

HP ProLiant ML110 G7 Server User Guide

Abstract

This document is for the person who installs, administers, and troubleshoots servers and storage systems. This document is intended for experienced IT professionals or end-users with no or prior hardware setup experience. 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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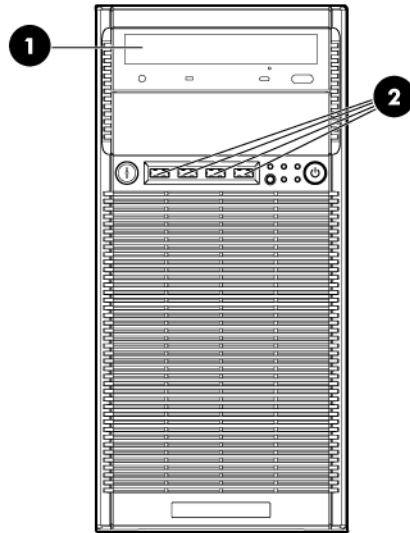
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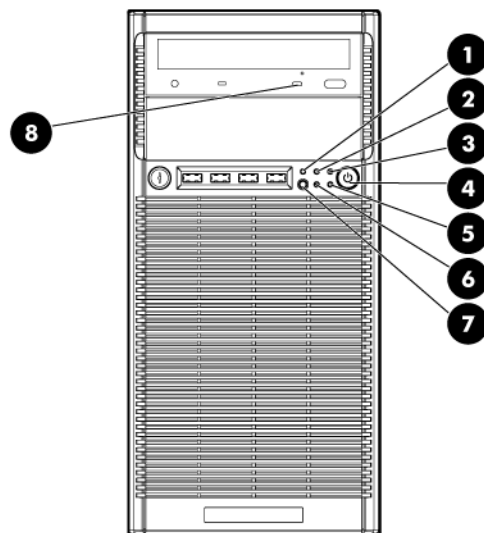
Component identification

Front panel components



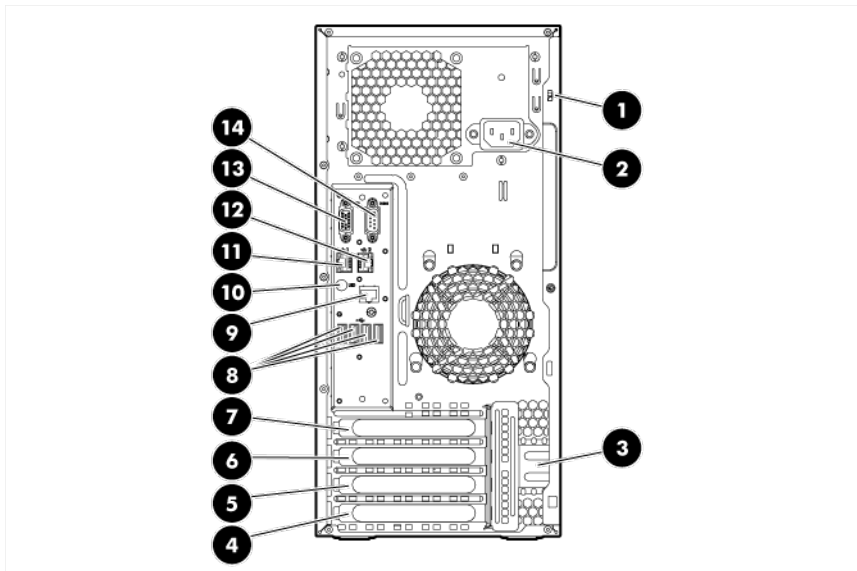
Item	Description
1	Media drive bay
2	USB connectors (4)

Front panel LEDs and buttons



Item	Description	Status
1	System health LED	Green = Normal Amber = System degraded Red = System critical
2	NIC 1 link/activity LED	Green = Network link Flashing green = Network link and activity Off = No link to network (If the power is off, view the rear panel NIC LEDs for status.)
3	Drive activity LED	Flashing green = Drive active Off = No drive activity
4	System power button/LED	Green = System on Amber = System in standby, but power is still applied Off = Power cord not attached or power supply failed
5	Power status LED	Green = System on Amber = System in standby, but power is still applied Off = Power cord not attached or power supply failed
6	NIC 2 link/activity LED	Green = Network link Flashing green = Network link and activity Off = No link to network (If the power is off, view the rear panel NIC LEDs for status.)
7	UID button/LED	Blue = Activated Flashing blue = System being remotely managed Off = Deactivated
8	Optical drive activity LED	Flashing green = Drive active Off = No drive activity

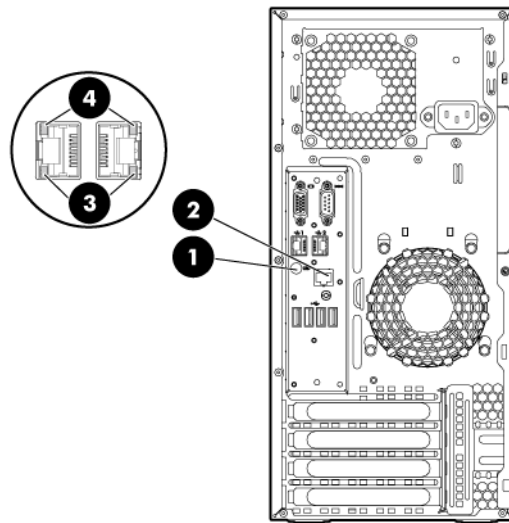
Rear panel components



Item	Description
1	Kensington lock notch
2	Power supply connector
3	PCIe slot cover retainer latch

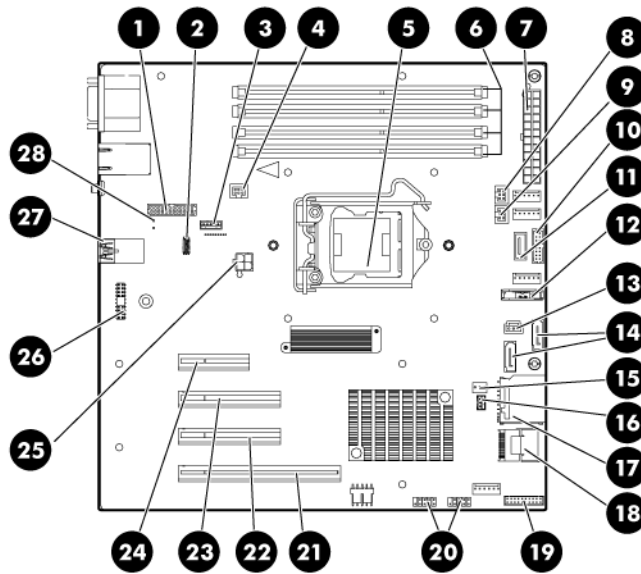
4	Slot 1 PCIe2x16 (16, 8, 4, 1)
5	Slot 2 PCIe2x8 (4, 1)
6	Slot 3 PCIe2x8 (4, 1)
7	Slot 4 PCIe2x4 (1)
8	USB connectors (4)
9	HP dedicated iLO management port (option)
10	UID button/LED
11	10/100/1000 NIC1 connector/shared iLO management port
12	10/100/1000 NIC2 connector
13	Video connector
14	Serial connector

Rear panel LEDs and buttons



Item	Description	Status
1	UID LED/button	Flashing blue = Activated Off = System being managed remotely/deactivated
2	HP dedicated iLO management port option LEDs	Green = Network link Flashing green = Network link and activity Off = No link to network
3	NIC activity LED	Green = Network activity Flashing green = Network activity Off = No network activity
4	NIC link LED	Green = Network link Off = No network link

System board components

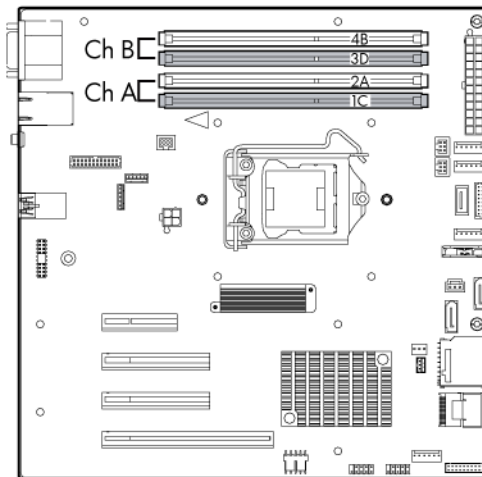


Item	Description
1	Dedicated iLO management module connector
2	System maintenance switch
3	RPS connector (1x5 pin)
4	Front system fan connector (2x3 pin)
5	Processor socket
6	DIMM slots (4)
7	24-pin power supply connector
8	Processor-heatsink fan assembly connector (2x3 pin)
9	Rear system fan connector (2x3 pin)
10	RPS connector (2x8 pin)
11	Internal USB connector
12	System battery
13	I ² C cable connector
14	SATA connectors (2)
15	SMB bus connector
16	Temperature sensor connector
17	SD card connector
18	Mini-SAS connector
19	Front I/O connector
20	Front USB connectors (2)
21	Slot 1 PCIe2x16 (16, 8, 4, 1)
22	Slot 2 PCIe2x8 (4, 1)
23	Slot 3 PCIe2x8 (4, 1)
24	Slot 1 PCIe2x4 (1)
25	4-pin power supply connector
26	TPM connector

Item	Description
27	Rear USB connectors (4)
28	NMI header

DIMM slot locations

DIMM slots are numbered sequentially (1 through 4) for the processor.



System maintenance switch

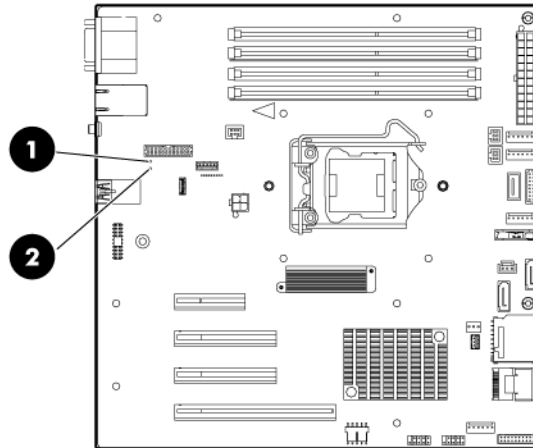
Position	Default	Function
1	Off	Off = iLO security is enabled On = iLO security is disabled
2	Off	Off = System configuration can be changed On = System configuration is locked
3	—	Reserved
4	—	Reserved
5	Off	Off = Power-on password is enabled On = Power-on password is disabled
6	Off	Off = No function On = Clear NVRAM
7	—	Reserved
8	—	Reserved
9	—	Reserved
10	—	Reserved

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.

System board LEDs



Item	LED description	Status
1	Power supply 1 failure	Red = Power supply 1 failed Off = Normal
2	Power supply 2 (redundant) failure	Red = Power supply 2 failed Off = Normal

NMI functionality

An NMI crash dump enables you to create crash dump files when a system is hung and not responding to traditional debug mechanisms.

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

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

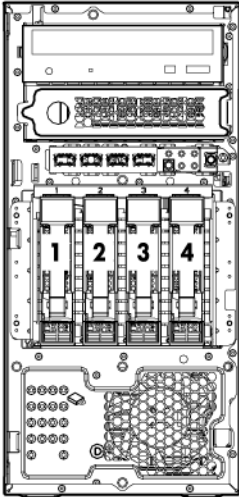
- Short the NMI header pins.
- Use the iLO Virtual NMI feature.

For more information, see the whitepaper on the HP website

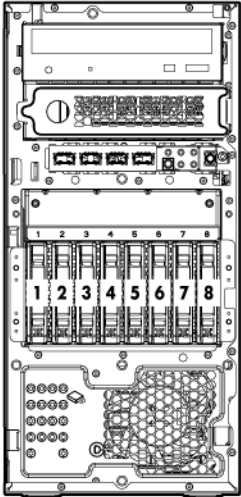
(<http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00797875/c00797875.pdf>).

SAS and SATA drive numbering

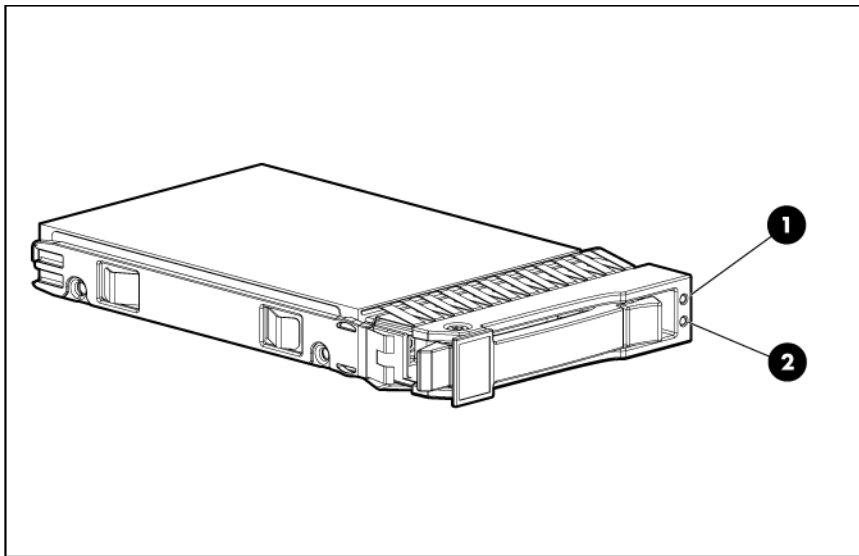
- Four-bay LFF drive model



- Eight-bay SFF drive model



SAS and SATA drive LEDs



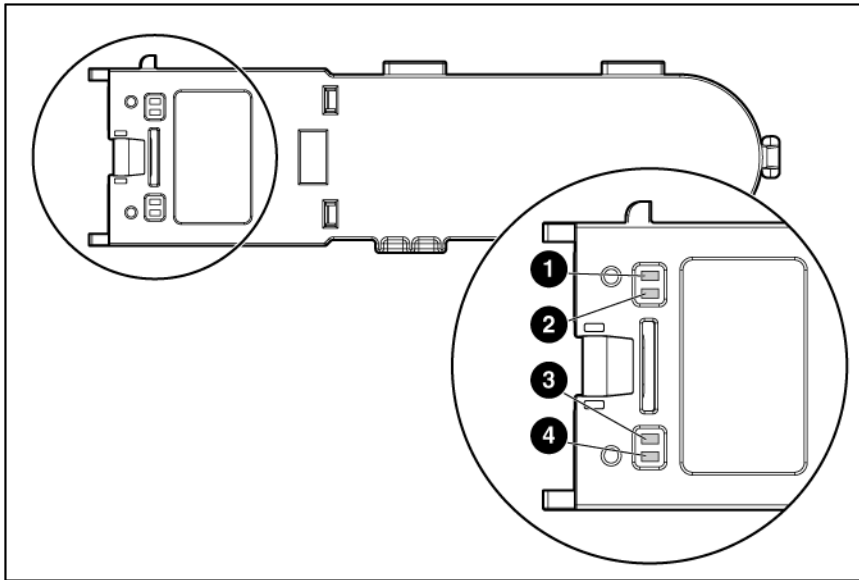
Item	Description
1	Fault/UID LED (amber/blue)
2	Online LED (green)

SAS and SATA drive LED combinations

Online/activity LED (green)	Fault/UID LED (amber/blue)	Interpretation
On, off, or flashing	Alternating amber and blue	The drive has failed, or a predictive failure alert has been received for this drive; it also has been selected by a management application.
On, off, or flashing	Steadily blue	The drive is operating normally, and it has been selected by a management application.
On	Amber, flashing regularly (1 Hz)	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
On	Off	The drive is online, but it is not active currently.
Flashing regularly (1 Hz)	Amber, flashing regularly (1 Hz)	Do not remove the drive. Removing a drive may terminate the current operation and cause data loss. The drive is part of an array that is undergoing capacity expansion or stripe migration, but a predictive failure alert has been received for this drive. To minimize the risk of data loss, do not replace the drive until the expansion or migration is complete.
Flashing regularly (1 Hz)	Off	Do not remove the drive. Removing a drive may terminate the current operation and cause data loss. The drive is rebuilding, or it is part of an array that is undergoing capacity expansion or stripe migration.
Flashing irregularly	Amber, flashing regularly (1 Hz)	The drive is active, but a predictive failure alert has been received for this drive. Replace the drive as soon as possible.
Flashing irregularly	Off	The drive is active, and it is operating normally.

Online/activity LED (green)	Fault/UID LED (amber/blue)	Interpretation
Off	Steadily amber	A critical fault condition has been identified for this drive, and the controller has placed it offline. Replace the drive as soon as possible.
Off	Amber, flashing regularly (1 Hz)	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
Off	Off	The drive is offline, a spare, or not configured as part of an array.

BBWC module LEDs

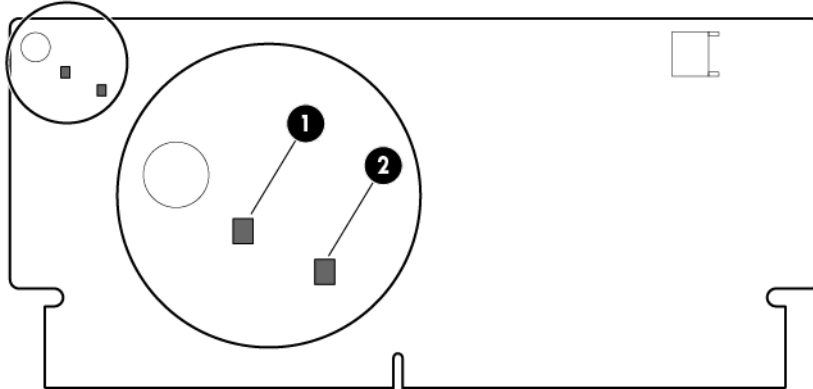


Item ID	Color	Description
1	Green	System Power LED. This LED illuminates steadily when the system is powered up and 12-V system power is available. This power supply is used to maintain the battery charge and provide supplementary power to the cache microcontroller.
2	Green	Auxiliary Power LED. This LED illuminates steadily when 3.3V auxiliary voltage is detected. The auxiliary voltage is used to preserve BBWC data and is available any time that the system power cords are connected to a power supply.
3	Amber	Battery Health LED. To interpret the illumination patterns of this LED, see the following table.
4	Green	BBWC Status LED. To interpret the illumination patterns of this LED, see the following table.

LED3 pattern	LED4 pattern	Interpretation
—	One blink every two seconds	The system is powered down, and the cache contains data that has not yet been written to the drives. Restore system power as soon as possible to prevent data loss. If 3.3 V auxiliary power is available, as indicated by LED 2, then data preservation time is extended. If no auxiliary power is available, only battery power preserves the data. A fully-charged battery can normally preserve data for at least two days. The battery lifetime also depends on the cache module size. For more information, see the controller QuickSpecs on the HP Product Bulletin website (http://www.hp.com/go/productbulletin).
—	Double blink, then pause	The cache microcontroller is waiting for the host controller to communicate.
—	One blink per second	The battery pack is below the minimum charge level and is being charged. Features that require a battery (such as write cache, capacity expansion, stripe size migration, and RAID migration) are temporarily unavailable until charging is complete. The recharge process takes between 15 minutes and 2 hours, depending on the initial capacity of the battery.
—	Steady glow	The battery pack is fully charged, and posted write data is stored in the cache.
—	Off	The battery pack is fully charged, and write data is not posted in the cache.
One blink per second	One blink per second	An alternating green and amber blink pattern indicates that the cache microcontroller is executing from within its boot loader and receiving new flash code from the host controller.
Steady glow	—	There is a short circuit across the battery terminals or within the battery pack. BBWC features are disabled until the battery pack is replaced. The life expectancy of a battery pack is typically more than three years.
One blink per second	—	An open circuit is across the battery terminals or within the battery pack. BBWC features are disabled until the battery pack is replaced. The life expectancy of a battery pack is typically more than three years.

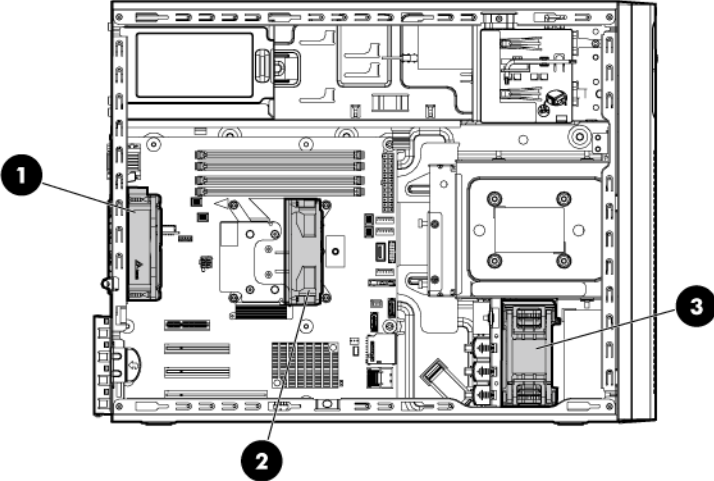
FBWC module LEDs

The FBWC module has two single-color LEDs (green and amber). The LEDs are duplicated on the reverse side of the cache module to facilitate status viewing.



1 Green LED	2 Amber LED	Interpretation
Off	On	A backup is in progress.
Flashing (1 Hz)	On	A restore is in progress.
Flashing (1 Hz)	Off	The capacitor pack is charging.
On	Off	The capacitor pack has completed charging.
Flashing (2 Hz) Alternating with amber LED	Flashing (2 Hz) Alternating with green LED	One of the following conditions exists: <ul style="list-style-type: none"> The charging process has timed out. The capacitor pack is not connected.
On	On	The flash code image failed to load.
Off	Off	The flash code is corrupt.

Fan locations



Item	Description
1	Rear system fan (for processor cooling)
2	Processor-heatsink fan assembly
3	Front system fan (for expansion board cooling)

Operations

Power up the server

1. Connect each power cord to the server.
2. Connect each power cord to the power source.
3. Press the Power On/Standby button.

The server exits standby mode and applies full power to the system. The system power LED changes from amber to green.

Power down the server

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



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.



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

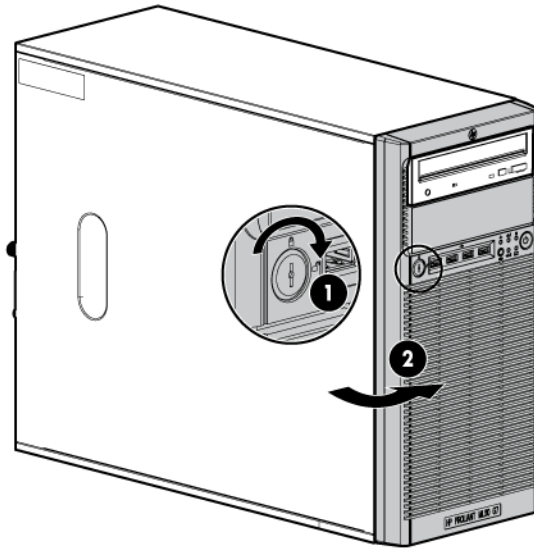
To power down the server, use one of the following methods:

- 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.
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.

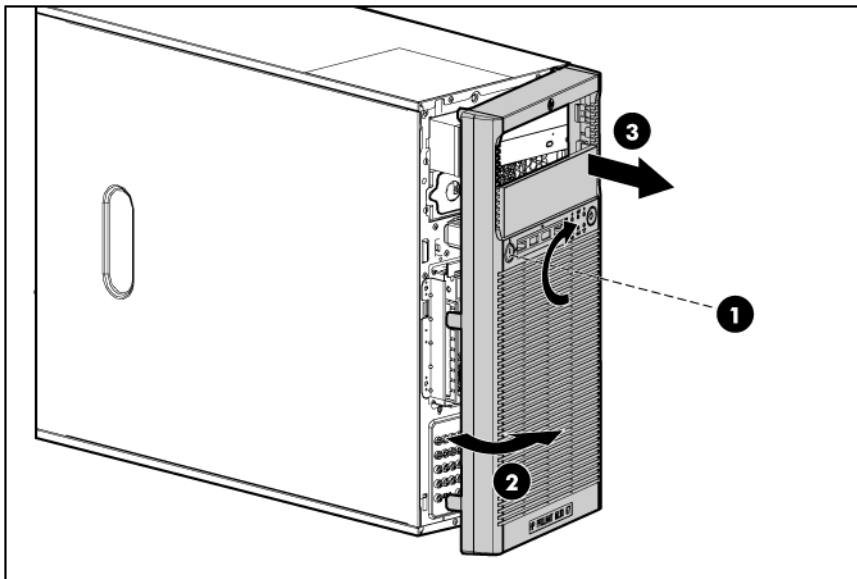
Unlock and open the tower bezel

The tower bezel must be unlocked and opened to access the drive cage and media bays. It must be unlocked to remove the access panel. The bezel must remain closed during normal server operations.



Remove the tower bezel

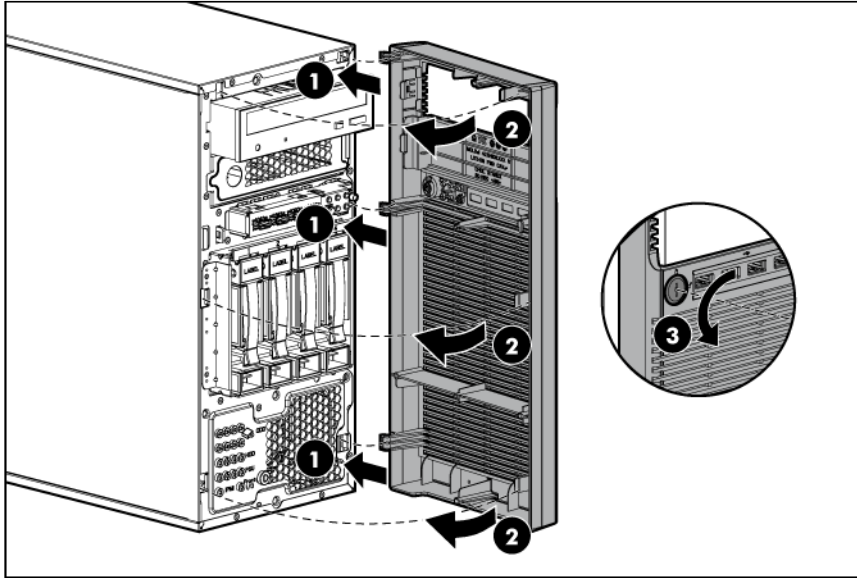
1. Unlock and open the tower bezel (on page 20).
2. Pull the bezel away from the front chassis.



Install the tower bezel

1. Insert the tabs on the tower bezel into the slots on the front chassis.

2. Close and lock the tower bezel.



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. If the server supports hot-plug components, minimize the amount of time the access panel is open.

1. Power down the server (on page 19).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Unlock the tower bezel ("Unlock and open the tower bezel" on page 20).
4. Place the server on its side.
5. Remove the thumbscrew on the access panel.
6. Slide the access panel back.
7. Lift the access panel away from the chassis.

Install the access panel

⚠ 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.

1. Place the access panel on the chassis, and then slide it toward the front of the server.
2. Tighten the thumbscrew.
3. Close and lock the tower bezel.

4. Connect each power cord to the server.
5. Connect each power cord to the power source.



IMPORTANT: Be sure that the panel is locked into place securely before powering up the server.

6. Power up the server (on page 19).

Remove the air baffle



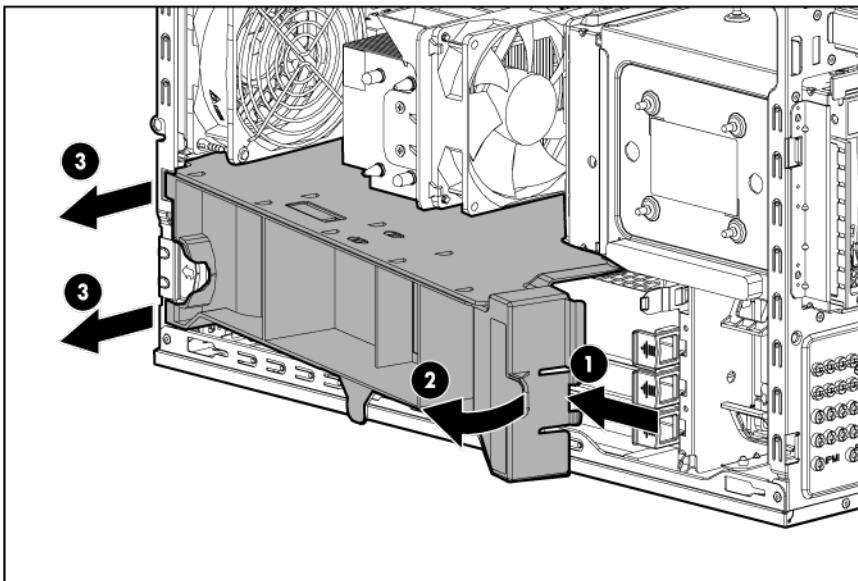
CAUTION: For proper cooling, do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-plug components, minimize the amount of time the access panel is open.

1. Power down the server (on page 19).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Unlock the tower bezel ("Unlock and open the tower bezel" on page 20).
4. Remove the access panel (on page 21).



CAUTION: Do not detach the cable that connects the battery pack to the cache module. Detaching the cable causes any unsaved data in the cache module to be lost.

5. Remove the air baffle.

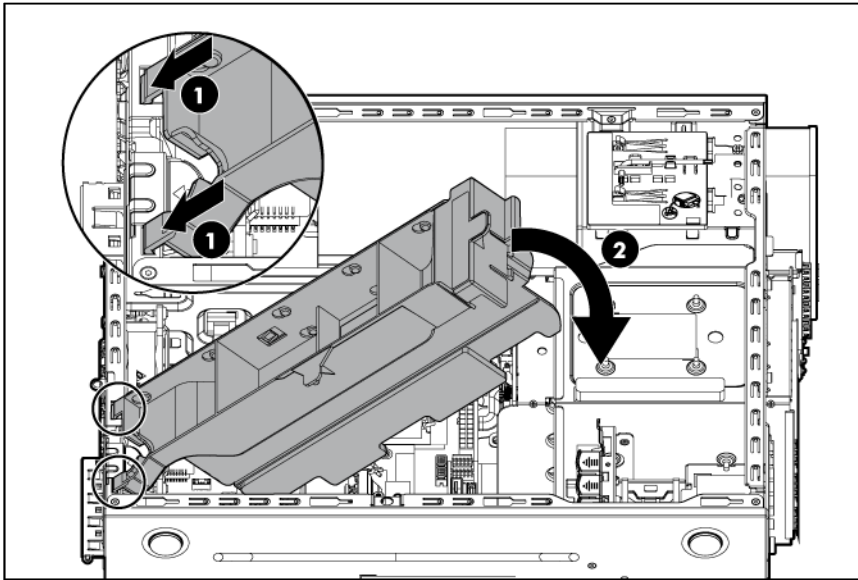


Install the air baffle



CAUTION: For proper cooling, do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-plug components, minimize the amount of time the access panel is open.

1. Insert the tabs on the baffle into the slots on the rear chassis.
2. Push the front end of the baffle inside the chassis.



3. Install the access panel (on page 21).
4. Lock the tower bezel.
5. Connect each power cord to the server.
6. Connect each power cord to the power source.
7. Power up the server (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 ProLiant Essentials (HP SIM and RDP)
- 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

Leave at least a 7.6-cm (3-inch) clearance space at the front and back of the server for proper ventilation.

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.

Identifying the contents of the server shipping carton

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, Documentation CD, and software products

In addition to the supplied items, you might need:

- Operating system or application software
- Hardware options


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 30)."


Setting up a tower server

To set up a tower server, follow these steps. To install the server into a rack, see [Installing a server into a rack](#) ("[Installing a server in a rack](#)" on page 26).

1. 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 NIC connectors.

2. Connect the power cord to the rear of the server.
3. 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 a server in a rack

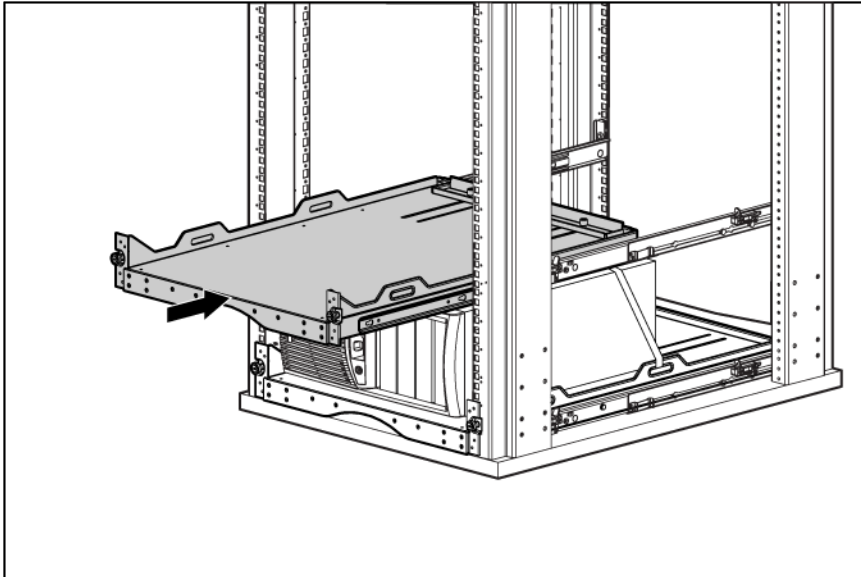
The procedure to install the tray in the rack is similar to the procedures to install a server in a rack. For more information, see the *2U Quick Deploy Rail System Installation Instructions* that shipped in the rail kit.



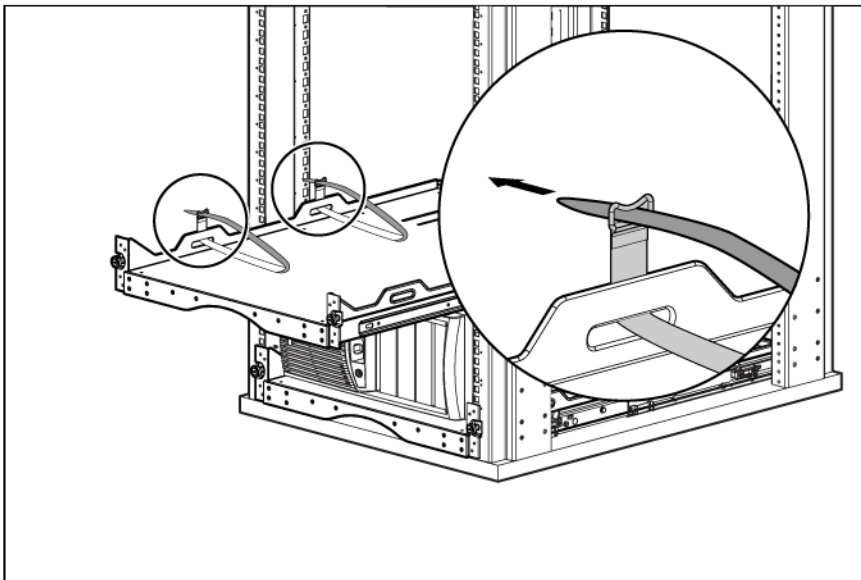
CAUTION: To avoid damage to the equipment, be sure that the rack rails are installed in a predetermined location on the rack so that airflow clearance issues are resolved. For airflow clearance information, refer to the documentation that ships with the server.

To install the component:

1. See the "Installing the Product into a Rack" section of the *2U Quick Deploy Rack Rail System Installation Instructions* to do the following:
 - a. Install the component rails on the tray.
 - b. Install the rack rails in the rack.
2. Install the tray onto the rack rails, and then partially slide the assembly into the rack.



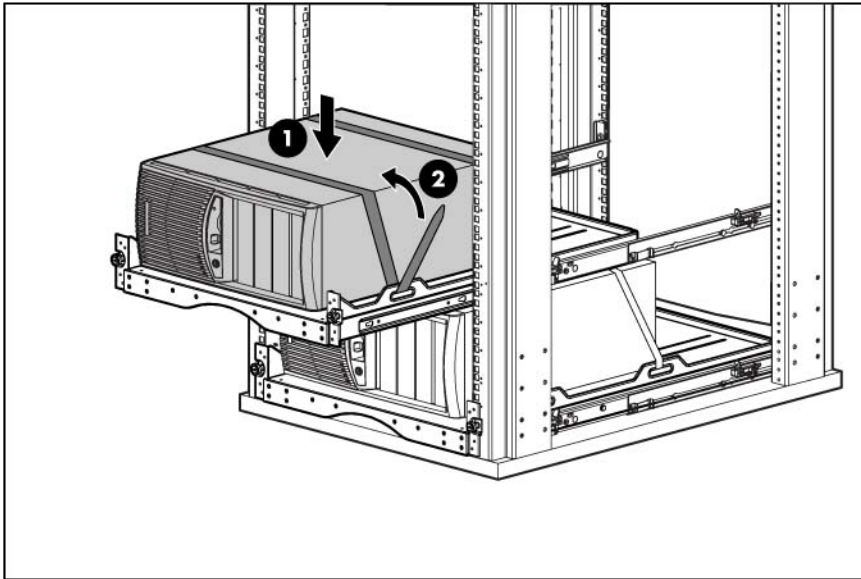
3. Attach the straps to the tray.



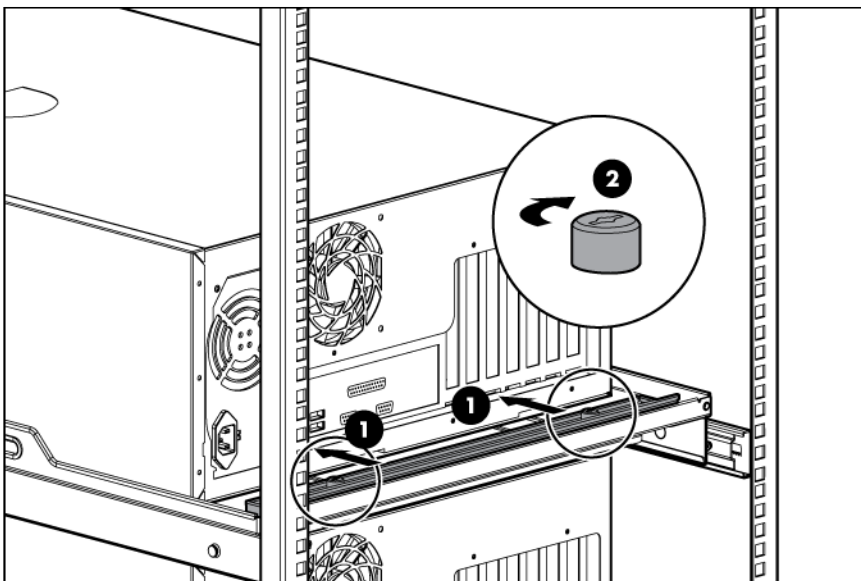
4. Place the server on the tray, and then secure the server to the tray.



CAUTION: To prevent damage to equipment, do not place the monitor on a rack-mounted server. The rack enabling kit supports only the server.



5. Slide the tray fully into the rack, and then tighten the thumbscrews.
6. Slide the locking bracket forward, and then tighten the thumbscrews.



Powering up and configuring the server

To power up the server, press the Power On/Standby button.

While the server boots, RBSU and the ORCA utility are automatically configured to prepare the server for operating system installation.

To configure these utilities manually:

- Press the **F8** key when prompted during the array controller initialization to configure the array controller using ORCA.

- Press the **F9** key when prompted during the boot process to change the server settings using RBSU. The system is set up by default for the English language.

For more information on the automatic configuration, refer to the *HP ROM-Based Setup Utility User Guide* located on the Documentation CD.

Installing the operating system

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

Methods to install an operating system on the server include:

- SmartStart assisted installation—Insert the SmartStart CD into the DVD-ROM drive and reboot the server.
- Manual installation—Insert the operating system CD into the DVD-ROM drive and reboot the server. You might have to obtain additional drivers from the HP website (<http://www.hp.com/support>).

For more information, see the SmartStart installation poster in the HP ProLiant Essentials Foundation Pack included with the server.


Registering the server


To register the server, see the HP 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.

HP product QuickSpecs

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

SAS and SATA drive options

The server provides non-hot-plug capability through an embedded SATA controller. To obtain hot-plug capability, install an optional controller and hot-plug cable option kit. The server supports up to four non-hot-plug or hot-plug LFF drives and up to eight hot-plug SFF drives.

Drive installation guidelines


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

- The system automatically sets all drive numbers.
- If only one drive is used, install it in the bay with the lowest drive number.
- When drives are grouped together into the same drive array, they must be of the same capacity to provide the greatest storage space efficiency.

Optional storage controllers provide support for hot-plug capability and drive LEDs. Controller options are:

- The embedded controller supports non-hot-plug SATA drives. Drive LEDs are not supported.
- Optional SATA controllers support hot-plug SATA drives and drive LEDs.
- Optional SAS controllers support hot-plug SAS or SATA drives and drive LEDs.

Installing a 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.

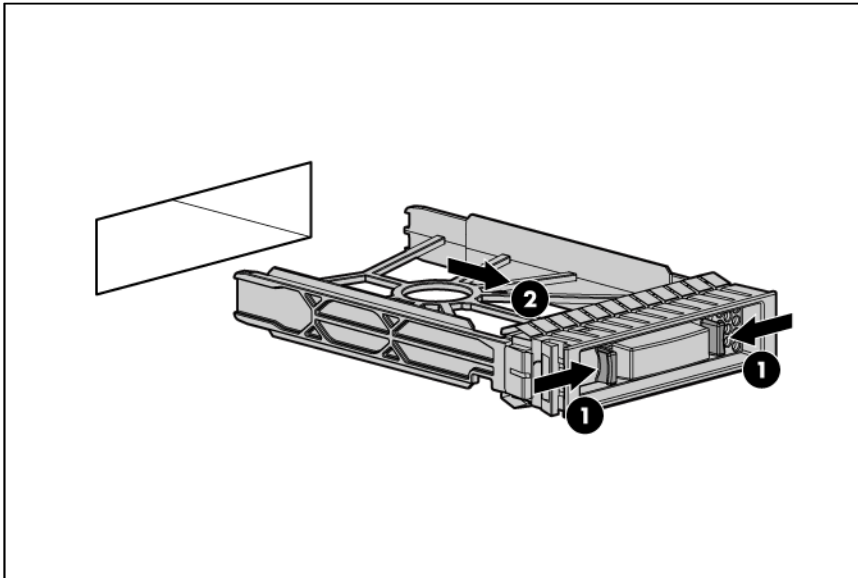


IMPORTANT: Hot-plug capability and drive LED support are only available when a supported optional controller is installed in the server.

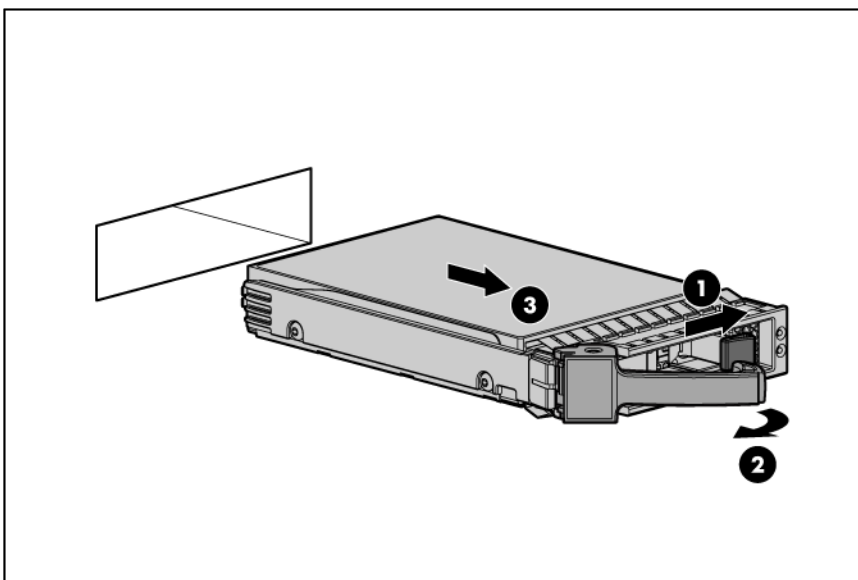


IMPORTANT: If only one drive is being installed, install it in the bay with the lowest drive number. For drive installation guidelines, see "Drive installation guidelines (on page 30)."

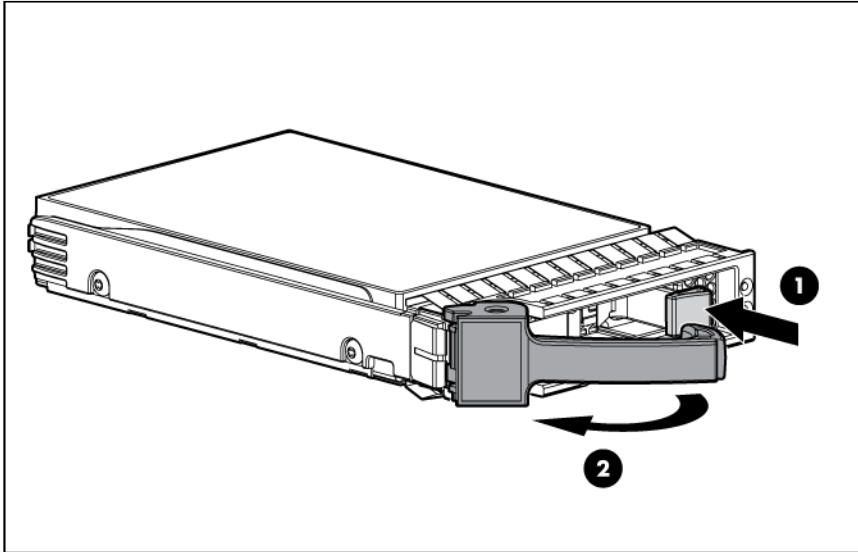
1. Power down the server if performing a non-hot-plug installation or maintenance procedure ("Power down the server" on page 19).
2. Remove the tower bezel (on page 20).
3. Do one of the following:
 - o Remove the drive blank.



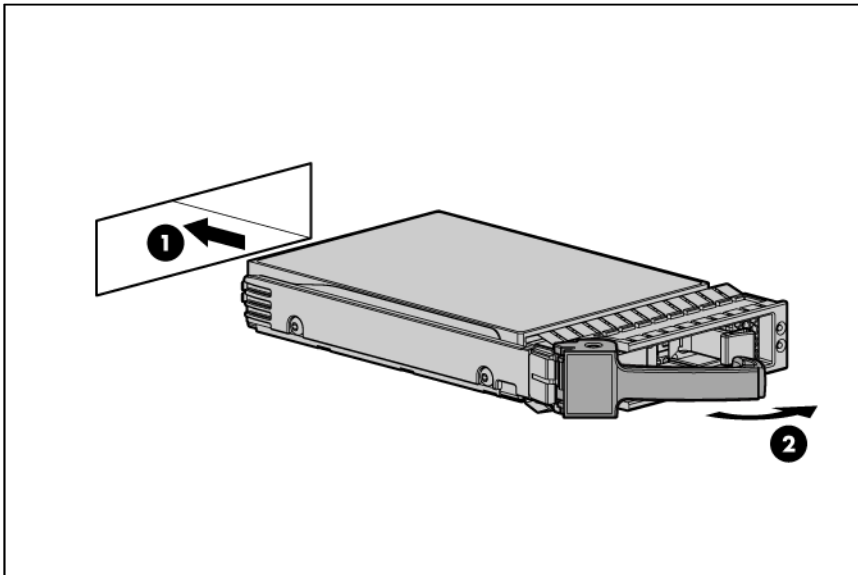
- o Remove the drive.



4. Prepare the drive.



5. Install the drive.



6. Install the tower bezel (on page 20).
7. Power up the server (on page 19).

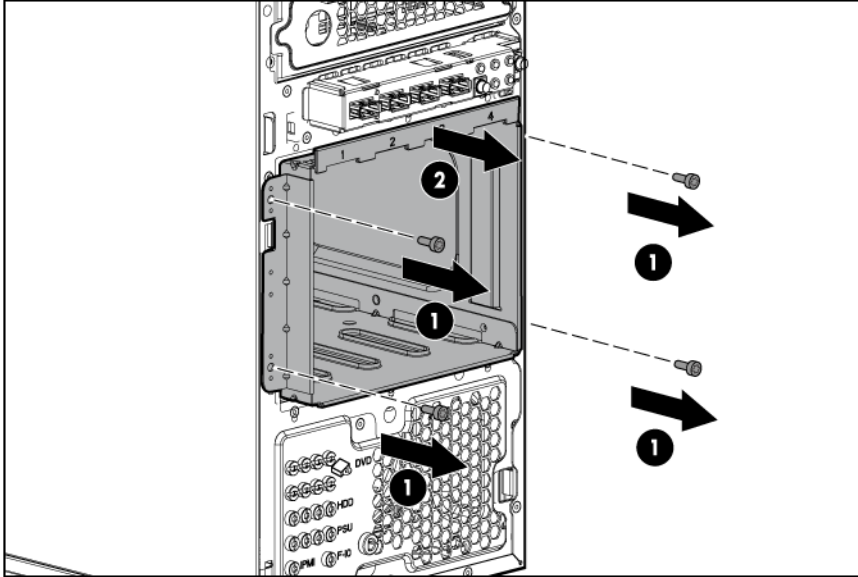
Drive cage options

Four-bay LFF hot-plug drive cage option

To install the component:

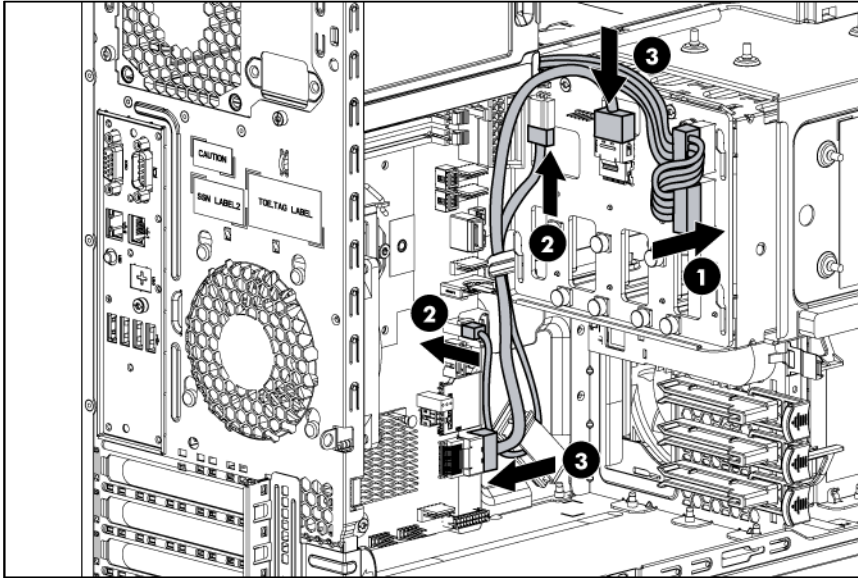
1. Power down the server (on page 19).
2. Remove all power:
 - a. Disconnect each power cord from the power source.

- b. Disconnect each power cord from the server.
- 3. Unlock the tower bezel ("[Unlock and open the tower bezel](#)" on page 20).
- 4. Remove the access panel (on page 21).
- 5. Remove all installed drives.
- 6. Disconnect the drive cage cables.
- 7. Using a T-15 Torx screwdriver, remove the four screws, and then remove the drive cage assembly.



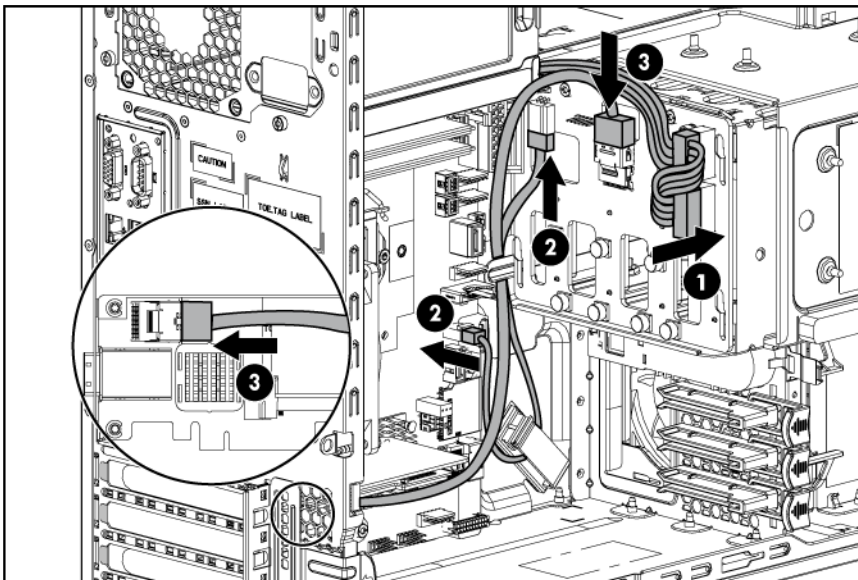
- 8. Slide the optional drive cage assembly partially into the server chassis.
- 9. Connect the drive backplane cables:
 - a. Connect the power cable to the backplane.
 - b. Connect the I²C cable.
 - c. Do one of the following:
 - Connect the Mini-SAS cable to the system board (SATA drive support only).

For cable routing information, see "Hot-plug, SATA drive support (on page 61)."

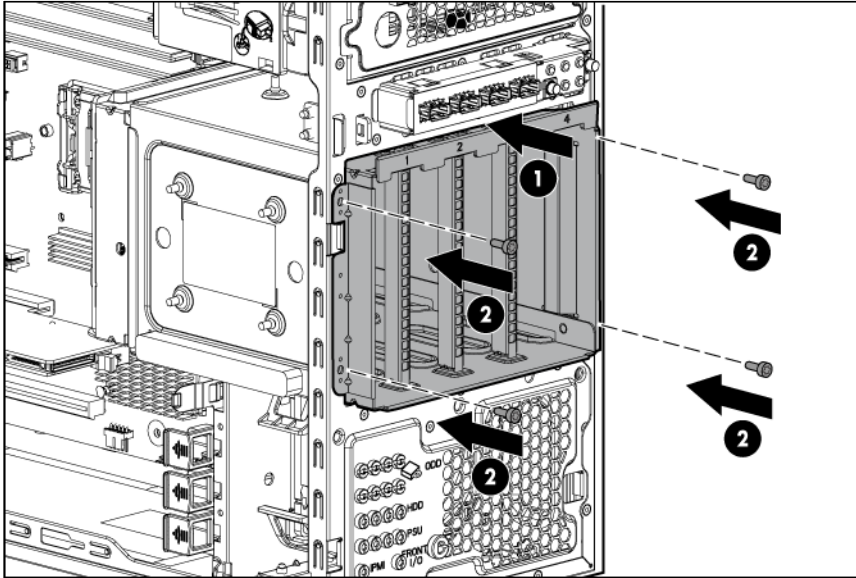


- Connect one end of the Mini-SAS cable to the backplane and the other end to a HP Smart Array SAS RAID controller card connector (SAS drive support only).

For cable routing information, see "Hot-plug, SAS drive support (on page 61)."



10. Slide the drive cage assembly fully into the server chassis and install the four screws.



11. Install the drives ("Installing a drive" on page 30).

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.

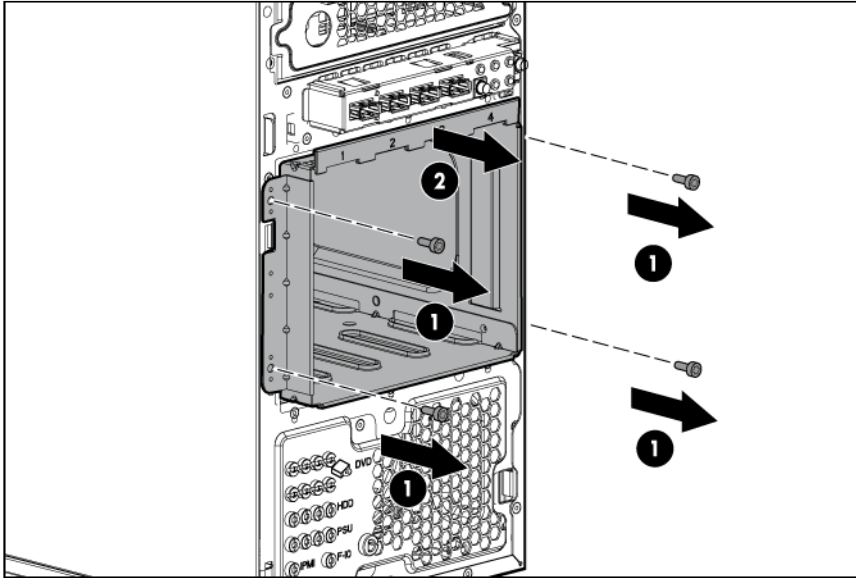
12. Install the access panel (on page 21).
13. Lock the tower bezel.
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. Power up the server (on page 19).

Eight-bay SFF hot-plug drive cage option

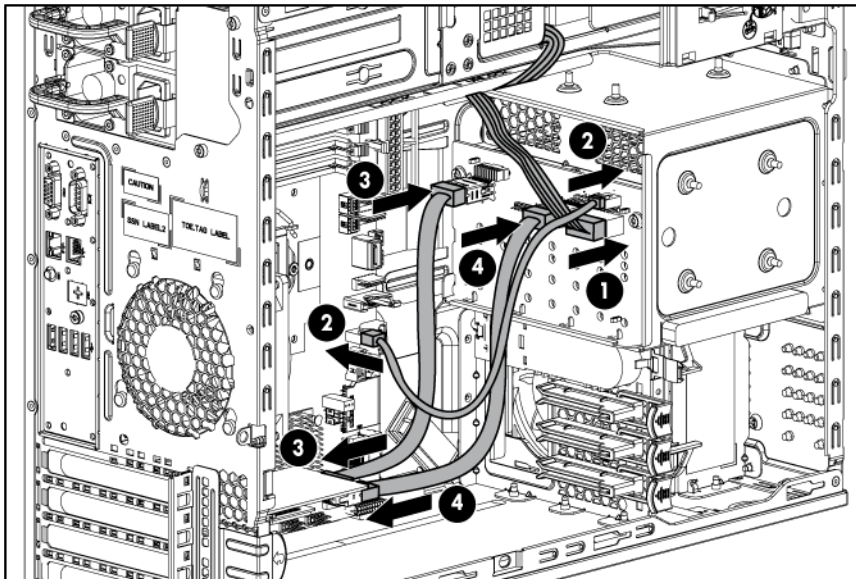
To install the component:

1. Power down the server (on page 19).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Unlock the tower bezel ("Unlock and open the tower bezel" on page 20).
4. Remove the access panel (on page 21).
5. Remove all installed drives.
6. Disconnect the drive cage cables.

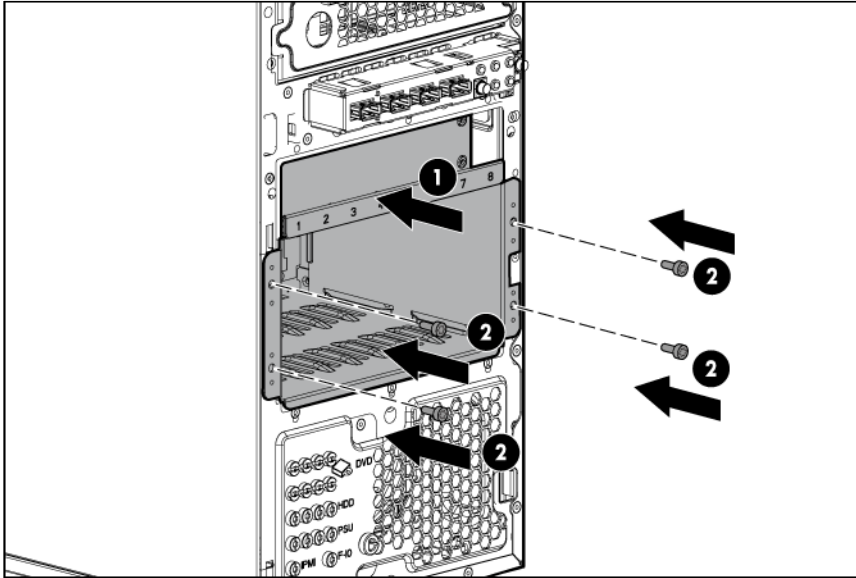
- Using a T-15 Torx screwdriver, remove the four screws, and then remove the drive cage assembly.



- Slide the SFF drive cage assembly partially into the server chassis.
- Connect the drive backplane cables:
 - Connect the power cable to the backplane.
 - Connect the I²C cable.
 - Connect both Mini-SAS cables to the HP Smart Array SAS RAID controller card connector.For cable routing information, see "Eight-bay SFF drive cabling (on page 62)."



10. Slide the drive cage assembly fully into the server chassis and install the four screws.



11. Install the drives ("Installing a drive" on page 30).

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.

12. Install the access panel (on page 21).
13. Lock the tower bezel.
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. Power up the server (on page 19).

Drive LED cable option

The SAS drive LED cable provides LED functionality for non-hot-plug SAS drives when an optional SAS controller and an optional SAS controller cable are installed.

To install the component:

1. Power down the server (on page 19).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Unlock the tower bezel ("Unlock and open the tower bezel" on page 20).
4. Remove the access panel (on page 21).
5. Install the optional SAS controller. For more information, see "Expansion boards ("Expansion board options" on page 48)."
6. Connect the SAS drive LED cable to the system board (pin J40) and to the SAS controller.
7. Install the access panel (on page 21).
8. Lock the tower bezel.

9. Connect each power cord to the server.
10. Connect each power cord to the power source.
11. Power up the server (on page 19).

Storage controller option



IMPORTANT: For additional installation and configuration information, refer to the documentation that ships with the option.

To install the component:

1. Power down the server (on page 19).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Unlock the tower bezel ("Unlock and open the tower bezel" on page 20).
4. Remove the access panel (on page 21).
5. Remove the drive cables.
6. Install the storage controller into slot 1.
For more information, see the documentation that ships with the option.
7. Connect the storage controller cable to the controller and to the drive.
For more information, see "Storage cabling (on page 60)."
8. Install the access panel (on page 21).
9. Lock the tower bezel.
10. Connect each power cord to the server.
11. Connect each power cord to the power source.
12. Power up the server (on page 19).


For more information about the controller and its features, see the *HP Smart Array Controllers for HP ProLiant Servers User Guide* on the HP website (http://www.hp.com/support/SAC_UG_ProLiantServers_en). To configure arrays, see the *Configuring Arrays on HP Smart Array Controllers Reference Guide* on the HP website (http://www.hp.com/support/CASAC_RG_en).


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>).


BBWC battery/FBWC capacitor pack and module option




CAUTION: To prevent a server malfunction or damage to the equipment, do not add or remove the battery pack while an array capacity expansion, RAID level migration, or stripe size migration is in progress.

 **CAUTION:** After the server is powered down, wait 15 seconds and then check the amber LED before unplugging the cable from the cache module. If the amber LED blinks after 15 seconds, do not remove the cable from the cache module. The cache module is backing up data, and data is lost if the cable is detached.

 **IMPORTANT:** The battery pack might have a low charge when installed. In this case, a POST error message is displayed when the server is powered up, indicating that the battery pack is temporarily disabled. No action is necessary on your part. The internal circuitry automatically recharges the batteries and enables the battery pack. This process might take up to four hours. During this time, the cache module functions properly, but without the performance advantage of the battery pack.

 **CAUTION:** The cache module connector does not use the industry-standard DDR3 mini-DIMM pinout. Do not use the controller with cache modules designed for other controller models, because the controller can malfunction and you can lose data. Also, do not transfer this cache module to an unsupported controller model, because you can lose data.

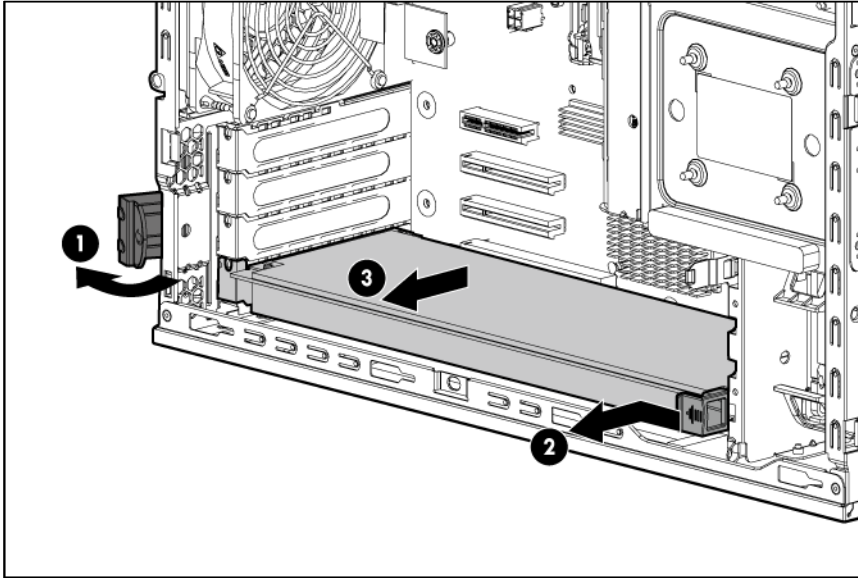
NOTE: The data protection and the time limit also apply if a power outage occurs. When power is restored to the system, an initialization process writes the preserved data to the hard drives.

 **CAUTION:** In systems that use external data storage, be sure that the server is the first unit to be powered down and the last to be powered back up. Taking this precaution ensures that the system does not erroneously mark the drives as failed when the server is powered up.

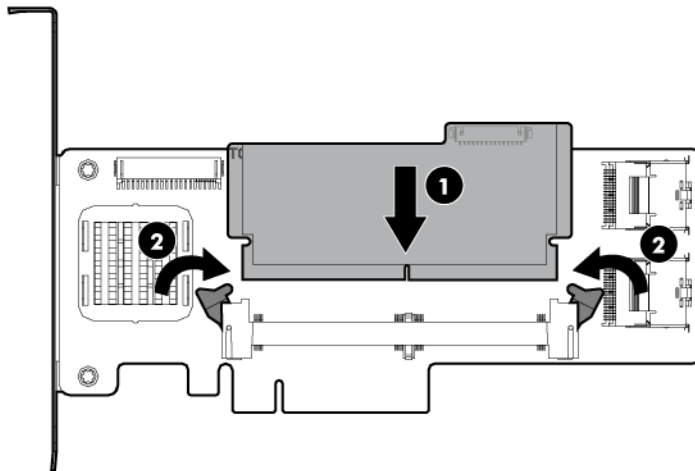
To install the component:

1. Back up all server data.
2. Close all applications.
3. Power down the server (on page 19).
4. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
5. Unlock the tower bezel ("[Unlock and open the tower bezel](#)" on page 20).
6. Remove the access panel (on page 21).
7. Remove the air baffle (on page 22).
8. Open the expansion slot cover retainer.

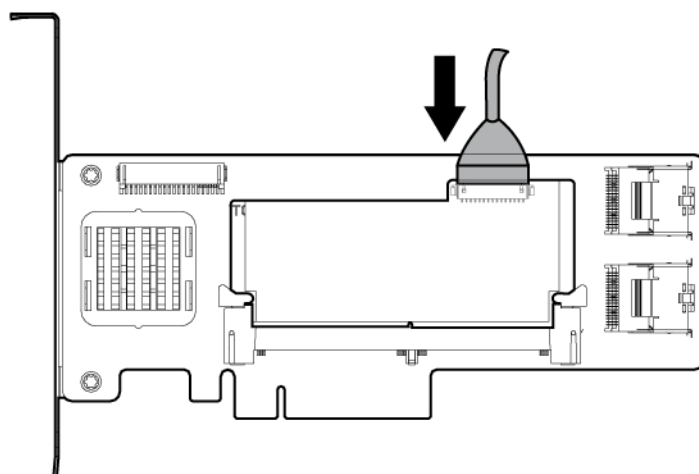
9. Remove the full-length expansion board retainer if any full-length expansion boards are installed.



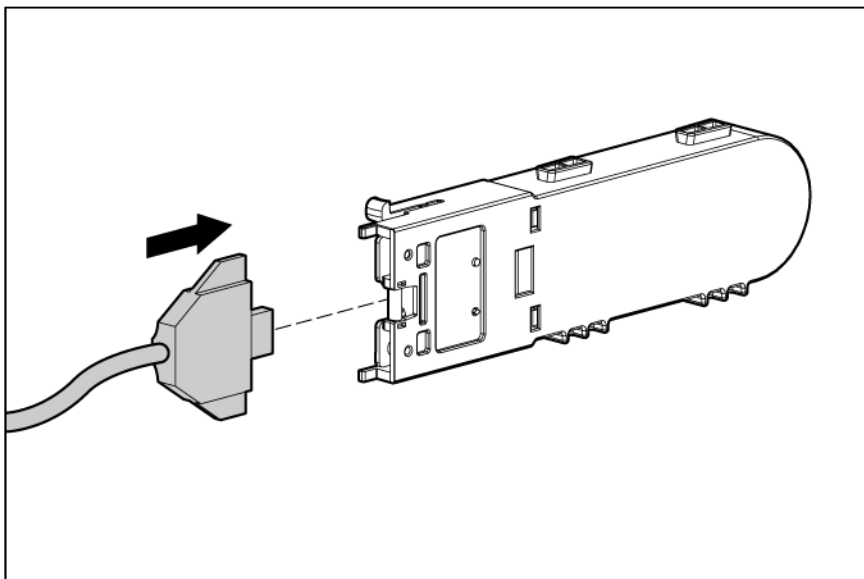
10. Install the storage controller, if not installed.
11. Install the cache module on the storage controller.



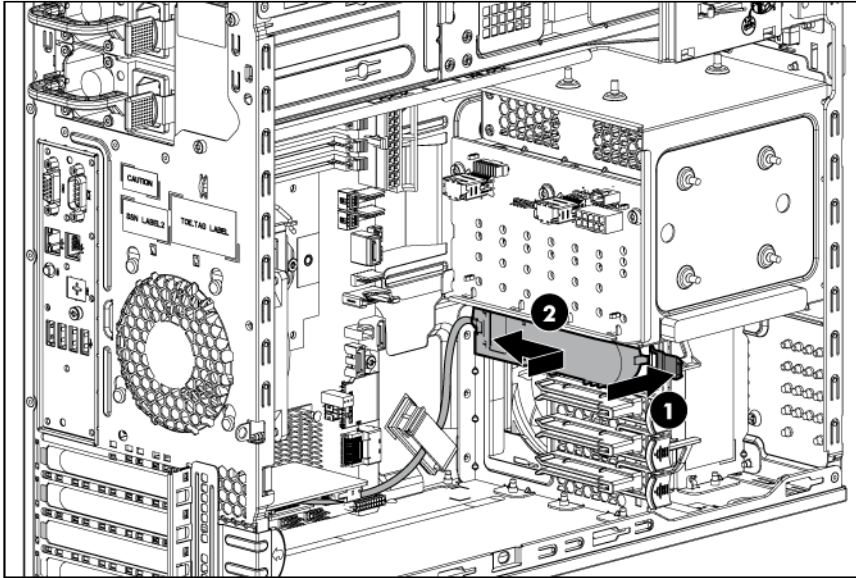
12. Connect the battery/capacitor pack cable to the cache module.



13. Connect the battery/capacitor pack cable to the pack.



14. Install the battery/capacitor pack.



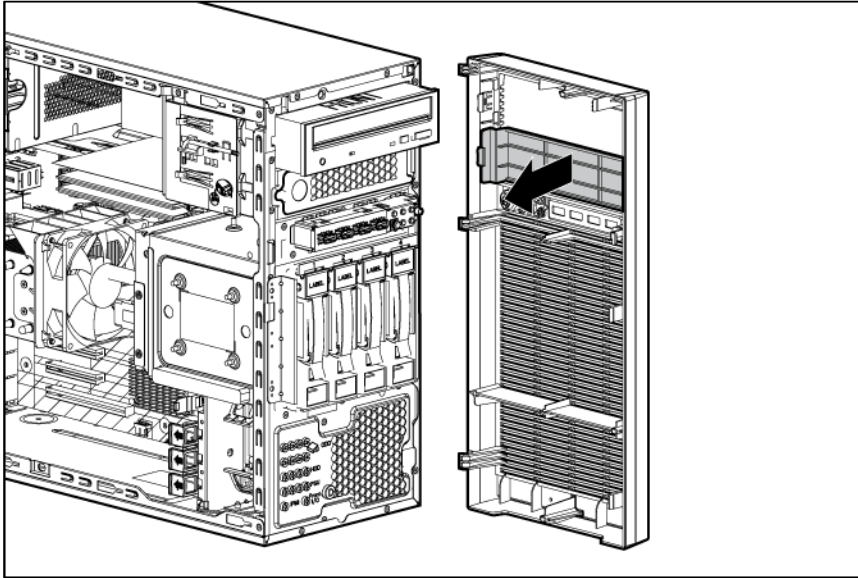
15. Install the full-length expansion board retainer, if any full-length expansion boards were removed.
16. Install the air baffle (on page 22).
17. Install the access panel (on page 21).
18. Lock the tower bezel.
19. Connect each power cord to the server.
20. Connect each power cord to the power source.
21. Power up the server (on page 19).

Optical drive option

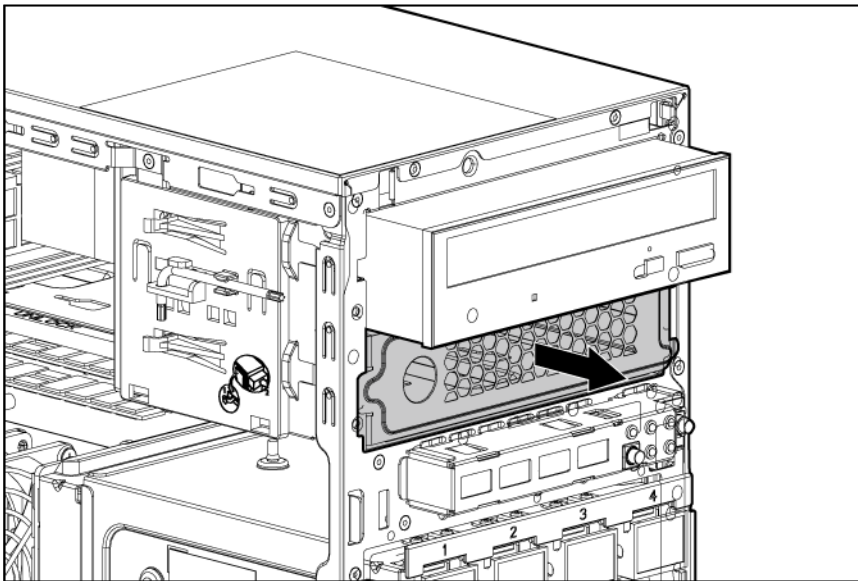
To install the component:

1. Power down the server (on page 19).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Unlock the tower bezel ("[Unlock and open the tower bezel](#)" on page 20).
4. Remove the access panel (on page 21).

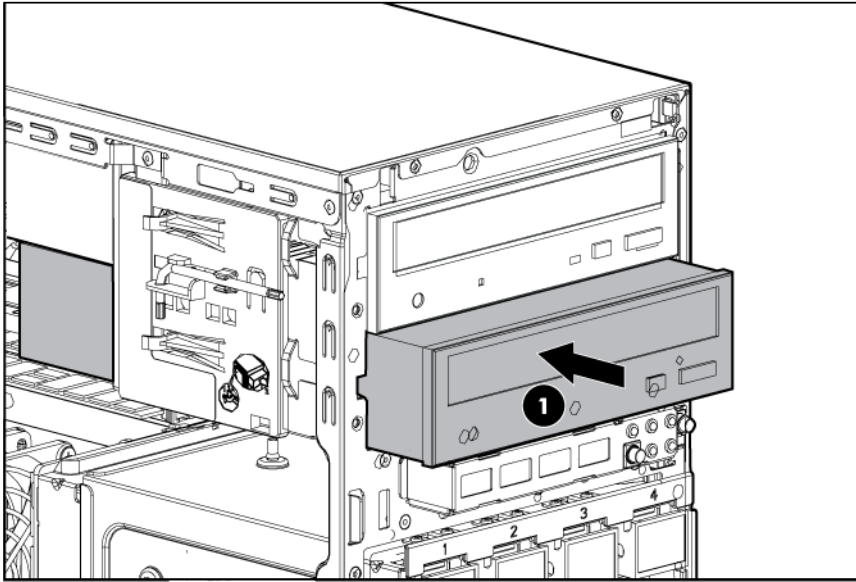
5. Remove the optical bay blank.



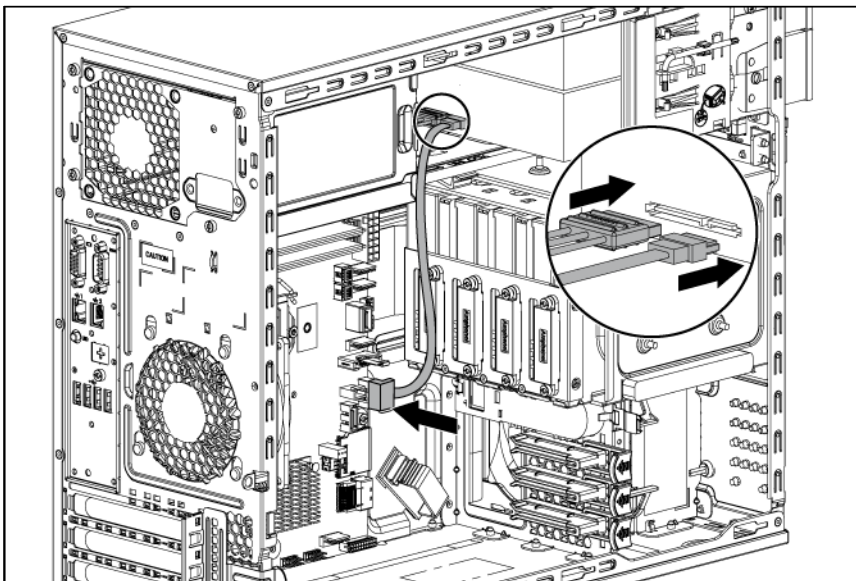
6. Remove the EMI shield. Retain the shield for future use.



7. Install the optical drive into the lower optical drive bay. When fully inserted, the assembly locking latch clicks.



8. Connect the drive cables:
 - a. Connect the power cable to the drive.
 - b. Connect one end of the SATA cable to the drive and the other end to the system board.
For cable routing information, see "Optical drive cabling (on page 63)."



9. Install the access panel (on page 21).
10. Lock the tower bezel.
11. Connect each power cord to the server.
12. Connect each power cord to the power source.
13. Power up the server (on page 19).

Memory options

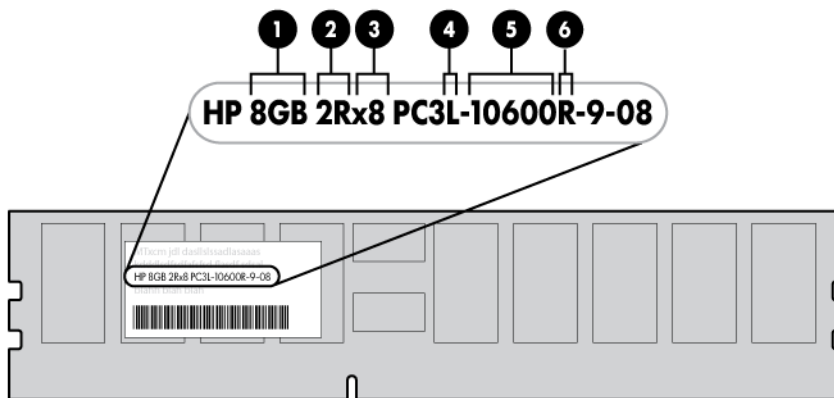
The server memory subsystem supports only UDIMMs.

The server supports dual-rank, PC3-10600E (DDR3) DIMMs operating at a speed of 1333 MHz.

Depending on the processor model and the number of DIMMs installed, the memory clock speed might be reduced to 1066 or 800 MHz. For more information, see "General DIMM slot population guidelines (on page 47)."

DIMM identification

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



Item	Description	Definition
1	Size	—
2	Rank	1R = Single-rank 2R = Dual-rank 3R = Three-rank 4R = Quad-rank
3	Data width	x4 = 4-bit x8 = 8-bit
4	Voltage rating	L = Low voltage (1.35V) U = Ultra low voltage (1.25V) Blank or omitted = Standard
5	Memory speed	12800 = 1600-MT/s 10600 = 1333-MT/s 8500 = 1066-MT/s
6	DIMM type	R = RDIMM (registered) E = UDIMM (unbuffered with ECC) L = LRDIMM (load reduced)

For the latest supported memory information, see the QuickSpecs on the HP website (<http://h18000.www1.hp.com/products/quickspecs/ProductBulletin.html>). At the website, choose the geographic region, and then locate the product by name or product category.

Single-rank and dual-rank DIMMs

DIMM configuration requirements are based on these classifications:

- Single-rank DIMM—One set of memory chips that is accessed while writing to or reading from the memory.
- Dual-rank DIMM—Two single-rank DIMMs on the same module, with only one rank 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-rank DIMMs provide the greatest capacity with the existing memory technology. For example, if current DRAM technology supports 2-GB single-rank DIMMs, a dual-rank DIMM would be 4 GB.

Memory subsystem architecture

The memory subsystem in this server is divided into channels. Each channel supports two DIMM slots.

Channel	Slot	Slot number
A	C	1
	A	2
B	D	3
	B	4

This server supports UDIMMs.

DIMM slots in this server are identified by number and by letter. Letters identify the population order. Slot numbers are reported by ROM messages during boot and for error reporting. For the DIMM slot locations, see "DIMM slot locations (on page 11)."

Memory configuration

To optimize server availability, the server supports Advanced ECC. This feature provides the greatest memory capacity for a given DIMM size, while providing up to 8-bit error correction, depending on the specific DIMM type. This mode is the default option for this server.

Advanced Memory Protection options are configured in 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 "HP ROM-Based Setup Utility (on page 66)."

For the latest memory configuration information, see the product QuickSpecs on the HP Product Bulletin website (<http://www.hp.com/go/productbulletin>).

ECC memory configuration

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 by using Standard ECC, the error is sent to the server and causes the server to halt.

UDIMM maximum memory configurations

The server supports a maximum of 16 GB, using 1-GB, 2-GB, and 4-GB single- or dual-rank UDIMMs.

General DIMM slot population guidelines

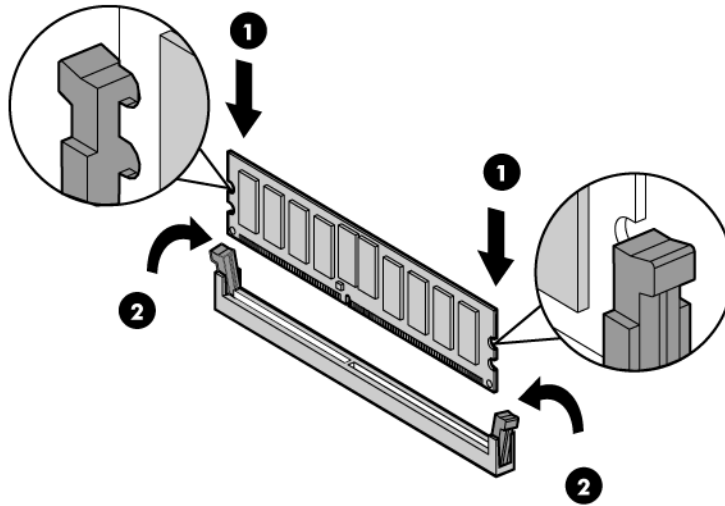
- The server has four memory slots.
- The server supports two channels with two DIMM slots per channel.
 - Memory channel A consists of the two DIMM slots that are closest to the processor.
 - Memory channel B consists of the two DIMM slots that are farthest from the processor.
- White DIMM slot indicates the first slot of a channel (2-A, 4-B).
- Memory speed support depends on the type of processor installed. See the technical specification of the installed processor for more information.
- The server supports dual-rank, 1333 MT/s ECC DIMMs.
- The server supports up to 16-GB (4x4 GB) DIMMs.
- The server does not support:
 - LV-DIMMs
 - RDIMMs
 - Non-ECC DIMMs
- When installing DIMMs:
 - If the processor is not installed, then do not install DIMMs
 - Populate the DIMM slots in the sequence: 2-A, 4-B, 1-C, 3-D
 - The DIMM slot farthest from the processor (either CHA or CHB) must be populated first
 - Populate DIMM slots from heaviest load (double-rank) to lightest load (single-rank)
 - Use HP-qualified DIMMs

NOTE: The server does not support Elpida 1G/2G/4G UDIMM memory.

Installing a DIMM

1. Power down the server (on page 19).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Unlock the tower bezel ("[Unlock and open the tower bezel](#)" on page 20).
4. Remove the access panel (on page 21).
5. Open the DIMM slot latches.

6. Install the DIMM.



7. Install the access panel (on page 21).
8. Lock the tower bezel.
9. Connect each power cord to the server.
10. Connect each power cord to the power source.
11. Power up the server (on page 19).

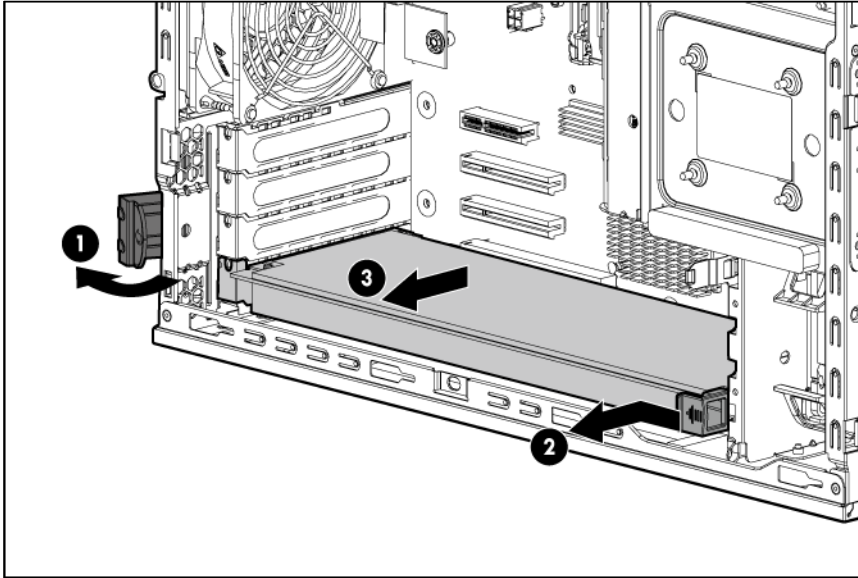
Expansion board options

The server supports PCIe Gen 2 expansion boards.

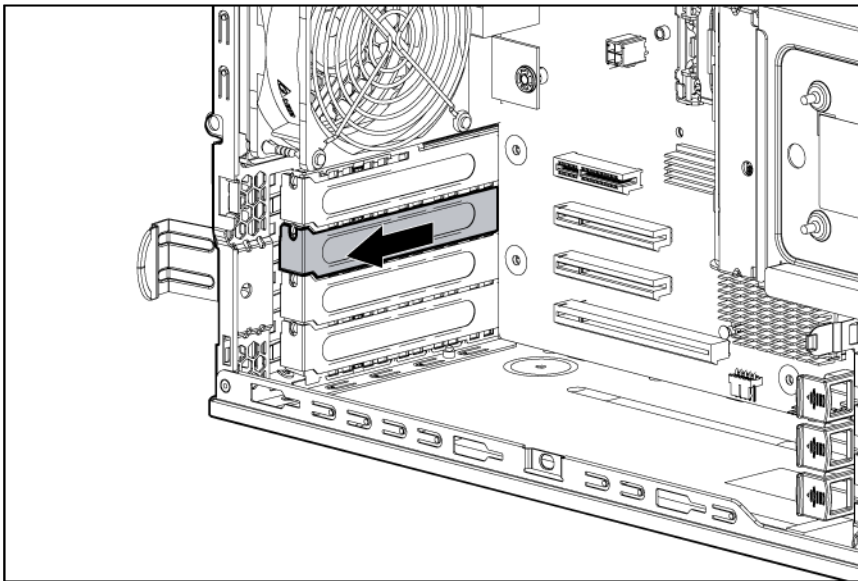
Installing an expansion board

1. Power down the server (on page 19).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Unlock the tower bezel ("[Unlock and open the tower bezel](#)" on page 20).
4. Remove the access panel (on page 21).
5. Remove the air baffle (on page 22).
6. Open the expansion slot cover retainer.

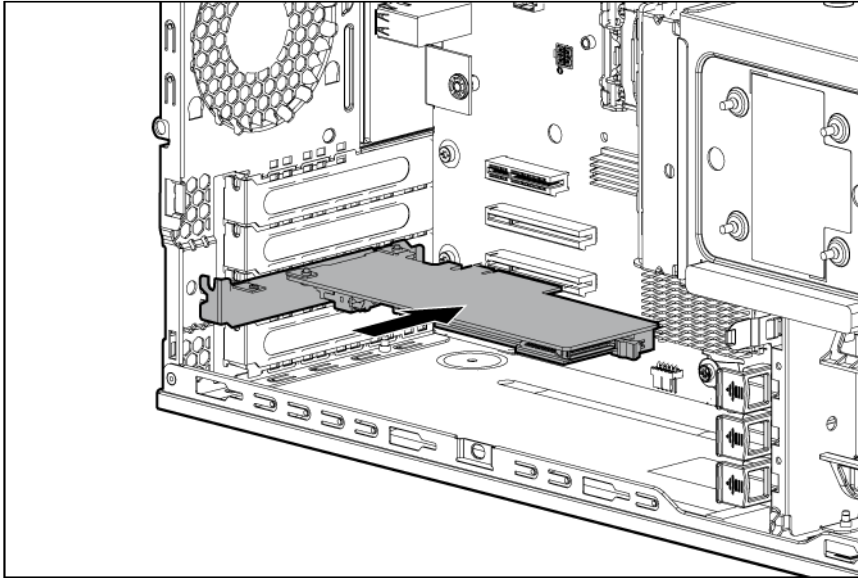
7. Remove the full-length expansion board retainer if any full-length expansion boards are installed.



8. Remove the expansion slot cover.



9. Install the expansion board.



10. Connect any required internal or external cables to the expansion board. See the documentation that ships with the expansion board.
11. If installing a full-length expansion board, install back the board retainer.
12. Install the air baffle (on page 22).
13. Install the access panel (on page 21).
14. Lock the tower bezel.
15. Connect each power cord to the server.
16. Connect each power cord to the power source.
17. Power up the server (on page 19).

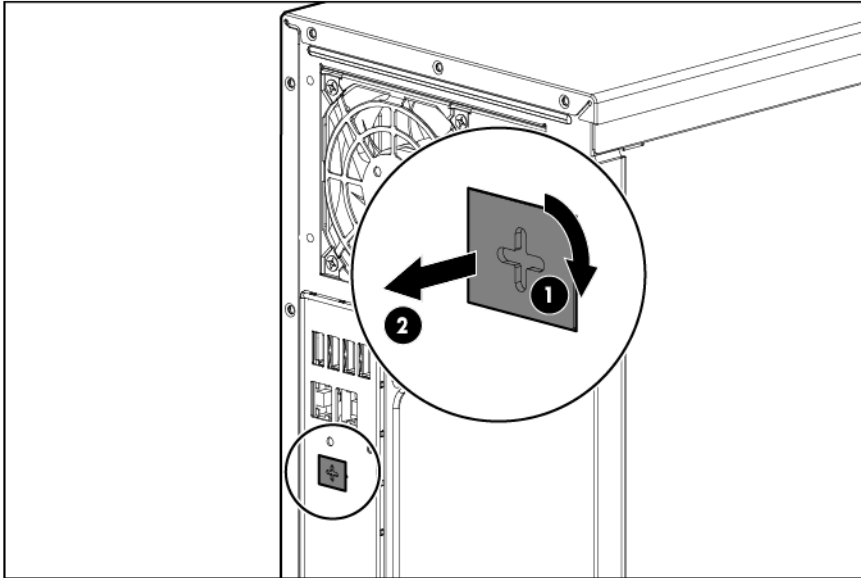
Dedicated iLO management port option

NOTE: Depending on model purchased, the server may look slightly different than shown.

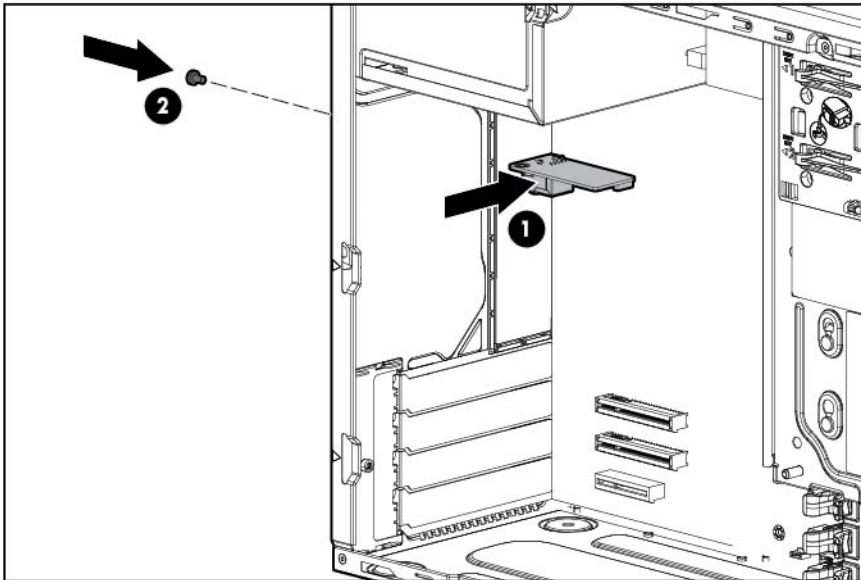
To install the component:

1. Power down the server (on page 19).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Unlock the tower bezel ("[Unlock and open the tower bezel](#)" on page 20).
4. Remove the access panel (on page 21).

- Using a flat screwdriver, toggle the knockout to loosen it, and then pull it out of the chassis.



- Install the dedicated iLO management module.



- Install the access panel (on page 21).
- Lock the tower bezel.
- Connect each power cord to the server.
- Connect each power cord to the power source.
- Power up the server (on page 19).

Enabling the dedicated iLO management port

The onboard NIC 1/shared iLO connector is set as the default system iLO port.

To enable the installed dedicated iLO module:

- During the server startup sequence after module installation, to access iLO RBSU, press the **F8** key.

2. Select the **Network** menu.
3. Click the **Network Interface Adapter** field.
4. To change the setting to **ON**, press the spacebar.
5. To save the new settings, press the **F10** key.
6. Select the **File** menu, and then to close iLO RBSU, click **Exit**.
7. To confirm exiting iLO RBSU, click **OK**. The server automatically reboots.



IMPORTANT: If the iLO RBSU settings are reset to the default values, access to the machine will be lost. Access the physical machine, and then set the **Network Interface Adapter** field to **ON**.

HP Trusted Platform Module option

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

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 54).
3. Enabling the Trusted Platform Module (on page 55).

Enabling the TPM requires accessing RBSU ("HP ROM-Based Setup Utility" on page 66). For more information about RBSU, see the HP website (<http://www.hp.com/go/ilomgmtengine/docs>).

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:

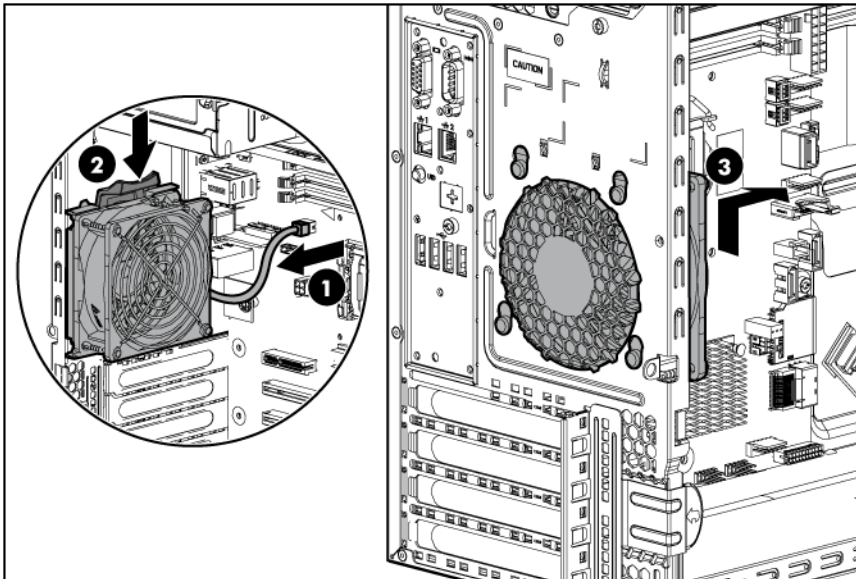
- Do not remove an installed TPM. Once installed, the TPM becomes a permanent part of the system board.
- When installing or replacing hardware, HP service providers cannot enable the TPM or the encryption technology. For security reasons, only the customer can enable these features.
- When returning 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, 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.

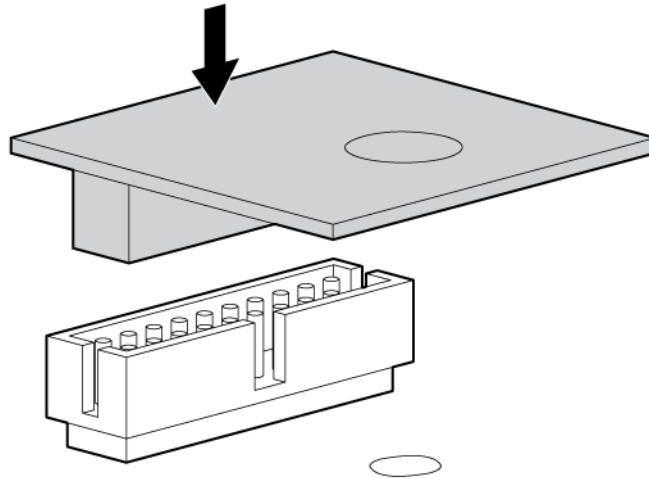
⚠ WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

1. Power down the server (on page 19).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Unlock the tower bezel ("Unlock and open the tower bezel" on page 20).
4. Remove the access panel (on page 21).
5. Remove the rear system fan.

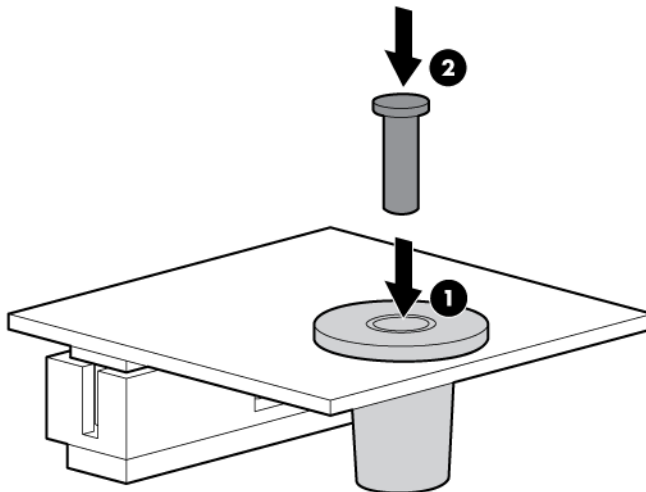


⚠ CAUTION: Any attempt to remove an installed TPM from the system board breaks or disfigures the TPM security rivet. Upon locating a broken or disfigured rivet on an installed TPM, administrators should consider the system compromised and take appropriate measures to ensure the integrity of the system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

6. Install the TPM board. Press down on the connector to seat the board.



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



8. Install the rear system fan.
9. Install the access panel (on page 21).
10. Lock the tower bezel.
11. Connect each power cord to the server.
12. Connect each power cord to the power source.
13. Power up the server (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. When prompted during the start-up sequence, access RBSU by pressing the **F9** key.
2. From the Main Menu, select **Server Security**.
3. From the Server Security Menu, select **Trusted Platform Module**.
4. From the Trusted Platform Module Menu, select **TPM Functionality**.
5. Select **Enable**, and then press the **Enter** key to modify the TPM Functionality setting.
6. Press the **Esc** key to exit the current menu, or press the **F10** key to exit RBSU.
7. Reboot the server.
8. Enable the TPM in the OS. For OS-specific instructions, see the OS documentation.


 **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>).

RPS enablement option

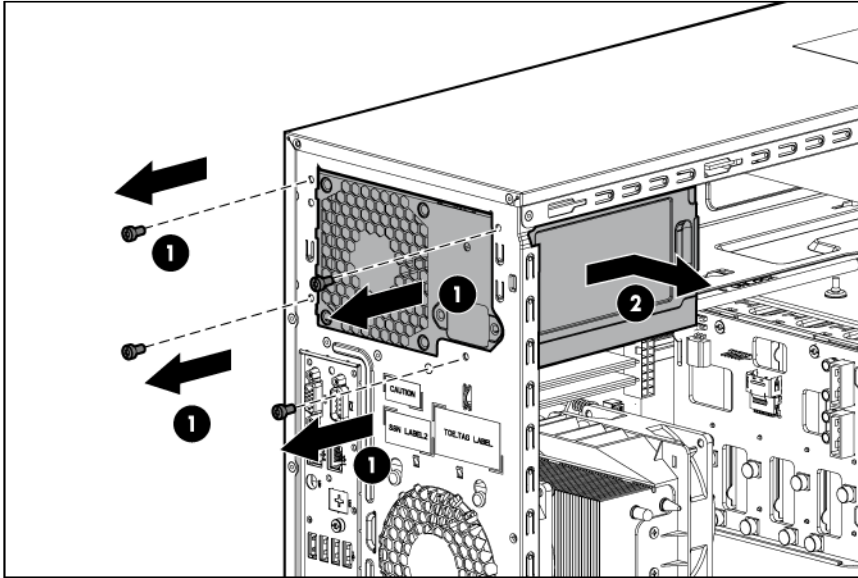
Only the upper optical drive bay is available after installation of the RPS Enablement Kit.

 **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.

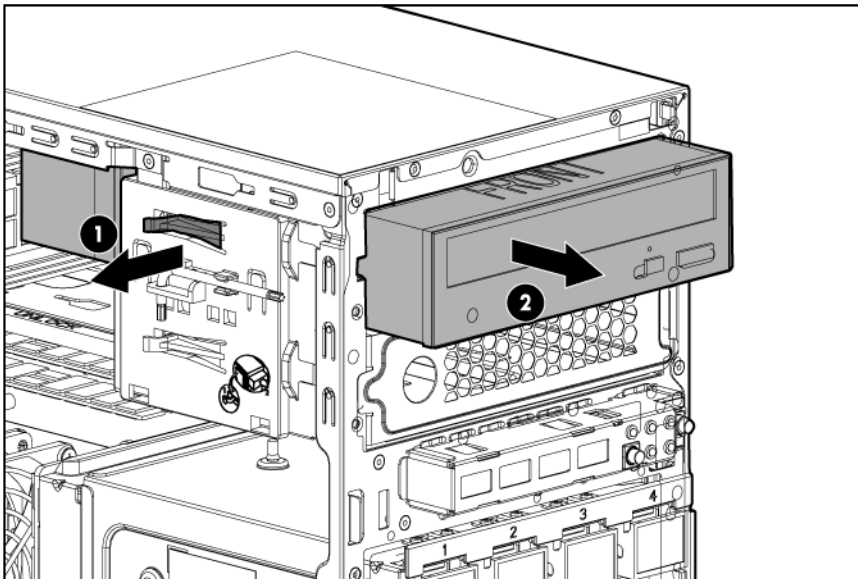
To install the component:

1. Power down the server (on page 19).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Unlock the tower bezel ("Unlock and open the tower bezel" on page 20).
4. Remove the access panel (on page 21).
5. Disconnect all drive power cables and the non-hot-plug power supply cables.

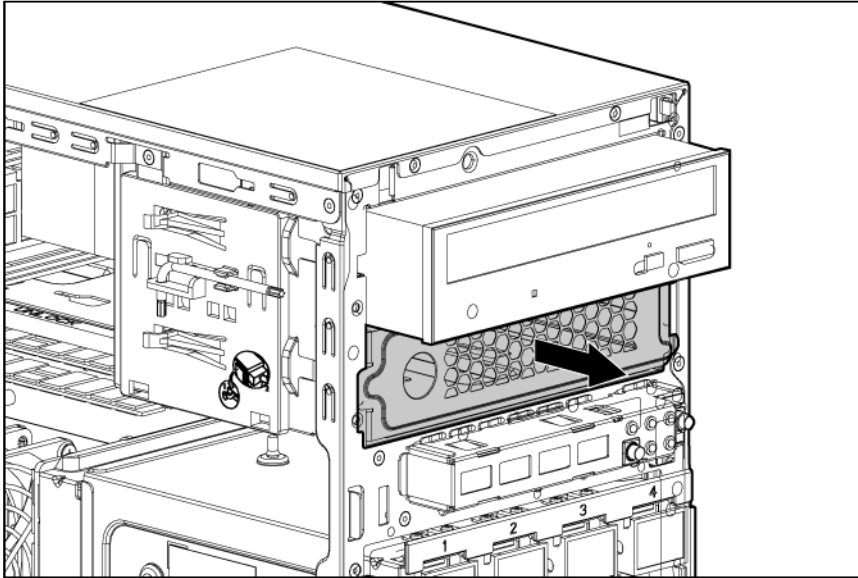
6. Remove the power supply.



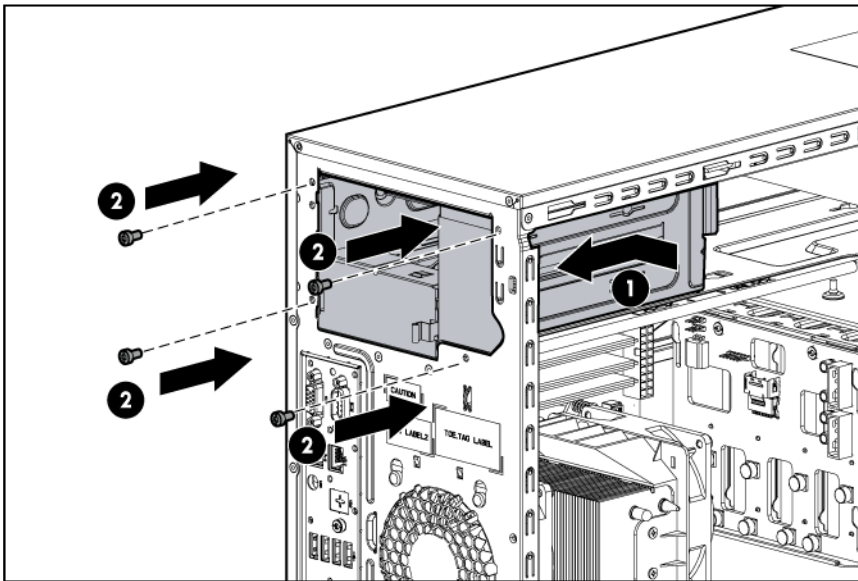
7. Disconnect all cables from installed optical drives.
8. Remove all installed devices and any EMI shields from the optical drive bays ("[Optical drive option](#)" on page 42).
 - o Remove the optical drive



- Remove the EMI shield.

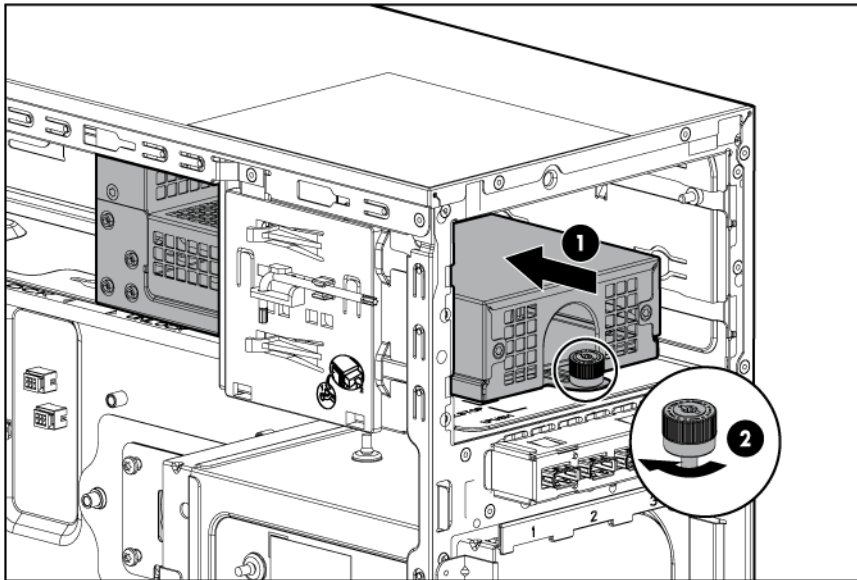


9. Install the RPS cage.



10. Insert the RPS backplane module cables into the optical drive cage, and then slide in the module into the lower optical drive bay. Align the left edge of the module with the guide mark on the bay.

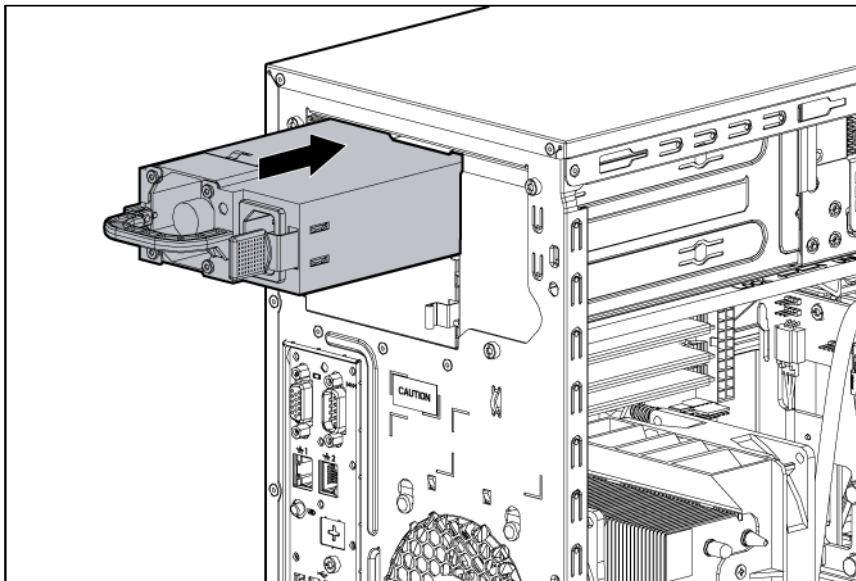
NOTE: The RPS Option Kit is sold separately.



11. Do one of the following:

- For improved power efficiency, install an HP CS power supply in the upper bay of the RPS cage.

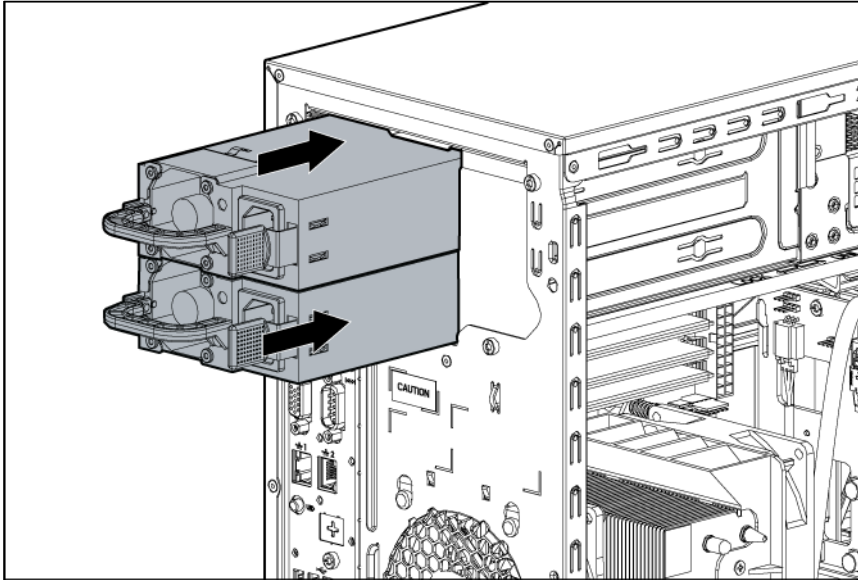
NOTE: To install a second redundant power supply in the redundant power supply cage, first remove the cage EMI shield.



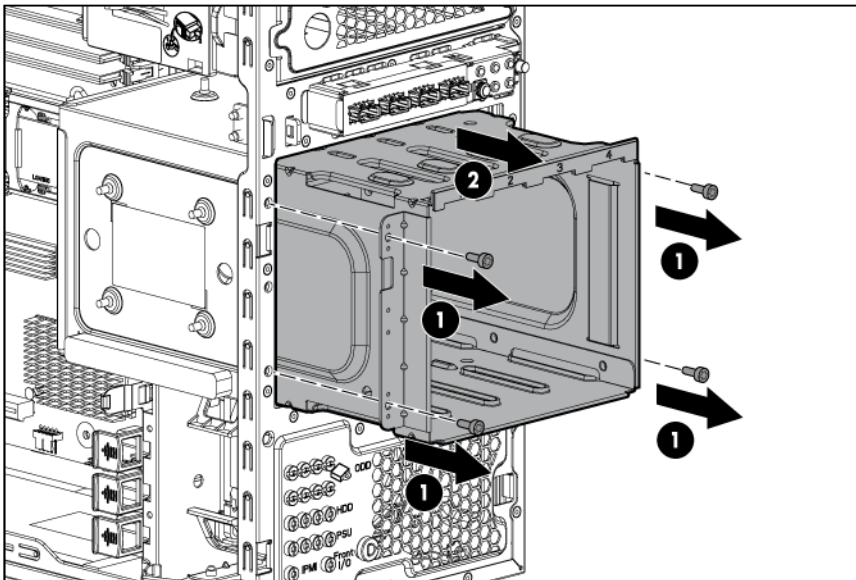
CAUTION: The default and redundant power supplies in the server must have the same output power capacity. Verify that all power supplies have the same part number and label color. The system becomes unstable and might shut down when it detects mismatched power supplies.

NOTE: To install a second redundant power supply in the redundant power supply cage, first remove the cage EMI shield.

- For improved power efficiency and redundancy, install two HP CS power supplies:



12. Remove the four screws, and then loosen the drive cage.



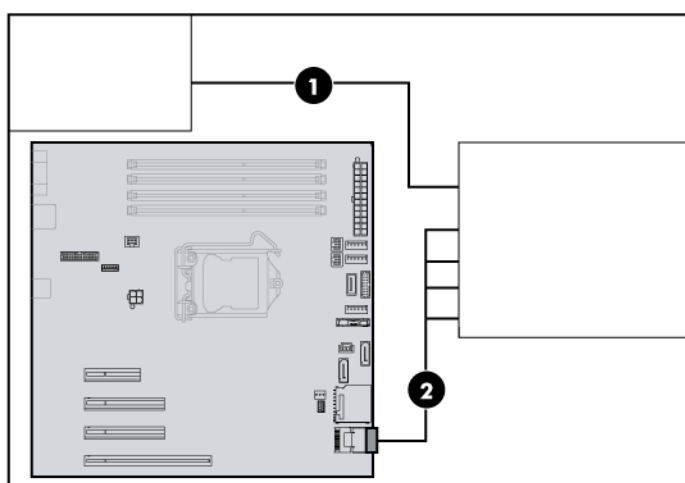
13. Route and connect the redundant power supply cables to the system board.
14. Insert the four screws to tighten the drive cage.
15. Install any device originally installed in the upper optical drive bay.
16. Install the EMI shield in the lower optical drive bay.
17. Install the access panel (on page 21).
18. If the lower optical bay blank is not attached to the tower bezel, install it.
19. Lock the tower bezel.
20. Connect each power cord to the server.
21. Connect each power cord to the power source.
22. Power up the server (on page 19).

Cabling

Storage cabling

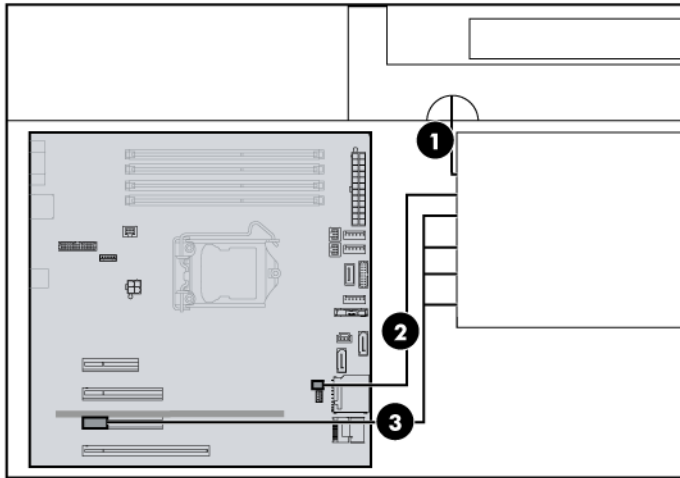
Four-bay LFF drive cabling

Non-hot-plug, SATA drive support



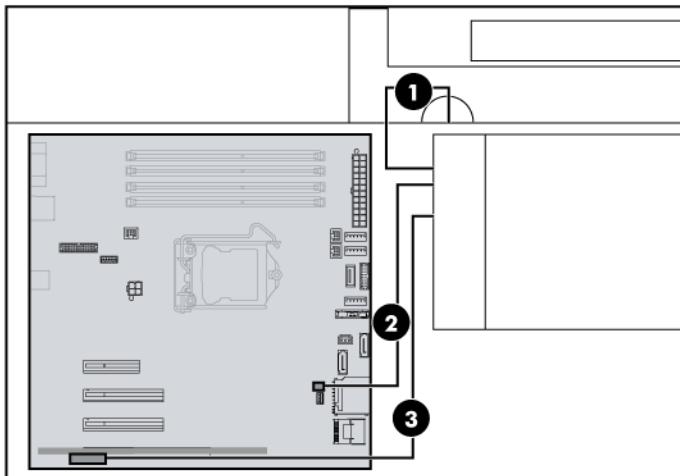
Item	Description
1	Power cable
2	Non-hot-plug LFF SATA to Mini-SAS cable

Hot-plug, SATA drive support



Item	Description
1	Power cable
2	I ² C cable
3	Data cable (Mini-SAS cable to system board Mini-SAS connector card)

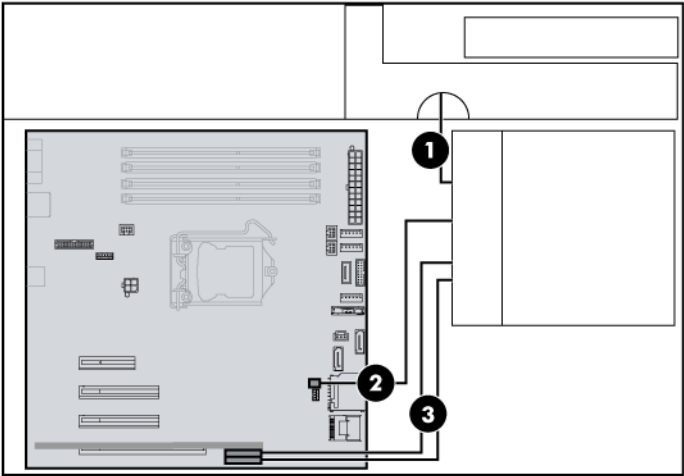
Hot-plug, SAS drive support



Item	Description
1	Power cable
2	I ² C cable
3	Data cable (Mini-SAS cable to optional HP Smart Array P212 controller card)

Eight-bay SFF drive cabling

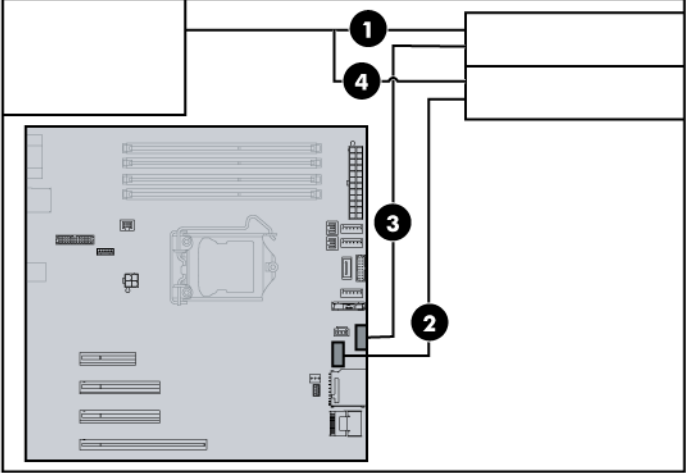
This configuration supports only hot-plug SAS drives.



Item	Description
1	Power cable
2	I ² C cable
3	Mini-SAS cables (2) to optional HP Smart Array P410 controller card

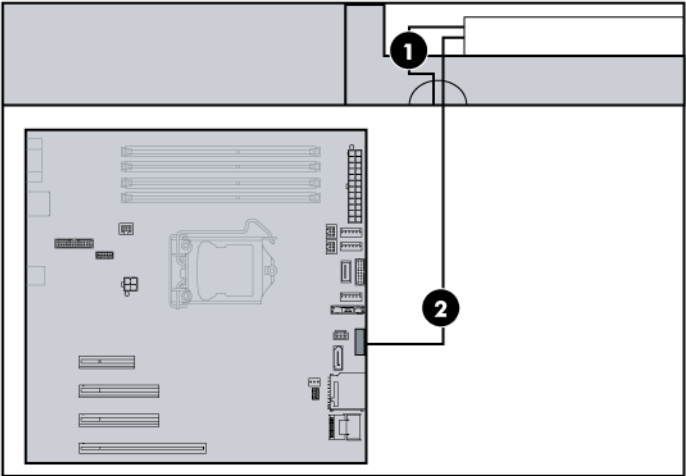
Optical drive cabling

Optical drive cabling in a nonredundant power configuration



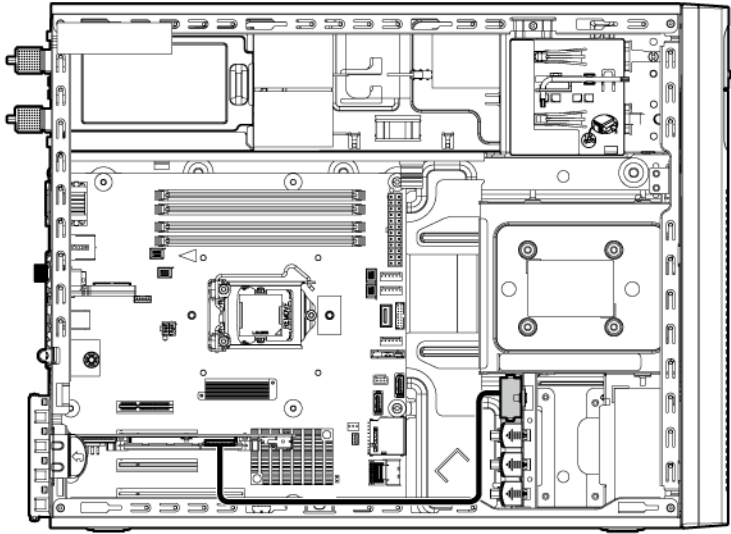
Item	Description
1	Upper optical drive power cable
2	Lower optical drive SATA cable
3	Upper optical drive SATA cable
4	Lower optical drive power cable

Optical drive cabling in a redundant power configuration



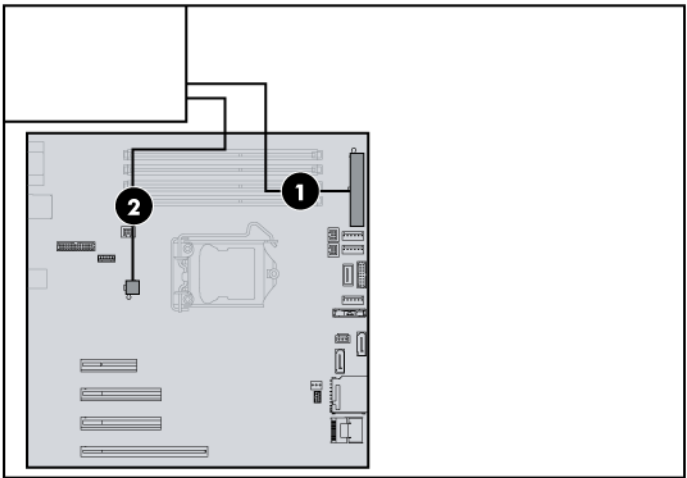
Item	Description
1	Upper media drive power cable
2	Upper media drive SATA cable

Battery/capacitor pack cabling



Power supply cabling

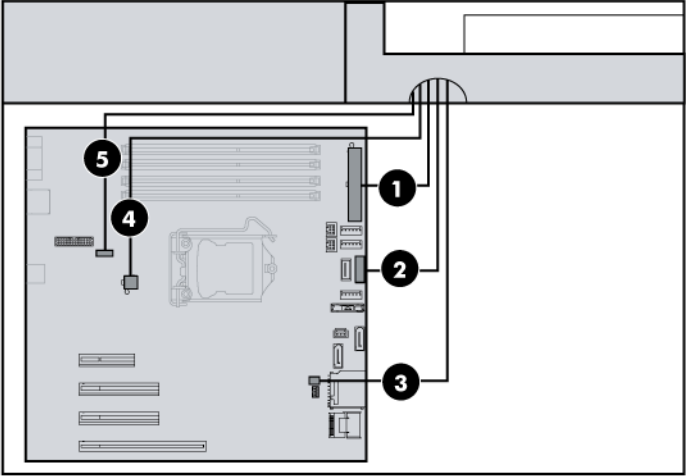
Nonredundant power supply cabling



Item	Description
1	24-pin power cable

Item	Description
2	4-pin power cable

Redundant power supply cabling



Item	Description
1	24-pin power cable
2	16-pin RPS cable
3	3-pin RPS cable
4	4-pin power cable
5	5-pin RPS cable

Configuration and utilities

Configuration tools

SmartStart software

SmartStart is a collection of software that optimizes single-server setup, providing a simple and consistent way to deploy server configuration. SmartStart has been tested on many ProLiant server products, resulting in proven, reliable configurations.

SmartStart assists the deployment process by performing a wide range of configuration activities, including:

- Preparing the system for installing "off-the-shelf" versions of leading operating system software
- Installing optimized server drivers, management agents, and utilities automatically with every assisted installation
- Testing server hardware using the Insight Diagnostics Utility ("HP Insight Diagnostics" on page 71)
- Installing software drivers directly from the CD. With systems that have Internet connection, the SmartStart Autorun Menu provides access to a complete list of ProLiant system software.
- Enabling access to the Array Configuration Utility and Erase Utility (on page 71)

SmartStart is included in the HP Insight Foundation suite for ProLiant. For more information about SmartStart software, see the HP Insight Foundation suite for ProLiant or the HP website (<http://www.hp.com/go/foundation>).

SmartStart Scripting Toolkit

The SmartStart Scripting Toolkit is a server deployment product that allows you to build an unattended automated installation for high-volume server deployments. The SmartStart 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 SmartStart Scripting Toolkit, see the HP website (<http://www.hp.com/servers/sstoolkit>).

HP ROM-Based Setup Utility

RBSU is a configuration utility embedded in HP ProLiant servers that performs a wide range of configuration activities that can include the following:

- Configuring system devices and installed options
- Enabling and disabling system features

- Displaying system information
- Selecting the primary boot controller
- Configuring memory options
- Language selection

For more information on RBSU, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP website (<http://www.hp.com/support/smartstart/documentation>).

Using RBSU

To use RBSU, use the following keys:

- To access RBSU, press the **F9** key during power-up when prompted.
- To navigate the menu system, use the arrow keys.
- To make selections, press the **Enter** key.
- To access Help for a highlighted configuration option, press the **F1** key.



IMPORTANT: RBSU automatically saves settings when you press the **Enter** key. The utility does not prompt you for confirmation of settings before you exit the utility. To change a selected setting, you must select a different setting and press the **Enter** key.

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 proper typical server operation, but configuration settings can be modified using RBSU. The system will prompt you for access to RBSU with each power-up.

Auto-configuration process

The auto-configuration process automatically runs when you boot the server for the first time. During the power-up sequence, the system ROM automatically configures the entire system without needing any intervention. During this process, the ORCA utility, in most cases, automatically configures the array to a default setting based on the number of drives connected to the server.

NOTE: The server may not support all the following examples.

NOTE: If the boot drive is not empty or has been written to in the past, ORCA does not automatically configure the array. You must run ORCA to configure the array settings.

Drives installed	Drives used	RAID level
1	1	RAID 0
2	2	RAID 1
3, 4, 5, or 6	3, 4, 5, or 6	RAID 5
More than 6	0	None

To change any ORCA default settings and override the auto-configuration process, press the **F8** key when prompted.

For more information on RBSU, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP website (<http://www.hp.com/support/smartstart/documentation>).

Boot options

Near the end of the boot process, the boot options screen is displayed. This screen is visible for several seconds before the system attempts to boot from a supported boot device. During this time, you can do the following:

- Access RBSU by pressing the **F9** key.
- Access the System Maintenance Menu (which enables you to launch ROM-based Diagnostics or Inspect) by pressing the **F10** key.
- Access the boot menu by pressing the **F11** key.
- Force a PXE Network boot by pressing the **F12** key.

BIOS Serial Console

BIOS Serial Console allows you to configure the serial port to view POST error messages and run RBSU remotely through a serial connection to the server COM port. The server that you are remotely configuring does not require a keyboard and mouse.

For more information about BIOS Serial Console, see the *BIOS Serial Console User Guide* on the Documentation CD or the HP website (<http://www.hp.com/support/smartstart/documentation>).

Array Configuration Utility

ACU is a browser-based utility with the following features:

- Runs as a local application or remote service
- Supports online array capacity expansion, logical drive extension, assignment of online spares, and RAID or stripe size migration
- Suggests the optimum configuration for an unconfigured system
- Provides different operating modes, enabling faster configuration or greater control over the configuration options
- Remains available any time that the server is on
- Displays on-screen tips for individual steps of a configuration procedure
- Beginning with ACU version 8.28.13.0, provides diagnostic functionality on the Diagnostics tab (formerly known as Array Diagnostics Utility).

For optimum performance, the minimum display settings are 1024 × 768 resolution and 16-bit color. Servers running Microsoft® operating systems require one of the following supported browsers:

- Internet Explorer 6.0 or later
- Mozilla Firefox 2.0 or later

For Linux servers, see the README.TXT file for additional browser and support information.

For more information about the controller and its features, see the *HP Smart Array Controllers for HP ProLiant Servers User Guide* on the HP website (http://www.hp.com/support/SAC_UG_ProLiantServers_en). To

configure arrays, see the *Configuring Arrays on HP Smart Array Controllers Reference Guide* on the HP website (http://www.hp.com/support/CASAC_RG_en).

Option ROM Configuration for Arrays

Before installing an operating system, you can use the ORCA utility to create the first logical drive, assign RAID levels, and establish online spare configurations.

The utility also provides support for the following functions:

- Reconfiguring one or more logical drives
- Viewing the current logical drive configuration
- Deleting a logical drive configuration
- Setting the controller to be the boot controller
- Selecting the boot volume

If you do not use the utility, ORCA will default to the standard configuration.

For more information regarding the default configurations that ORCA uses, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD.

For more information about the controller and its features, see the *HP Smart Array Controllers for HP ProLiant Servers User Guide* on the HP website (http://www.hp.com/support/SAC_UG_ProLiantServers_en). To configure arrays, see the *Configuring Arrays on HP Smart Array Controllers Reference Guide* on the HP website (http://www.hp.com/support/CASAC_RG_en).

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 RBSU.
2. Select the **Advanced Options** menu.
3. Select **Service Options**.
4. Select **Serial Number**. The following warnings appear:

```
WARNING! WARNING! WARNING! The serial number is loaded into the system during
the manufacturing process and should NOT be modified. This option should only
be used by qualified service personnel. This value should always match the
serial number sticker located on the chassis.
```



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

```
Warning: The Product ID should ONLY be modified by qualified personnel. This
value should always match the Product ID on the chassis.
```
8. Enter the product ID and press the **Enter** key.
9. Press the **Esc** key to close the menu.
10. Press the **Esc** key to exit RBSU.
11. Press the **F10** key to confirm exiting RBSU. The server automatically reboots.

Management tools

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 (does not apply to HP ProLiant DL980 Servers), 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. At the same time, the HP SIM console notifies you by sending a message to a designated pager number that ASR has restarted the system. You can disable ASR from the System Management Homepage or through RBSU.

ROMPaaS utility

The ROMPaaS utility enables you to upgrade the system firmware (BIOS). To upgrade the firmware, insert a ROMPaaS USB Key into an available USB port and boot the system. In addition to ROMPaaS, Online Flash Components for Windows and Linux operating systems are available for updating the system firmware.

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

For more information, 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**.

Integrated Lights-Out technology

The iLO subsystem is a standard component of selected ProLiant servers that provides server health and remote server manageability. The iLO subsystem includes an intelligent microprocessor, secure memory, and a dedicated network interface. This design makes iLO independent of the host server and its operating system.

In addition to remote management features, iLO is also responsible for managing the health of the ProLiant server. The intelligence of iLO manages the Sea of Sensors thermal control, directs power management functions, and monitors the health of server components.


The iLO subsystem provides secure remote access from any authorized network client. The enhancements to iLO enable customers to get work done faster by providing turbo-charged remote access performance, a streamlined user experience, and enhanced standards support.

Using iLO, you can do the following:

- Access a high-performance and secure Remote Console to the server from anywhere in the world.
- Use the shared iLO Remote Console to collaborate with up to six server administrators.
- Remotely mount high-performance Virtual Media devices to the server.
- Securely and remotely control the power state of the managed server.
- Send alerts from iLO regardless of the state of the host server.
- Access advanced troubleshooting features through the iLO interface.

For more information about iLO features (which may require an iLO Advanced Pack or iLO Advanced for BladeSystem license), see the iLO documentation on the Documentation CD or on the HP website (<http://www.hp.com/go/ilo>).

Erase Utility

 **CAUTION:** Perform a backup before running the System 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. Refer to the instructions for using this utility.

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, use the System Erase button on the home screen of the SmartStart CD ("SmartStart software" on page 66).

USB support

HP provides both standard USB 2.0 support and legacy USB 2.0 support. Standard support is provided by the OS through the appropriate USB device drivers. Before the OS loads, HP provides support for USB devices through legacy USB support, which is enabled by default in the system ROM.

Legacy USB support provides USB functionality in environments where USB support is not available normally. Specifically, HP provides legacy USB functionality for the following:

- POST
- RBSU
- Diagnostics
- DOS
- Operating environments which do not provide native USB support

Diagnostic tools

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, launch the SmartStart CD.

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, refer to the HP website (<http://www.hp.com/servers/diags>).

HP Insight Diagnostics survey functionality

HP Insight Diagnostics (on page 71) provides survey functionality that gathers critical hardware and software information on ProLiant servers.

This functionality supports operating systems that may not be 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 SmartStart-assisted HP Insight Diagnostics installation, or it can be installed through the HP PSP ("ProLiant Support Packs" on page 74).

NOTE: The current version of SmartStart provides the memory spare part numbers for the server. To download the latest version, see the HP website (<http://www.hp.com/support>).

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 Survey Utility
- From within operating system-specific IML viewers
 - For NetWare: IML Viewer (does not apply to HP ProLiant DL980 Servers)
 - For Windows®: IML Viewer
 - For Linux: IML Viewer Application
- From within the iLO user interface
- From within HP Insight Diagnostics (on page 71)

For more information, see the Management CD or DVD in the HP Insight Foundation suite for ProLiant.

Remote support and analysis tools

HP Insight Remote Support software

HP strongly recommends that you install HP Insight Remote Support software to complete the installation or upgrade of your product and to enable enhanced delivery of your HP Warranty, HP Care Pack Service, or HP contractual support agreement. HP Insight Remote Support supplements your monitoring 24 x 7 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 may be sent to your authorized HP Channel Partner for on-site service, if configured and available in your country. The software is available in two variants:

- **HP Insight Remote Support Standard:** This software supports server and storage devices and is optimized for environments with 1–50 servers. Ideal for customers who can benefit from proactive notification but do not need proactive service delivery and integration with a management platform.

- HP Insight Remote Support Advanced: This software provides comprehensive remote monitoring and proactive service support for nearly all HP servers, storage, network, and SAN environments, plus selected non-HP servers that have a support obligation with HP. It is integrated with HP Systems Insight Manager. A dedicated server is recommended to host both HP Systems Insight Manager and HP Insight Remote Support Advanced.

Details for both versions are available on the HP website (<http://www.hp.com/go/insightremotesupport>).

To download the software, go to Software Depot (<http://www.software.hp.com>).

Select **Insight Remote Support** from the menu on the right.

Keeping the system current

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 a SmartStart-supported OS, use the SmartStart software (on page 66) and its Assisted Path feature to install the OS and latest driver support.

If you are installing drivers from the SmartStart CD, be sure that you are using the latest SmartStart version that your server supports. To verify that your server is using the latest supported version, see the HP website (<http://www.hp.com/support>). For more information, see the documentation provided with the SmartStart CD.

If you do not use the SmartStart CD 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 from the HP website (<http://www.hp.com/support>).

To directly locate the OS drivers for a particular server, enter the following web address into the browser:

<http://www.hp.com/support/<servername>>

In place of <servername>, enter the server name.

For example:

<http://www.hp.com/support/dl360g6> (<http://www.hp.com/support/dl360g6>)

Version control

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

- VCRM manages the repository for Windows and Linux PSPs as well as online firmware. Administrators can browse a graphical view of the PSPs or configure VCRM to automatically update the repository with Internet downloads of the latest software from HP.
- VCA compares installed software versions and available updates. Administrators can configure VCA to point to a repository managed by VCRM.

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

ProLiant Support Packs

PSPs represent operating system-specific bundles of ProLiant optimized drivers, utilities, and management agents. Refer to the PSP website (<http://h18000.www1.hp.com/products/servers/management/psp.html>).

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>).

Firmware

The Smart Update Firmware DVD is an organized firmware collection for ProLiant servers and options powered by HP Smart Update Manager (on page 74). The Smart Update Firmware DVD combines the following resources on a single DVD:

- Firmware Maintenance CD
- HP BladeSystem Firmware Deployment Tool (FDT)
- The HP BladeSystem online firmware bundles
- The ProLiant BladeSystem Release Sets
- Offline, automatic mode for HP ProLiant BL, DL, ML, and 100 Series servers
- Firmware deployment support for HP ProLiant 100 Series servers

HP Smart Update Manager

The HP Smart Update Manager provides intelligent and flexible firmware and software deployment. This technology assists in reducing the complexity of provisioning and updating HP ProLiant Servers, options, and Blades within the data center. HP SUM is delivered on the Smart Update Firmware DVD, ProLiant Support Packs, and Easy Set-up CDs.

HP SUM enables system administrators to upgrade ROM images efficiently across a wide range of servers and options. This tool has the following features:

- Enables GUI and a command-line, scriptable interface
- Enables scriptable, command-line deployment
- Requires no agent for remote installations
- Enables dependency checking, which ensures appropriate install order and dependency checking between components
- Deploys software and firmware on Windows and Linux operating systems
- Performs local or remote (one-to-many) online deployment
- Deploys firmware and software together
- Supports offline and online deployment
- Deploys necessary component updates only

- Downloads the latest components from Web
- Enables direct update of BMC firmware (iLO and LO100i)

For more information about HP SUM and to access the *HP Smart Update Manager User Guide*, see the HP website (<http://www.hp.com/go/hpsum/documentation>).

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>).

Care Pack

HP Care Pack Services offer upgraded service levels to extend and expand bundled services with easy-to-buy, easy-to-use support packages that help you make the most of your server investments. For more information, see the HP website (<http://www.hp.com/services/carepack>).

Troubleshooting

Troubleshooting resources

The *HP ProLiant Servers Troubleshooting Guide* provides procedures for resolving common problems and comprehensive courses of action for fault isolation and identification, error message interpretation, issue resolution, and software maintenance on ProLiant servers and server blades. This guide includes problem-specific flowcharts to help you navigate complex troubleshooting processes. To view the guide, select a language:

- English (http://www.hp.com/support/ProLiant_TSG_en)
- French (http://www.hp.com/support/ProLiant_TSG_fr)
- Italian (http://www.hp.com/support/ProLiant_TSG_it)
- Spanish (http://www.hp.com/support/ProLiant_TSG_sp)
- German (http://www.hp.com/support/ProLiant_TSG_gr)
- Dutch (http://www.hp.com/support/ProLiant_TSG_nl)
- Japanese (http://www.hp.com/support/ProLiant_TSG_jp)

Pre-diagnostic steps



WARNING: To avoid potential problems, ALWAYS read the warnings and cautionary information in the server documentation before removing, replacing, reseating, or modifying system components.



IMPORTANT: This guide provides information for multiple servers. Some information may not apply to the server you are troubleshooting. Refer to the server documentation for information on procedures, hardware options, software tools, and operating systems supported by the server.

1. Review the important safety information (on page 76).
2. Gather symptom information (on page 78).
3. Prepare the server for diagnosis (on page 78).
4. Use the Start diagnosis flowchart (on page 81) to begin the diagnostic process.

Important safety information

Familiarize yourself with the safety information in the following sections before troubleshooting the server.

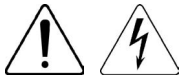


Important safety information

Before servicing this product, read the *Important Safety Information* document provided with the server.

Symbols on equipment

The following symbols may be placed on equipment to indicate the presence of potentially hazardous conditions.



This symbol indicates the presence of hazardous energy circuits or electric shock hazards. Refer all servicing to qualified personnel.

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



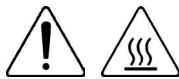
This symbol indicates the presence of electric shock hazards. The area contains no user or field serviceable parts. Do not open for any reason.

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



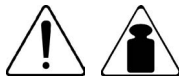
This symbol on an RJ-45 receptacle indicates a network interface connection.

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



This symbol indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

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



27.2 kg
60.0 lb

This symbol indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: 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.



These symbols, on power supplies or systems, indicate that the equipment is supplied by multiple sources of power.

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

Warnings and cautions



WARNING: Only authorized technicians trained by HP should attempt to repair this equipment. All troubleshooting and repair procedures are detailed to allow only subassembly/module-level repair. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard.



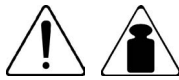
WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling feet are extended to the floor.
- The full weight of the rack rests on the leveling feet.
- 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 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.



27.2 kg
60.0 lb

WARNING: To reduce the risk of personal injury or damage to the equipment:

- Observe local occupation health and safety requirements and guidelines for manual handling.
- Obtain adequate assistance to lift and stabilize the chassis during installation or removal.
- The server is unstable when not fastened to the rails.
- When mounting the server in a rack, remove the power supplies and any other removable module to reduce the overall weight of the product.



CAUTION: To properly ventilate the system, you must provide at least 7.6 cm (3.0 in) of clearance at the front and back of the server.



CAUTION: The server is designed to be electrically grounded (earthed). To ensure proper operation, plug the AC power cord into a properly grounded AC outlet only.

Symptom information

Before troubleshooting a server problem, collect the following information:

- What events preceded the failure? After which steps does the problem occur?
- What has been changed since the time the server was working?
- Did you recently add or remove hardware or software? If so, did you remember to change the appropriate settings in the server setup utility, if necessary?
- How long has the server exhibited problem symptoms?
- If the problem occurs randomly, what is the duration or frequency?

To answer these questions, the following information may be useful:

- Run HP Insight Diagnostics (on page 71) and use the survey page to view the current configuration or to compare it to previous configurations.
- Refer to your hardware and software records for information.
- Refer to server LEDs and their statuses.

Prepare the server for diagnosis

1. Be sure the server is in the proper operating environment with adequate power, air conditioning, and humidity control. For required environmental conditions, see the server documentation.

2. Record any error messages displayed by the system.
3. Remove all diskettes, CD-ROMs, DVD-ROMs, and USB drive keys.
4. Power down the server and peripheral devices if you will be diagnosing the server offline. If possible, always perform an orderly shutdown:
 - a. Exit any applications.
 - b. Exit the operating system.
 - c. Power down the server (on page 19).
5. Disconnect any peripheral devices not required for testing (any devices not necessary to power up the server). Do not disconnect the printer if you want to use it to print error messages.
6. Collect all tools and utilities, such as a Torx screwdriver, loopback adapters, ESD wrist strap, and software utilities, necessary to troubleshoot the problem.
 - o You must have the appropriate Health Drivers and Management Agents installed on the server. To verify the server configuration, connect to the System Management Homepage (<http://h18013.www1.hp.com/products/servers/management/agents/index.html>) and select **Version Control Agent**. The VCA gives you a list of names and versions of all installed HP drivers, Management Agents, and utilities, and whether they are up-to-date.
 - o HP recommends you have access to the server documentation for server-specific information.
 - o HP recommends you have access to the SmartStart CD for value-added software and drivers required during the troubleshooting process. Download the current version of SmartStart from the HP website (<http://www.hp.com/servers/smartstart>).

Performing processor procedures in the troubleshooting process

Before performing any troubleshooting steps that involve processors, review the following guidelines:

- Be sure that only authorized personnel perform the troubleshooting steps that involve installing, removing, or replacing a processor.
- Always locate the documentation for your processor model before performing **any** steps that require installing, removing, or replacing a processor. If you cannot locate the hard copy of the instructions that shipped with the processor, see the processor instructions in this document.
- Some processor models require the use of a processor installation tool, and specific steps are documented to ensure that you do not damage the processor or processor socket on the system board. For server models that have pins inside the processor socket, remember that **THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED**. If you damage the socket, you must replace the system board.
- Depending on the server model, the contacts may be on the processor or they may be inside the processor socket. Never touch the contacts. **THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED**. If the contacts inside the processor socket are damaged, the system board must be replaced.
- Always complete all other troubleshooting procedures before removing or replacing a processor.

Breaking the server down to the minimum hardware configuration


During the troubleshooting process, you may be asked to break the server down to the minimum hardware configuration. A minimum configuration consists of only the components needed to boot the server and successfully pass POST.

When requested to break the server down to the minimum configuration, uninstall the following components, if installed:

- All additional DIMMs
Leave only the minimum required to boot the server—either one DIMM or a pair of DIMMs. For more information, see the memory guidelines in the server user guide.
- All additional cooling fans, if applicable
For the minimum fan configuration, see the server user guide.
- All additional power supplies, if applicable (leave one installed)
- All hard drives
- All optical drives (DVD-ROM, CD-ROM, and so forth)
- All optional mezzanine cards
- All expansion boards

Before removing the components, be sure to determine the minimum configuration for each component and follow all guidelines in the server user guide.

Always use the recommended minimum configuration above before removing any processors. If you are unable to isolate the issue with the configuration above, you will then remove all but one of the processors.

 **CAUTION:** Before removing or replacing any processors, be sure to follow the guidelines provided in "Performing processor procedures in the troubleshooting process (on page 79)." Failure to follow the recommended guidelines can cause damage to the system board, requiring replacement of the system board.

Loose connections

Action:

- Be sure all power cords are securely connected.
- Be sure all cables are properly aligned and securely connected for all external and internal components.
- Remove and check all data and power cables for damage. Be sure no cables have bent pins or damaged connectors.
- If a fixed cable tray is available for the server, be sure the cords and cables connected to the server are routed correctly through the tray.
- Be sure each device is properly seated. Avoid bending or flexing circuit boards when reseating components.
- If a device has latches, be sure they are completely closed and locked.
- Check any interlock or interconnect LEDs that may indicate a component is not connected properly.
- If problems continue to occur, remove and reinstall each device, checking the connectors and sockets for bent pins or other damage.
- For HP ProLiant BL c-Class Server Blades, be sure the OA tray is seated properly.

Service notifications

To view the latest service notifications, refer to the HP website (<http://www.hp.com/go/bizsupport>). Select the appropriate server model, and then click the **Troubleshoot a Problem** link on the product page.

Server health LEDs

Some servers have an internal health LED and an external health LED, while other servers have a single system health LED. The system health LED provides the same functionality as the two separate internal and external health LEDs. Depending on the model, the internal health LED and external health LED may either appear solid or they may flash. Both conditions represent the same symptom.

For the location of server LEDs and information on their statuses, see the server documentation on the HP website (<http://www.hp.com/support>).

Troubleshooting flowcharts

To effectively troubleshoot a problem, HP recommends that you start with the first flowchart in this section, "Start diagnosis flowchart (on page 81)," and follow the appropriate diagnostic path. If the other flowcharts do not provide a troubleshooting solution, follow the diagnostic steps in "General diagnosis flowchart (on page 82)." The General diagnosis flowchart is a generic troubleshooting process to be used when the problem is not server-specific or is not easily categorized into the other flowcharts.

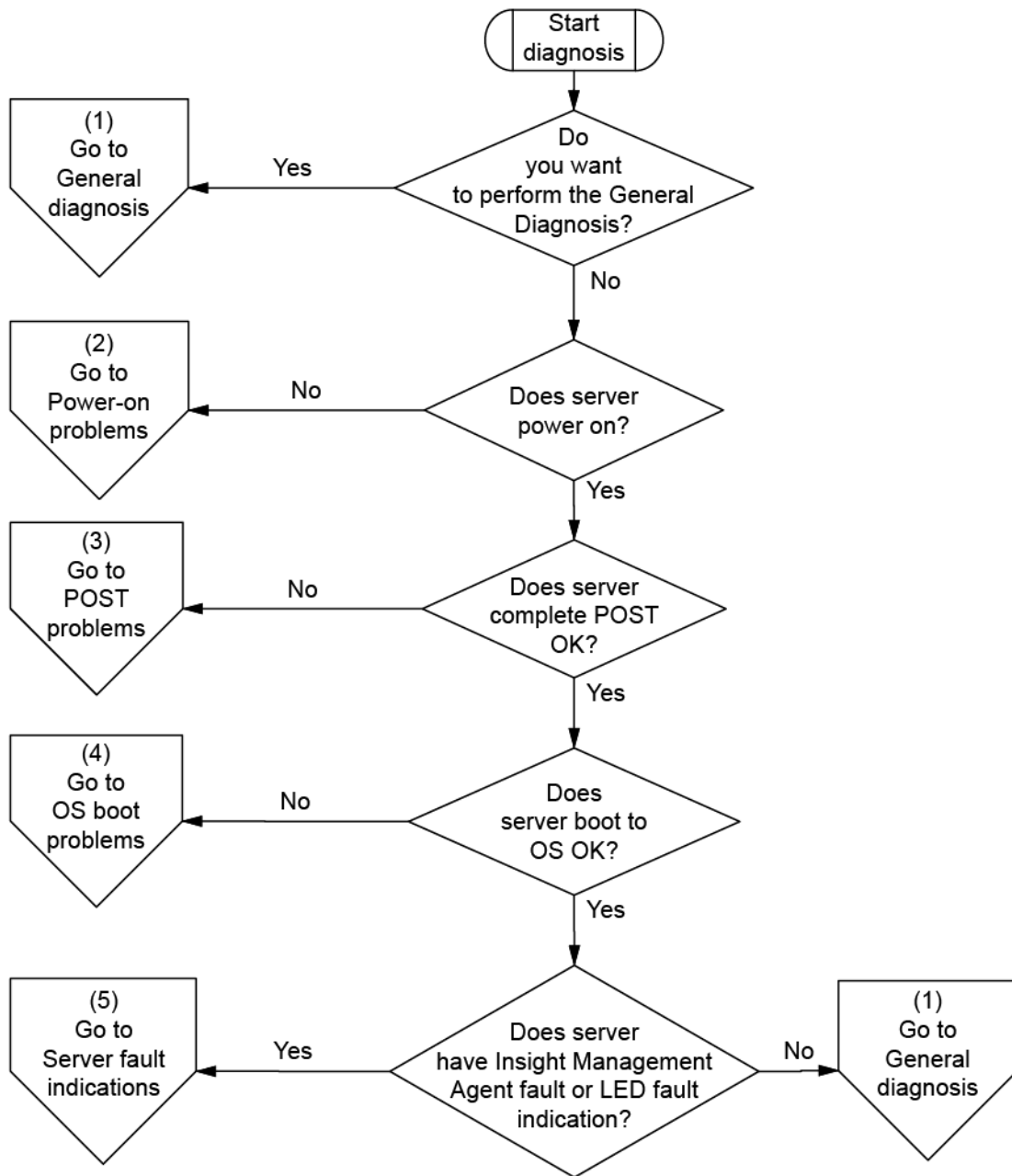
The available flowcharts include:

- Start diagnosis flowchart (on page 81)
- General diagnosis flowchart (on page 82)
- Server power-on problems flowchart (on page 84)
- POST problems flowchart (on page 87)
- OS boot problems flowchart (on page 89)
- Server fault indications flowchart (on page 90)

Start diagnosis flowchart

Use the following flowchart to start the diagnostic process.

Item	See
1	"General diagnosis flowchart (on page 82)"
2	"Power-on problems flowchart ("Server power-on problems flowchart" on page 84)"
3	"POST problems flowchart (on page 87)"
4	"OS boot problems flowchart (on page 89)"
5	"Server fault indications flowchart (on page 90)"

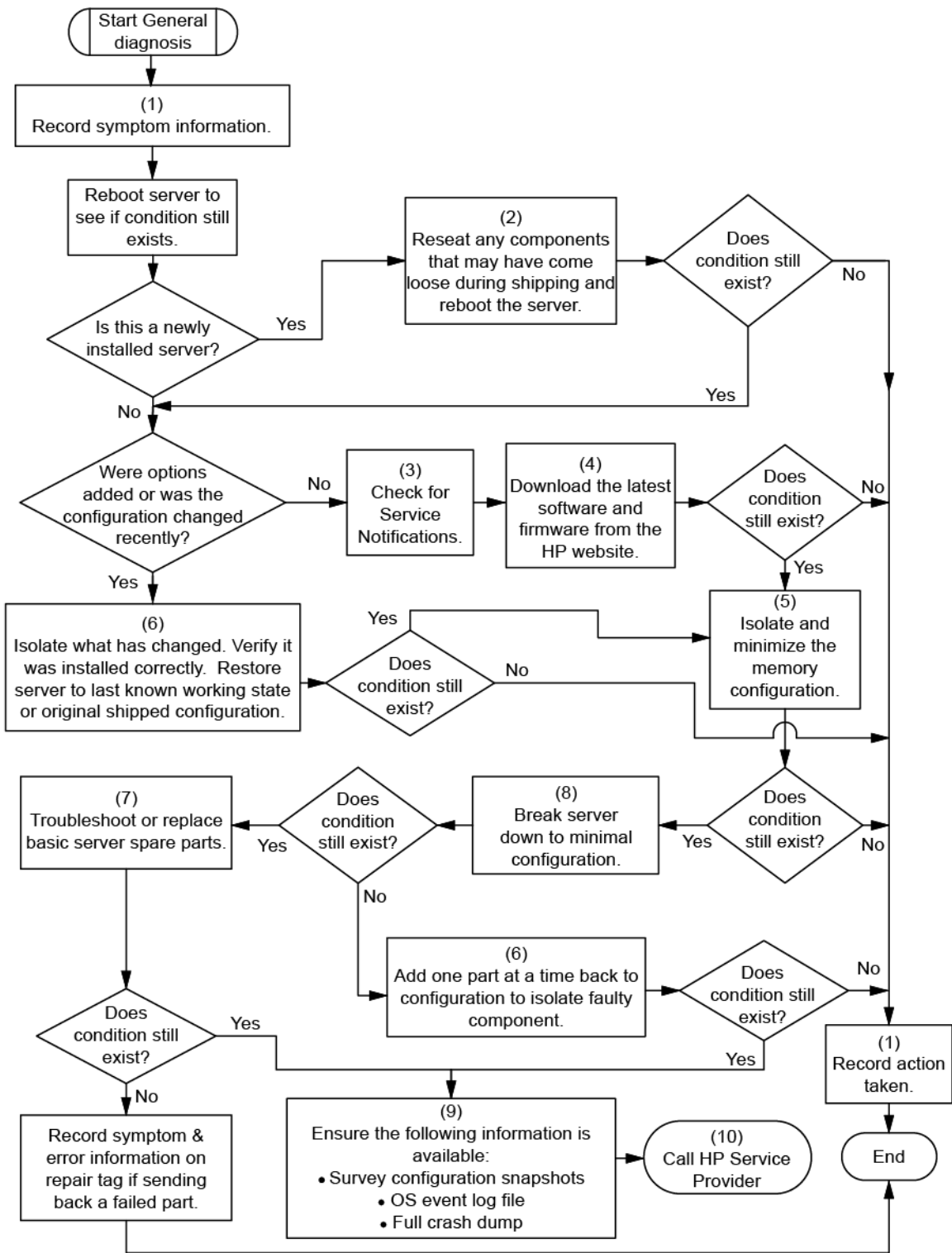


General diagnosis flowchart

The General diagnosis flowchart provides a generic approach to troubleshooting. If you are unsure of the problem, or if the other flowcharts do not fix the problem, use the following flowchart.

Item	See
1	"Symptom information (on page 78)"
2	"Loose connections (on page 80)"
3	"Service notifications (on page 81)"
4	The most recent version of a particular server or option firmware is available on the HP Support website (http://www.hp.com/support).

Item	See
5	"General memory problems are occurring" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)"
6	Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)
7	<ul style="list-style-type: none"> • "Hardware problems" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)" • Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)
8	"Breaking the server down to the minimum hardware configuration (on page 79)" or in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)"
9	<ul style="list-style-type: none"> • "Server information you need" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)" • "Operating system information you need" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)"
10	"HP contact information (on page 99)"



Server power-on problems flowchart

Symptoms:

- The server does not power on.
- The system power LED is off or amber.

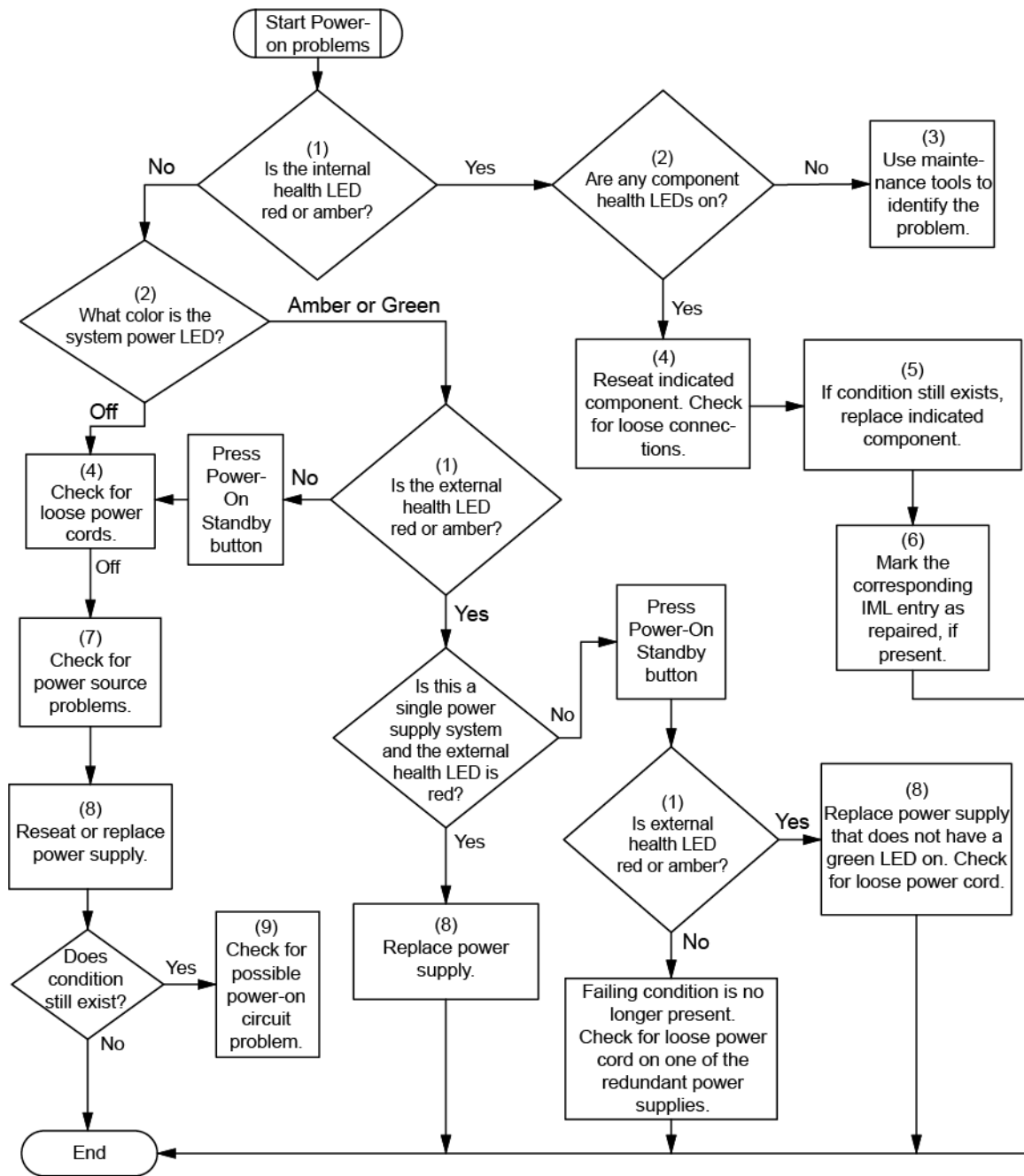
- The external health LED is red or amber.
- The internal health LED is red or amber.

NOTE: For the location of server LEDs and information on their statuses, refer to the server documentation.

Possible causes:

- Improperly seated or faulty power supply
- Loose or faulty power cord
- Power source problem
- Power on circuit problem
- Improperly seated component or interlock problem
- Faulty internal component

Item	See
1	"Server health LEDs (on page 81)" and "Component identification (on page 7)"
2	"HP Insight Diagnostics (on page 71)" or in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)"
3	"Loose connections (on page 80)"
4	Server maintenance and service guide, located on the Documentation CD, or the HP website (http://www.hp.com/products/servers/platforms)
5	"Integrated Management Log (on page 72)" or in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)"
6	"Power source problems" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)"
7	<ul style="list-style-type: none"> • "Power supply problems" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)" • Server maintenance and service guide, located on the Documentation CD, or the HP website (http://www.hp.com/products/servers/platforms)
8	"System open circuits and short circuits" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)"



POST problems flowchart

Symptoms:

- Server does not complete POST

NOTE: The server has completed POST when the system attempts to access the boot device.

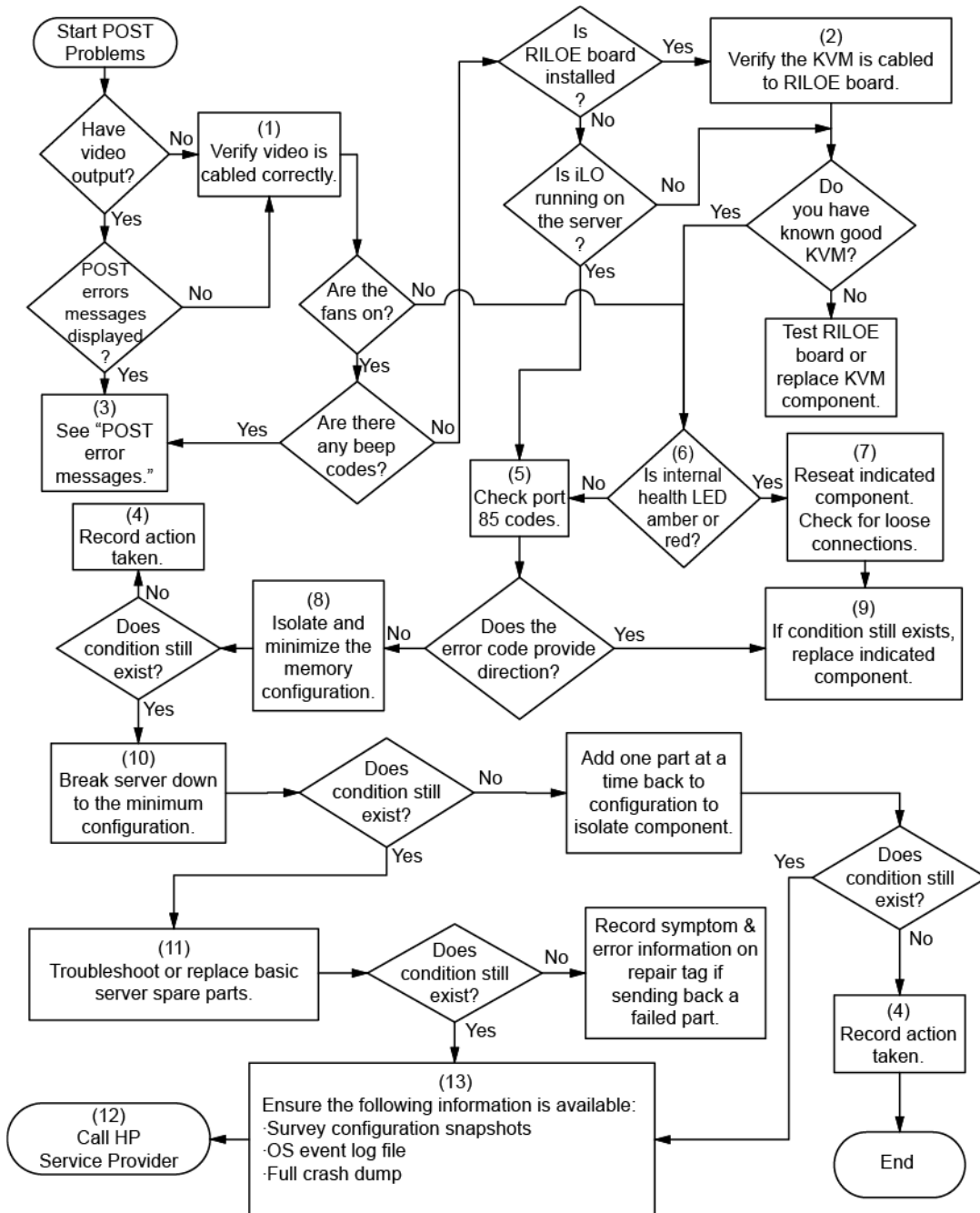
- Server completes POST with errors

Possible problems:

- Improperly seated or faulty internal component
- Faulty KVM device
- Faulty video device

Item	See
1	"Video problems" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)"
2	KVM or iLO documentation
3	"POST error messages and beep codes (on page 92)"
4	"Symptom information (on page 78)"
5	"Port 85 and iLO messages" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)"
6	"Server health LEDs (on page 81)" and "Component identification (on page 7)"
7	"Loose connections (on page 80)"
8	"General memory problems are occurring" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)"
9	Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms).
10	"Breaking the server down to the minimum hardware configuration (on page 79)" or in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)"
11	<ul style="list-style-type: none"> • "Hardware problems" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)" • Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)
12	"HP contact information (on page 99)"

Item	See
13	<ul style="list-style-type: none"> "Server information you need" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)" "Operating system information you need" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)"



OS boot problems flowchart

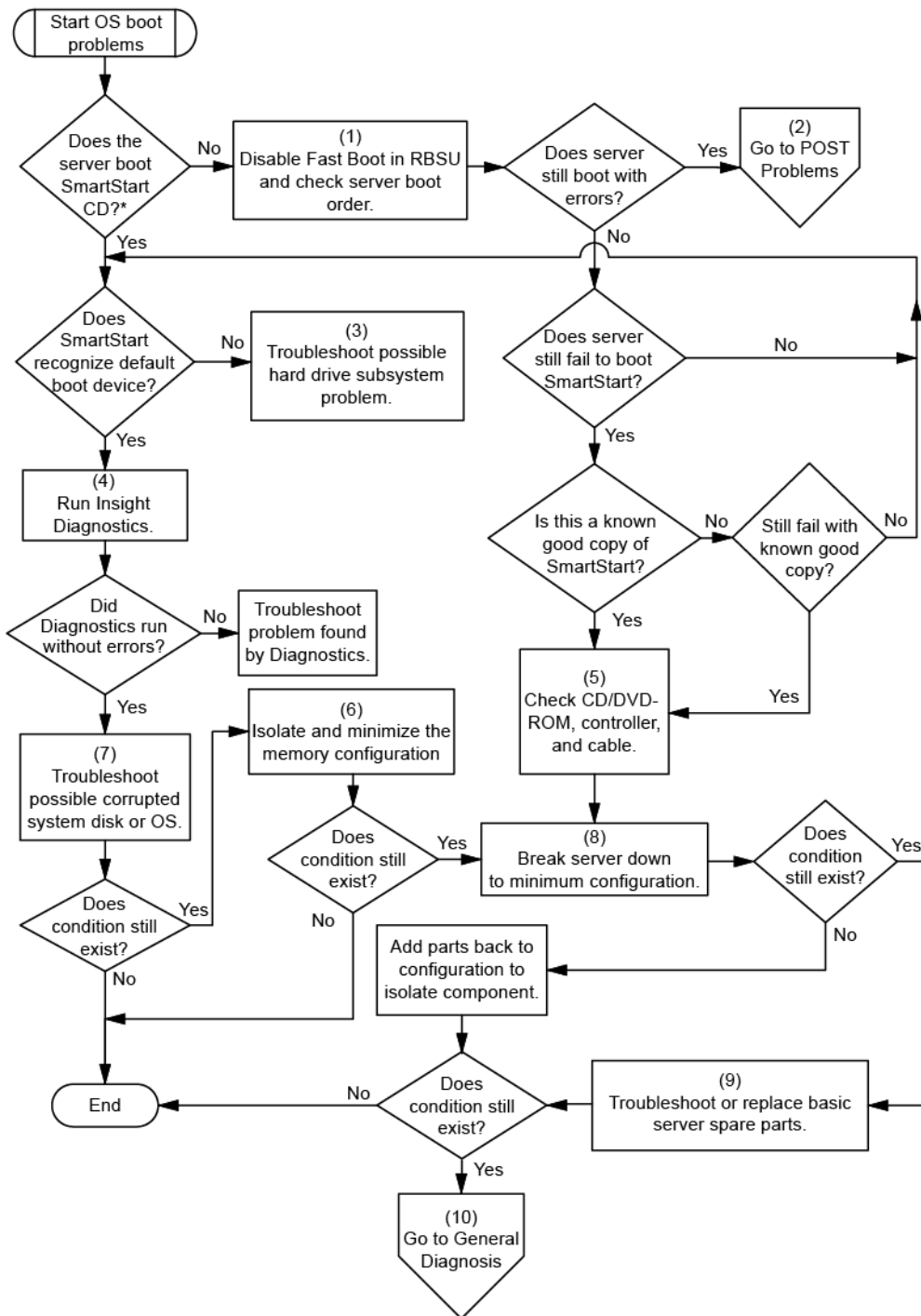
Symptoms:

- Server does not boot a previously installed operating system
- Server does not boot SmartStart

Possible causes:

- Corrupted operating system
- Hard drive subsystem problem
- Incorrect boot order setting in RBSU

Item	See
1	<i>HP ROM-Based Setup Utility User Guide</i> (http://www.hp.com/servers/smartstart)
2	"POST problems flowchart (on page 87)"
3	<ul style="list-style-type: none"> • "Hard drive problems" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)" • Controller documentation
4	"HP Insight Diagnostics (on page 71)" or in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)"
5	<ul style="list-style-type: none"> • "CD-ROM and DVD drive problems" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)" • Controller documentation • "Loose connections (on page 80)"
6	"General memory problems are occurring" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)"
7	<ul style="list-style-type: none"> • "Operating system problems" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)" • "HP contact information (on page 99)"
8	"Breaking the server down to the minimum hardware configuration (on page 79)" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)"
9	<ul style="list-style-type: none"> • "Hardware problems" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)" • Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)
10	"General diagnosis flowchart (on page 82)"



Server fault indications flowchart

Symptoms:

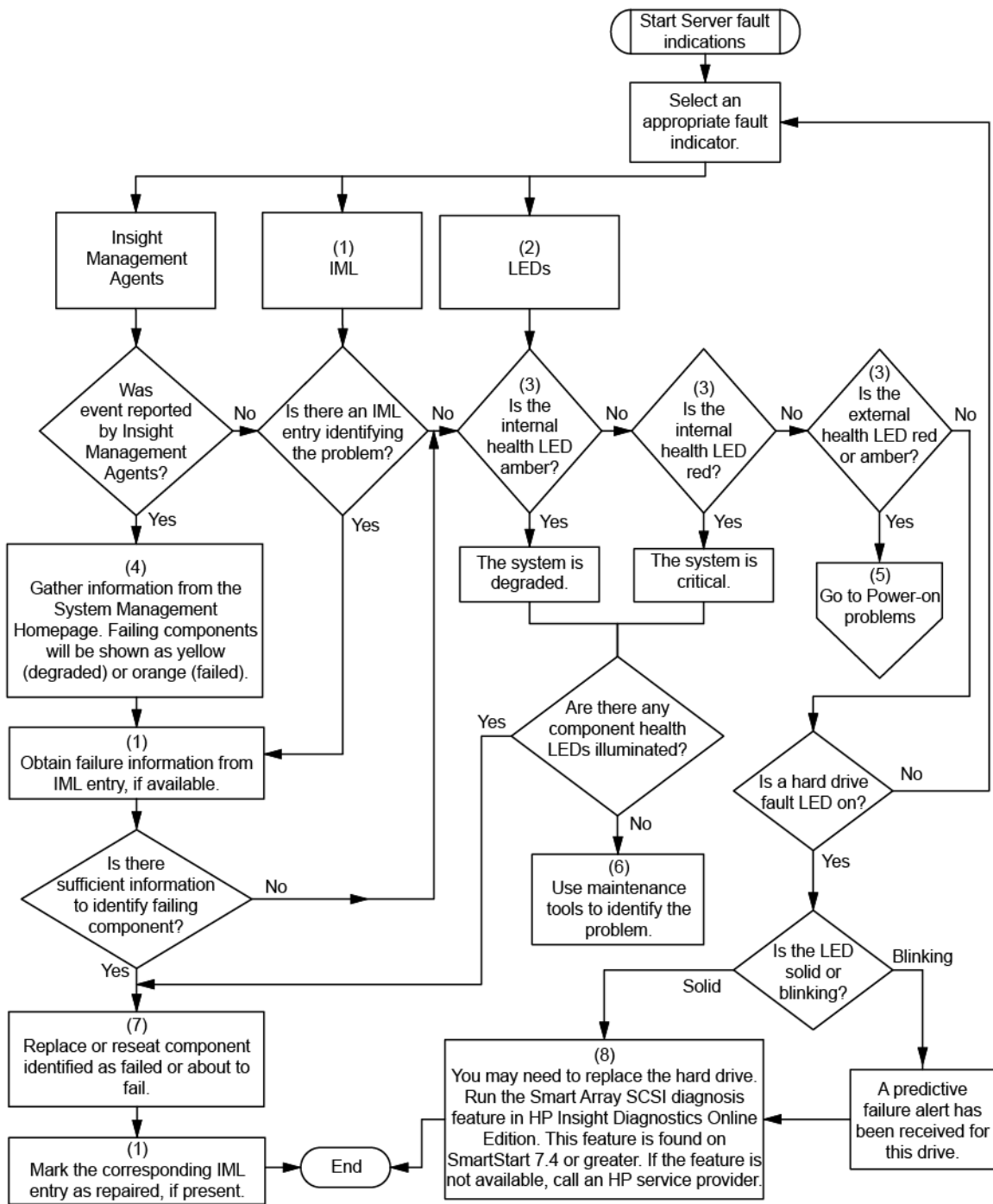
- Server boots, but a fault event is reported by Insight Management Agents
- Server boots, but the internal health LED, external health LED, or component health LED is red or amber

NOTE: For the location of server LEDs and information on their statuses, refer to the server documentation.

Possible causes:

- Improperly seated or faulty internal or external component
- Unsupported component installed
- Redundancy failure
- System overtemperature condition

Item	See
1	<ul style="list-style-type: none"> • "Integrated Management Log (on page 72)" or in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)" • "Event list error messages" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)"
2	"Component identification (on page 7)"
3	"Server health LEDs (on page 81)"
4	System Management Homepage (https://localhost:2381)
5	"Power-on problems flowchart ("Server power-on problems flowchart" on page 84)"
6	"HP Insight Diagnostics (on page 71)" or in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)"
7	<ul style="list-style-type: none"> • "Hardware problems" in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)" • Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)
8	<ul style="list-style-type: none"> • "Smart Array SCSI Diagnosis feature" or in the <i>HP ProLiant Servers Troubleshooting Guide</i> located on the Documentation CD or see "Troubleshooting resources (on page 76)" • Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms) • "HP contact information (on page 99)"



POST error messages and beep codes

For a complete listing of error messages, refer to the "POST error messages" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (<http://www.hp.com/support>).



WARNING: To avoid potential problems, ALWAYS read the warnings and cautionary information in the server documentation before removing, replacing, reseating, or modifying system components.

Battery replacement

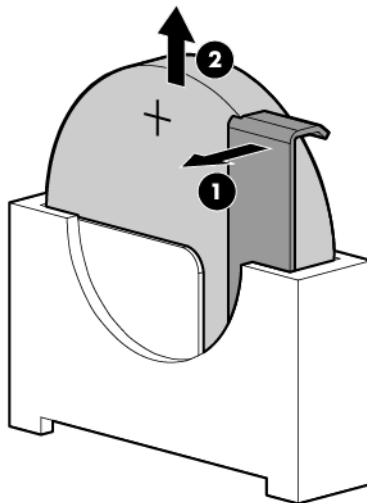
If the server no longer automatically displays the correct date and time, you might have to replace the battery that provides power to the real-time clock.



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.

1. Power down the server (on page 19).
2. Remove the access panel (on page 21).
3. Remove the battery.



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>).

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>)

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)
Shipping	-30°C to 50°C (-22°F to 122°F)
Storage	-30°C to 60°C (-22°F to 140°F)
Maximum wet bulb temperature	28°C (82.4°F)
Relative humidity (noncondensing)**	
Operating	10% to 90%
Non-operating	5% to 95%

* All temperature ratings shown are for sea level. An altitude derating of 1°C per 300 m (1.8°F per 1,000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed.

** Storage maximum humidity of 95% is based on a maximum temperature of 45°C (113°F). Altitude maximum for storage corresponds to a pressure minimum of 70 KPa.

Mechanical specifications

Specification	Value
Dimensions	
Height	36.74 cm (14.46 in)
Depth	47.3 cm (18.60 in)
Width	17.48 cm (6.882 in)
Weight (maximum)	14.68 kg (32.30 lb)

Power supply specifications

Depending on installed options, the server is configured with one of the following power supplies:

- HP ProLiant 460W Power Supply

NOTE: If two 460 W power supplies are installed, one serves as the redundant power supply.

Specification	Value
Input requirements	
Rated input voltage	100 to 120 VAC, 200 to 240 VAC

Rated input frequency	50 Hz to 60 Hz
Rated input current	5.5 A at 100 VAC 2.6 A at 200 VAC
Rated input power	526 W at 100V AC input 505 W at 200V AC input
BTUs per hour	1794 at 100V AC input 1725 at 200V AC input
Power supply output	
Rated steady-state power	460 W at 100V to 120V AC input 460 W at 200V to 240V AC input
Maximum peak power	460 W at 100V to 120V AC input 460 W at 200V to 240V AC input

- ATX 350W Power Supply

Specification	Value
Input requirements	
Rated input voltage	100V to 240V
Rated input frequency	50Hz to 60Hz
Rated input current	6A at 100VAC 3A at 200VAC
Efficiency	No less than 70% at 100% load No less than 70% at 50% load No less than 70% at 20% load
Power supply output	
Rated output power	350W

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 3 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://h20000.www2.hp.com/bizsupport/TechSupport/Document.jsp?lang=en&cc=us&objectID=c02843807>).
- 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 Agréé 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 spedisce 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 aggiuntive 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 garanteservice 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の修理受付窓口にご連絡いただければ、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。

客戶自行維修

HP 產品提供許多客戶自行維修 (CSR) 部件，以尽可能縮短維修時間和在更換缺陷部件方面提供更大的靈活性。如果在診斷期間 HP (或 HP 服務提供商或服務合作夥伴) 確定可以通過使用 CSR 部件完成維修，HP 將直接把該部件發送給您進行更換。有兩類 CSR 部件：

- **強制性的** — 要求客戶必須自行維修的部件。如果您請求 HP 更換這些部件，則必須為該服務支付差旅費和人工費用。
- **可選的** — 客戶可以選擇是否自行維修的部件。這些部件也是為客戶自行維修設計的。不過，如果您要求 HP 為您更換這些部件，則根據為您的產品指定的保修服務類型，HP 可能收取或不再收取任何附加費用。

注：某些 HP 部件的設計並未考慮客戶自行維修。為了滿足客戶保修的需要，HP 要求授權服務提供商更換相關部件。這些部件在部件圖解目錄中標記為“否”。

CSR 部件將在下一個工作日發運（取決於備貨情況和允許的地理範圍）。在允許的地理範圍內，可在當天或四小時內發運，但要收取額外費用。如果需要幫助，您可以致電 HP 技術支持中心，將會有技術人員通過電話為您提供幫助。HP 會在隨更換的 CSR 部件發運的材料中指明是否必須將有缺陷的部件返還給 HP。如果要求您將有缺陷的部件返還給 HP，那麼您必須在規定期限內（通常是五 (5) 個工作日）將缺陷部件發給 HP。有缺陷的部件必須隨所提供的發運材料中的相關文件一起返還。如果未能送還有缺陷的部件，HP 可能會要求您支付更換費用。客戶自行維修時，HP 將承擔所有相關運輸和部件返回費用，並指定快遞商/承運商。

有關 HP 客戶自行維修計劃的詳細信息，請與您當地的服務提供商聯繫。有關北美地區的計劃，請訪問 HP 網站 (<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.

참고: 일부 HP 부품은 고객 셀프 수리가 불가능하도록 설계되었습니다. HP는 만족스러운 고객 보증을 위해 공인 서비스 제공업체를 통해 부품을 교체하도록 하고 있습니다. 이러한 부품들은 Illustrated Parts Catalog에 "No"라고 표시되어 있습니다.

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

ASR

Automatic Server Recovery

BBWC

battery-backed write cache

CSA

Canadian Standards Association

CSR

Customer Self Repair

DDR

double data rate

EMI

electromagnetic interference

FBWC

flash-backed write cache

IEC

International Electrotechnical Commission

iLO

Integrated Lights-Out

IML

Integrated Management Log

ISEE

Instant Support Enterprise Edition

LFF

large form factor

NMI

nonmaskable interrupt

NVRAM

nonvolatile memory

ORCA

Option ROM Configuration for Arrays

PCIe

peripheral component interconnect express

PCI-X

peripheral component interconnect extended

PDU

power distribution unit

POST

Power-On Self Test

RBSU

ROM-Based Setup Utility

RDIMM

registered dual in-line memory module

RDP

Rapid Deployment Pack

RPS

redundant power supply

SAS

serial attached SCSI

SATA

serial ATA

SD

Secure Digital

SFF

small form factor

SIM

Systems Insight Manager

TMRA

recommended ambient operating temperature

TPM

Trusted Platform Module

UDIMM

unregistered dual in-line memory module

UID

unit identification

UPS

uninterruptible power system

USB

universal serial bus

Documentation feedback

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