, HP se réserve le droit de vous facturer les coûts de remplacement. Dans le cas d'une pièce CSR, HP supporte l'ensemble des frais d'expédition et de retour, et détermine la société de courses ou le transporteur à utiliser.

Pour plus d'informations sur le programme CSR de HP, contactez votre Mainteneur Agrée local. Pour plus d'informations sur ce programme en Amérique du Nord, consultez le site Web HP (http://www.hp.com/go/selfrepair).

Riparazione da parte del cliente

Per abbreviare i tempi di riparazione e garantire una maggiore flessibilità nella sostituzione di parti difettose, i prodotti HP sono realizzati con numerosi componenti che possono essere riparati direttamente dal cliente (CSR, Customer Self Repair). Se in fase di diagnostica HP (o un centro di servizi o di assistenza HP) identifica il guasto come riparabile mediante un ricambio CSR, HP lo spedirà direttamente al cliente per la sostituzione. Vi sono due categorie di parti CSR:

Obbligatorie – Parti che devono essere necessariamente riparate dal cliente. Se il cliente ne affida la riparazione ad HP, deve sostenere le spese di spedizione e di manodopera per il servizio.

Opzionali – Parti la cui riparazione da parte del cliente è facoltativa. Si tratta comunque di componenti progettati per questo scopo. Se tuttavia il cliente ne richiede la sostituzione ad HP, potrebbe dover sostenere spese addizionali a seconda del tipo di garanzia previsto per il prodotto.

NOTA: alcuni componenti HP non sono progettati per la riparazione da parte del cliente. Per rispettare la garanzia, HP richiede che queste parti siano sostituite da un centro di assistenza autorizzato. Tali parti sono identificate da un "No" nel Catalogo illustrato dei componenti.

In base alla disponibilità e alla località geografica, le parti CSR vengono spedite con consegna entro il giorno lavorativo seguente. La consegna nel giorno stesso o entro quattro ore è offerta con un supplemento di costo solo in alcune zone. In caso di necessità si può richiedere l'assistenza telefonica di un addetto del centro di supporto tecnico HP. Nel materiale fornito con una parte di ricambio CSR, HP specifica se il cliente deve restituire dei componenti. Qualora sia richiesta la resa ad HP del componente difettoso, lo si deve spedire ad HP entro un determinato periodo di tempo, generalmente cinque (5) giorni lavorativi. Il componente difettoso deve essere restituito con la documentazione associata nell'imballo di spedizione fornito. La mancata restituzione del componente può comportare la fatturazione del ricambio da parte di HP. Nel caso di riparazione da parte del cliente, HP sostiene tutte le spese di spedizione e resa e sceglie il corriere/vettore da utilizzare.

Per ulteriori informazioni sul programma CSR di HP contattare il centro di assistenza di zona. Per il programma in Nord America fare riferimento al sito Web HP (http://www.hp.com/go/selfrepair).

Customer Self Repair

HP Produkte enthalten viele CSR-Teile (Customer Self Repair), um Reparaturzeiten zu minimieren und höhere Flexibilität beim Austausch defekter Bauteile zu ermöglichen. Wenn HP (oder ein HP Servicepartner) bei der Diagnose feststellt, dass das Produkt mithilfe eines CSR-Teils repariert werden kann, sendet Ihnen HP dieses Bauteil zum Austausch direkt zu. CSR-Teile werden in zwei Kategorien unterteilt:

Zwingend – Teile, für die das Customer Self Repair-Verfahren zwingend vorgegeben ist. Wenn Sie den Austausch dieser Teile von HP vornehmen lassen, werden Ihnen die Anfahrt- und Arbeitskosten für diesen Service berechnet.

Optional – Teile, für die das Customer Self Repair-Verfahren optional ist. Diese Teile sind auch für Customer Self Repair ausgelegt. Wenn Sie jedoch den Austausch dieser Teile von HP vornehmen lassen möchten, können bei diesem Service je nach den für Ihr Produkt vorgesehenen Garantiebedingungen zusätzliche Kosten anfallen.

HINWEIS: Einige Teile sind nicht für Customer Self Repair ausgelegt. Um den Garantieanspruch des Kunden zu erfüllen, muss das Teil von einem HP Servicepartner ersetzt werden. Im illustrierten Teilekatalog sind diese Teile mit „No“ bzw. „Nein“ gekennzeichnet.

CSR-Teile werden abhängig von der Verfügbarkeit und vom Lieferziel am folgenden Geschäftstag geliefert. Für bestimmte Standorte ist eine Lieferung am selben Tag oder innerhalb von vier Stunden gegen einen Aufpreis verfügbar. Wenn Sie Hilfe benötigen, können Sie das HP technische Support Center anrufen und sich von einem Mitarbeiter per Telefon helfen lassen. Den Materialien, die mit einem CSR-Ersatzteil geliefert werden, können Sie entnehmen, ob das defekte Teil an HP zurückgeschickt werden muss. Wenn es erforderlich ist, das defekte Teil an HP zurückzuschicken, müssen Sie dies innerhalb eines vorgegebenen Zeitraums tun, in der Regel innerhalb von fünf (5) Geschäftstagen. Das defekte Teil muss mit der zugehörigen Dokumentation in der Verpackung zurückgeschickt werden, die im Lieferumfang enthalten ist. Wenn Sie das defekte Teil nicht zurückschicken, kann HP Ihnen das Ersatzteil in Rechnung stellen. Im Falle von Customer Self Repair kommt HP für alle Kosten für die Lieferung und Rücksendung auf und bestimmt den Kurier-/Frachtdienst.

Weitere Informationen über das HP Customer Self Repair Programm erhalten Sie von Ihrem Servicepartner vor Ort. Informationen über das CSR-Programm in Nordamerika finden Sie auf der HP Website unter (http://www.hp.com/go/selfrepair).

Reparaciones del propio cliente

Los productos de HP incluyen muchos componentes que el propio usuario puede reemplazar (*Customer Self Repair*, CSR) para minimizar el tiempo de reparación y ofrecer una mayor flexibilidad a la hora de realizar sustituciones de componentes defectuosos. Si, durante la fase de diagnóstico, HP (o los proveedores o socios de servicio de HP) identifica que una reparación puede llevarse a cabo mediante el uso de un componente CSR, HP le enviará dicho componente directamente para que realice su sustitución. Los componentes CSR se clasifican en dos categorías:

- **Obligatorio:** componentes para los que la reparación por parte del usuario es obligatoria. Si solicita a HP que realice la sustitución de estos componentes, tendrá que hacerse cargo de los gastos de desplazamiento y de mano de obra de dicho servicio.
- **Opcional:** componentes para los que la reparación por parte del usuario es opcional. Estos componentes también están diseñados para que puedan ser reparados por el usuario. Sin embargo, si precisa que HP realice su sustitución, puede o no conllevar costes adicionales, dependiendo del tipo de servicio de garantía correspondiente al producto.

NOTA: Algunos componentes no están diseñados para que puedan ser reparados por el usuario. Para que el usuario haga valer su garantía, HP pone como condición que un proveedor de servicios autorizado realice la sustitución de estos componentes. Dichos componentes se identifican con la palabra "No" en el catálogo ilustrado de componentes.

Según la disponibilidad y la situación geográfica, los componentes CSR se enviarán para que lleguen a su destino al siguiente día laborable. Si la situación geográfica lo permite, se puede solicitar la entrega en el mismo día o en cuatro horas con un coste adicional. Si precisa asistencia técnica, puede llamar al Centro de asistencia técnica de HP y recibirá ayuda telefónica por parte de un técnico. Con el envío de materiales para la sustitución de componentes CSR, HP especificará si los componentes defectuosos deberán devolverse a HP. En aquellos casos en los que sea necesario devolver algún componente a HP, deberá hacerlo en el periodo de tiempo especificado, normalmente cinco días laborables. Los componentes defectuosos deberán devolverse con toda la documentación relacionada y con el embalaje de envío. Si no enviara el componente defectuoso requerido, HP podrá cobrarle por el de sustitución. En el caso de todas

sustituciones que lleve a cabo el cliente, HP se hará cargo de todos los gastos de envío y devolución de componentes y escogerá la empresa de transporte que se utilice para dicho servicio.

Para obtener más información acerca del programa de Reparaciones del propio cliente de HP, póngase en contacto con su proveedor de servicios local. Si está interesado en el programa para Norteamérica, visite la página web de HP siguiente (http://www.hp.com/go/selfrepair).

Customer Self Repair

Veel onderdelen in HP producten zijn door de klant zelf te repareren, waardoor de reparatieduur tot een minimum beperkt kan blijven en de flexibiliteit in het vervangen van defecte onderdelen groter is. Deze onderdelen worden CSR-onderdelen (Customer Self Repair) genoemd. Als HP (of een HP Service Partner) bij de diagnose vaststelt dat de reparatie kan worden uitgevoerd met een CSR-onderdeel, verzendt HP dat onderdeel rechtstreeks naar u, zodat u het defecte onderdeel daarmee kunt vervangen. Er zijn twee categorieën CSR-onderdelen:

Verplicht: Onderdelen waarvoor reparatie door de klant verplicht is. Als u HP verzoekt deze onderdelen voor u te vervangen, worden u voor deze service reiskosten en arbeidsloon in rekening gebracht.

Optioneel: Onderdelen waarvoor reparatie door de klant optioneel is. Ook deze onderdelen zijn ontworpen voor reparatie door de klant. Als u echter HP verzoekt deze onderdelen voor u te vervangen, kunnen daarvoor extra kosten in rekening worden gebracht, afhankelijk van het type garantieservice voor het product.

OPMERKING: Sommige HP onderdelen zijn niet ontwikkeld voor reparatie door de klant. In verband met de garantievoorwaarden moet het onderdeel door een geautoriseerde Service Partner worden vervangen. Deze onderdelen worden in de geïllustreerde onderdelencatalogus aangemerkt met "Nee".

Afhankelijk van de leverbaarheid en de locatie worden CSR-onderdelen verzonden voor levering op de eerstvolgende werkdag. Levering op dezelfde dag of binnen vier uur kan tegen meerkosten worden aangeboden, indien dit mogelijk is gezien de locatie. Indien assistentie gewenst is, belt u een HP Service Partner om via de telefoon technische ondersteuning te ontvangen. HP vermeldt in de documentatie bij het vervangende CSR-onderdeel of het defecte onderdeel aan HP moet worden geretourneerd. Als het defecte onderdeel aan HP moet worden teruggezonden, moet u het defecte onderdeel binnen een bepaalde periode, gewoonlijk vijf (5) werkdagen, retourneren aan HP. Het defecte onderdeel moet met de bijbehorende documentatie worden geretourneerd in het meegeleverde verpakkingsmateriaal. Als u het defecte onderdeel niet terugzendt, kan HP u voor het vervangende onderdeel kosten in rekening brengen. Bij reparatie door de klant betaalt HP alle verzendkosten voor het vervangende en geretourneerde onderdeel en kiest HP zelf welke koerier/transportonderneming hiervoor wordt gebruikt.

Neem contact op met een Service Partner voor meer informatie over het Customer Self Repair programma van HP. Informatie over Service Partners vindt u op de HP website (http://www.hp.com/go/selfrepair).

Reparo feito pelo cliente

Os produtos da HP são projetados com muitas peças para reparo feito pelo cliente (CSR) de modo a minimizar o tempo de reparo e permitir maior flexibilidade na substituição de peças com defeito. Se, durante o período de diagnóstico, a HP (ou fornecedores/parceiros de serviço da HP) concluir que o reparo pode ser efetuado pelo uso de uma peça CSR, a peça de reposição será enviada diretamente ao cliente. Existem duas categorias de peças CSR:

Obrigatória – Peças cujo reparo feito pelo cliente é obrigatório. Se desejar que a HP substitua essas peças, serão cobradas as despesas de transporte e mão-de-obra do serviço.

Opcional – Peças cujo reparo feito pelo cliente é opcional. Essas peças também são projetadas para o reparo feito pelo cliente. No entanto, se desejar que a HP as substitua, pode haver ou não a cobrança de taxa adicional, dependendo do tipo de serviço de garantia destinado ao produto.

OBSERVAÇÃO: Algumas peças da HP não são projetadas para o reparo feito pelo cliente. A fim de cumprir a garantia do cliente, a HP exige que um técnico autorizado substitua a peça. Essas peças estão identificadas com a marca "No" (Não), no catálogo de peças ilustrado.

Conforme a disponibilidade e o local geográfico, as peças CSR serão enviadas no primeiro dia útil após o pedido. Onde as condições geográficas permitirem, a entrega no mesmo dia ou em quatro horas pode ser feita mediante uma taxa adicional. Se precisar de auxílio, entre em contato com o Centro de suporte técnico da HP para que um técnico o ajude por telefone. A HP especifica nos materiais fornecidos com a peça CSR de reposição se a peça com defeito deve ser devolvida à HP. Nos casos em que isso for necessário, é preciso enviar a peça com defeito à HP dentro do período determinado, normalmente cinco (5) dias úteis. A peça com defeito deve ser enviada com a documentação correspondente no material de transporte fornecido. Caso não o faça, a HP poderá cobrar a reposição. Para as peças de reparo feito pelo cliente, a HP paga todas as despesas de transporte e de devolução da peça e determina a transportadora/serviço postal a ser utilizado.

Para obter mais informações sobre o programa de reparo feito pelo cliente da HP, entre em contato com o fornecedor de serviços local. Para o programa norte-americano, visite o site da HP (http://www.hp.com/go/selfrepair).

カスタマーセルフリペア

修理時間を短縮し、故障部品の交換における高い柔軟性を確保するために、HP製品には多数のCSR部品があります。診断の際に、CSR部品を使用すれば修理ができるとHP（HPまたはHP正規保守代理店）が判断した場合、HPはその部品を直接、お客様に発送し、お客様に交換していただきます。CSR部品には以下の2通りがあります。

- **必須 -** カスタマーセルフリペアが必須の部品。当該部品について、もしもお客様がHPに交換作業を依頼される場合には、その修理サービスに関する交通費および人件費がお客様に請求されます。
- **任意 -** カスタマーセルフリペアが任意である部品。この部品もカスタマーセルフリペア用です。当該部品について、もしもお客様がHPに交換作業を依頼される場合には、お買い上げの製品に適用される保証サービス内容の範囲内においては、別途費用を負担していただくことなく保証サービスを受けることができます。

注： HP製品の一部の部品は、カスタマーセルフリペア用ではありません。製品の保証を継続するためには、HPまたはHP正規保守代理店による交換作業が必須となります。部品カタログには、当該部品がカスタマーセルフリペア除外品である旨が記載されています。

部品供給が可能な場合、地域によっては、CSR部品を翌営業日に届くように発送します。また、地域によっては、追加費用を負担いただくことにより同日または4時間以内に届くように発送することも可能な場合があります。サポートが必要なときは、HPの修理受付窓口に電話していただければ、技術者が電話でアドバイスします。交換用のCSR部品または同梱物には、故障部品をHPに返送する必要があるかどうかが表示されています。故障部品をHPに返送する必要がある場合は、指定期限内（通常は5営業日以内）に故障部品をHPに返送してください。故障部品を返送する場合は、届いた時の梱包箱に関連書類とともに入れてください。故障部品を返送しない場合、HPから部品費用が請求されます。カスタマーセルフリペアの際には、HPは送料および部品返送費を全額負担し、使用する宅配便会社や運送会社を指定します。

客户自行维修

HP 产品提供许多客户自行维修 (CSR) 部件，以尽可能缩短维修时间和在更换缺陷部件方面提供更大的灵活性。如果在诊断期间 HP（或 HP 服务提供商或服务合作伙伴）确定可以通过使用 CSR 部件完成维修，HP 将直接把该部件发送给您进行更换。有两类 CSR 部件：

- **强制性的** — 要求客户必须自行维修的部件。如果您请求 HP 更换这些部件，则必须为该服务支付差旅费和人工费用。
- **可选的** — 客户可以选择是否自行维修的部件。这些部件也是为客户自行维修设计的。不过，如果您要求 HP 为您更换这些部件，则根据为您的产品指定的保修服务类型，HP 可能收取或不再收取任何附加费用。

注：某些 HP 部件的设计并未考虑客户自行维修。为了满足客户保修的需要，HP 要求授权服务提供商更换相关部件。这些部件在部件图解目录中标记为“否”。

CSR 部件将在下一个工作日发运（取决于备货情况和允许的地理范围）。在允许的地理范围内，可在当天或四小时内发运，但要收取额外费用。如果需要帮助，您可以致电 HP 技术支持中心，将会有技术人员通过电话为您提供帮助。HP 会在随更换的 CSR 部件发运的材料中指明是否必须将有缺陷的部件返还给 HP。如果要求您将有缺陷的部件返还给 HP，那么您必须在规定期限内（通常是五 (5) 个工作日）将缺陷部件发给 HP。有缺陷的部件必须随所提供的发运材料中的相关文件一起返还。如果未能送还有缺陷的部件，HP 可能会要求您支付更换费用。客户自行维修时，HP 将承担所有相关运输和部件返回费用，并指定快递商/承运商。

有关 HP 客户自行维修计划的详细信息，请与您当地的服务提供商联系。有关北美地区的计划，请访问 HP 网站 (http://www.hp.com/go/selfrepair)。

客戶自行維修

HP 產品設計了許多「客戶自行維修」(CSR) 的零件以減少維修時間，並且使得更換瑕疵零件時能有更大的彈性。如果在診斷期間 HP（或 HP 服務供應商或維修夥伴）辨認出此項維修工作可以藉由使用 CSR 零件來完成，則 HP 將直接寄送該零件給您作更換。CSR 零件分為兩種類別：

- **強制的** — 客戶自行維修所使用的零件是強制性的。如果您要求 HP 更換這些零件，HP 將會向您收取此服務所需的外出費用與勞動成本。
- **選購的** — 客戶自行維修所使用的零件是選購的。這些零件也設計用於客戶自行維修之用。不過，如果您要求 HP 為您更換，則可能需要也可能不需要負擔額外的費用，端視針對此產品指定的保固服務類型而定。

備註：某些 HP 零件沒有消費者可自行維修的設計。為符合客戶保固，HP 需要授權的服務供應商更換零件。這些零件在圖示的零件目錄中，被標示為「否」。

基於材料取得及環境允許的情況下，CSR 零件將於下一個工作日以快遞寄送。在環境的允許下當天或四小時內送達，則可能需要額外的費用。若您需要協助，可致電「HP 技術支援中心」，會有一位技術人員透過電話來協助您。不論損壞的零件是否必須退回，HP 皆會在與 CSR 替換零件一起運送的材料中註明。若要將損壞的零件退回 HP，您必須在指定的一段時間內（通常為五 (5) 個工作天），將損壞的零件寄回 HP。損壞的零件必須與寄送資料中隨附的相關技術文件一併退還。如果無法退還損壞的零件，HP 可能要向您收取替換費用。針對客戶自行維修情形，HP 將負責所有運費及零件退還費用並指定使用何家快遞/貨運公司。

如需 HP 的「客戶自行維修」方案詳細資訊，請連絡您當地的服務供應商。至於北美方案，請參閱 HP 網站 (http://www.hp.com/go/selfrepair)。

고객 셀프 수리

HP 제품은 수리 시간을 최소화하고 결함이 있는 부품 교체 시 더욱 융통성을 발휘할 수 있도록 하기 위해 고객 셀프 수리(CSR) 부품을 다량 사용하여 설계되었습니다. 진단 기간 동안 HP(또는 HP 서비스 공급업체 또는 서비스 협력업체)에서 CSR 부품을 사용하여 수리가 가능하다고 판단되면 HP는 해당 부품을 바로 사용자에게 보내어 사용자가 교체할 수 있도록 합니다. CSR 부품에는 두 가지 종류가 있습니다.

- **고객 셀프 수리가 의무 사항인 필수 부품.** 사용자가 HP에 이 부품의 교체를 요청할 경우 이 서비스에 대한 출장비 및 작업비가 청구됩니다.
- **고객 셀프 수리가 선택 사항인 부품.** 이 부품들도 고객 셀프 수리가 가능하도록 설계되었습니다. 하지만 사용자가 HP에 이 부품의 교체를 요청할 경우 사용자가 구입한 제품에 해당하는 보증 서비스 유형에 따라 추가 비용 없이 교체가 가능할 수 있습니다.

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CSR 부품은 재고 상태와 지리적 조건이 허용하는 경우 다음 영업일 납품이 가능하도록 배송이 이루어집니다. 지리적 조건이 허용하는 경우 추가 비용이 청구되는 조건으로 당일 또는 4시간 배송이 가능할 수도 있습니다. 도움이 필요하시면 HP 기술 지원 센터로 전화하십시오. 전문 기술자가 전화로 도움을 줄 것입니다. HP는 결함이 발생한 부품을 HP로 반환해야 하는지 여부를 CSR 교체 부품과 함께 배송된 자료에 지정합니다. 결함이 발생한 부품을 HP로 반환해야 하는 경우에는 지정된 기간 내(통상 영업일 기준 5일)에 HP로 반환해야 합니다. 이 때 결함이 발생한 부품은 제공된 포장 재료에 넣어 관련 설명서와 함께 반환해야 합니다. 결함이 발생한 부품을 반환하지 않는 경우 HP가 교체 부품에 대해 비용을 청구할 수 있습니다. 고객 셀프 수리의 경우, HP는 모든 운송 및 부품 반환 비용을 부담하며 이용할 운송업체 및 택배 서비스를 결정합니다.

HP 고객 셀프 수리 프로그램에 대한 자세한 내용은 가까운 서비스 제공업체에 문의하십시오. 북미 지역의 프로그램에 대해서는 HP 웹 사이트(http://www.hp.com/go/selfrepair)를 참조하십시오.

Acronyms and abbreviations

ABEND

abnormal end

ACU

Array Configuration Utility

AMP

Advanced Memory Protection

ASHRAE

American Society of Heating, Refrigerating and Air-Conditioning Engineers

ASR

Automatic Server Recovery

CSA

Canadian Standards Association

CSR

Customer Self Repair

DDR

double data rate

FBWC

flash-backed write cache

HP SIM

HP Systems Insight Manager

HP SSA

HP Smart Storage Administrator

HP SUM

HP Smart Update Manager

IEC

International Electrotechnical Commission

iLO

Integrated Lights-Out

IML

Integrated Management Log

ISO

International Organization for Standardization

LFF

large form factor

NMI

nonmaskable interrupt

NVRAM

nonvolatile memory

OA

Onboard Administrator

PATA

parallel ATA

PCIe

Peripheral Component Interconnect Express

PDU

power distribution unit

POST

Power-On Self Test

PXE

preboot execution environment

RBSU

ROM-Based Setup Utility

RDIMM

registered dual in-line memory module

RDP

Rapid Deployment Pack

RoHS

Restriction of Hazardous Substances

RPS

redundant power supply

SAS

serial attached SCSI

SATA

serial ATA

SD

Secure Digital

SFF

small form factor

SIM

Systems Insight Manager

SPP

HP Service Pack for ProLiant

TMRA

recommended ambient operating temperature

TPM

Trusted Platform Module

UDIMM

unregistered dual in-line memory module

UEFI

Unified Extensible Firmware Interface

UID

unit identification

USB

universal serial bus

VC

Virtual Connect

VCA

Version Control Agent

VCRM

Version Control Repository Manager

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