



Hewlett Packard
Enterprise

HPE ProLiant DL580 Gen9 Server

User Guide

Abstract

This document is for the person who installs, administers, and troubleshoots servers and storage systems. Hewlett Packard Enterprise 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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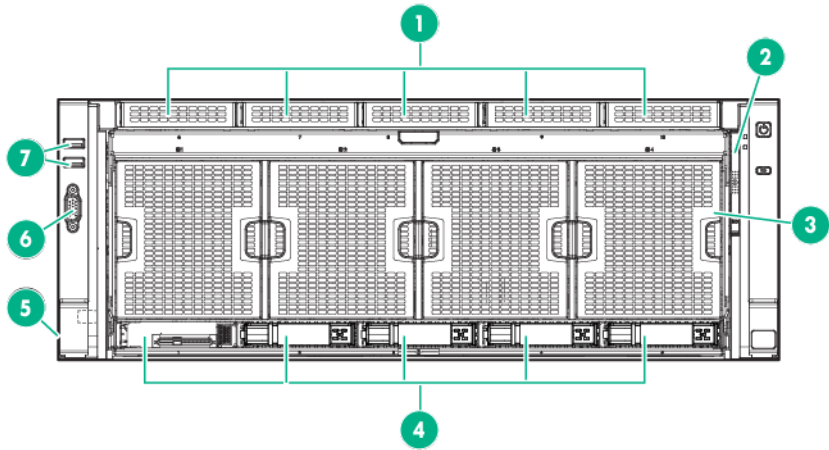
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Component identification

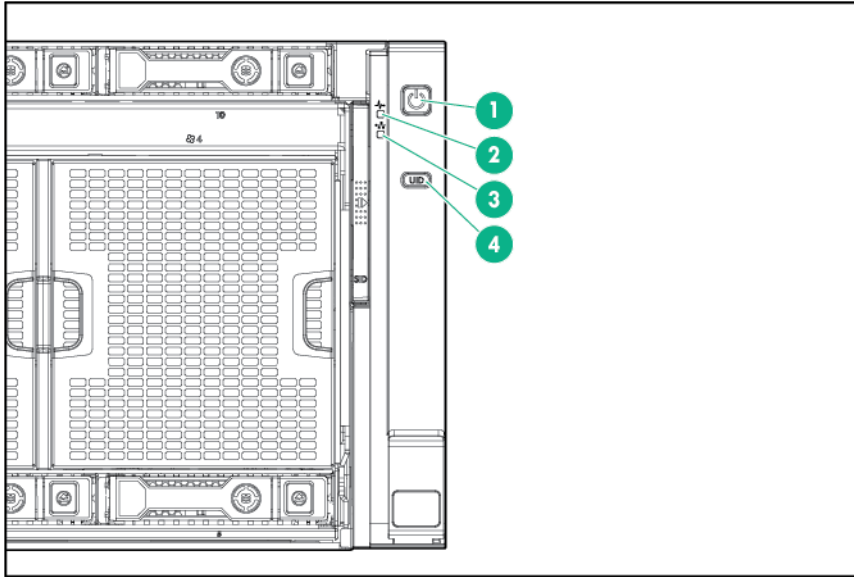
Front panel components



Item	Description
1	Drive bays 6 to 10*
2	Systems Insight Display
3	Fans 1 to 4
4	Drive bays 1 to 5
5	Discovery services connectors
6	Video connector
7	USB connectors (2)

* Drives installed in these bays require the optional drive backplane and cables.

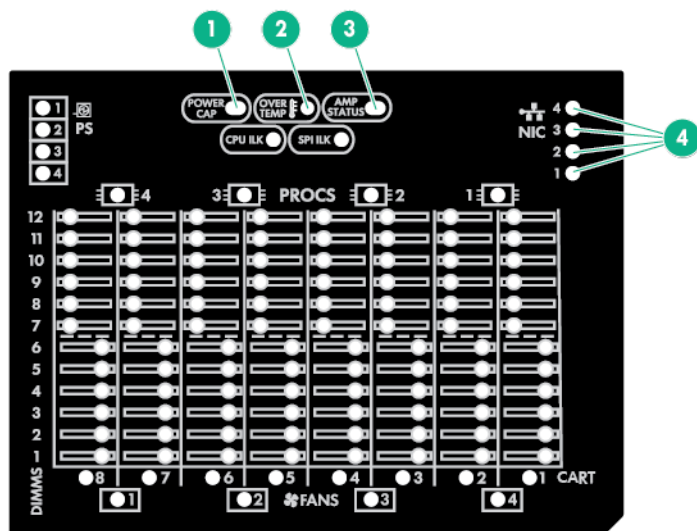
Front panel LEDs and buttons



Item	Description	Status
1	Power On/Standby button and system power LED	• Solid green = System on • Flashing green (1 Hz/cycle per sec) = Performing power on sequence • Solid amber = System in standby • Off = No power present
2	Health LED	• Solid green = Normal • Flashing amber = System degraded • Flashing red (1 Hz/cycle per sec) = System critical • Fast-flashing red (4 Hz/cycles per sec) = System power fault
3	Aggregate NIC LED	• Solid green = Link to network • Flashing green = Linked with activity on the network • Off = No network connection
4	UID button/link	• Solid blue = Activated • Flashing blue (1 Hz/cycle per sec) = Remote management or firmware upgrade in progress

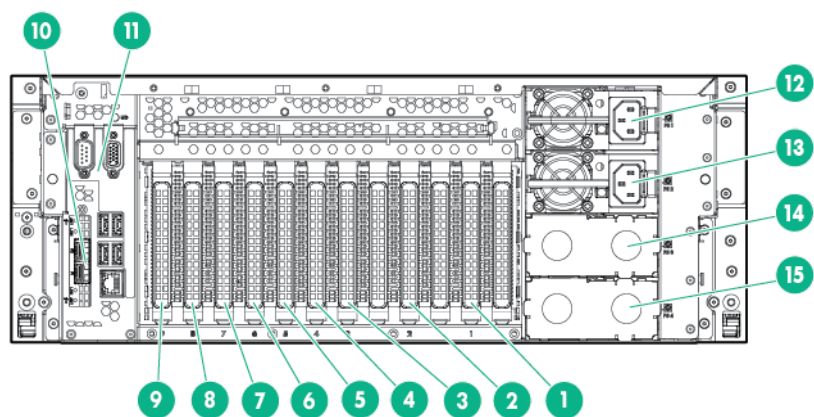
Systems Insight Display

The Systems Insight Display LEDs represent the server and component layout.



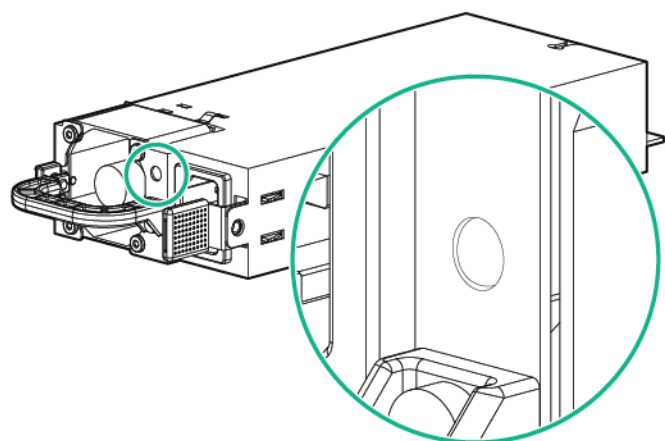
Item	LED	Description
1	Power cap	- Green = System on or requesting power on - Flashing amber = Power on denied - Off = Standby
2	Overtemperature	- Off = Normal - Amber = Failed or missing component
3	AMP status	- Off = No protection - Green = Protection enabled - Amber = Memory failure occurred - Amber (flashing) = Memory configuration error
4	NIC activity/link	- Green = Linked to network - Green (flashing) = Linked with activity on the network - Off = No network connection
	All other LEDs	- Off = Normal - Amber = Failed or missing component

Rear panel components



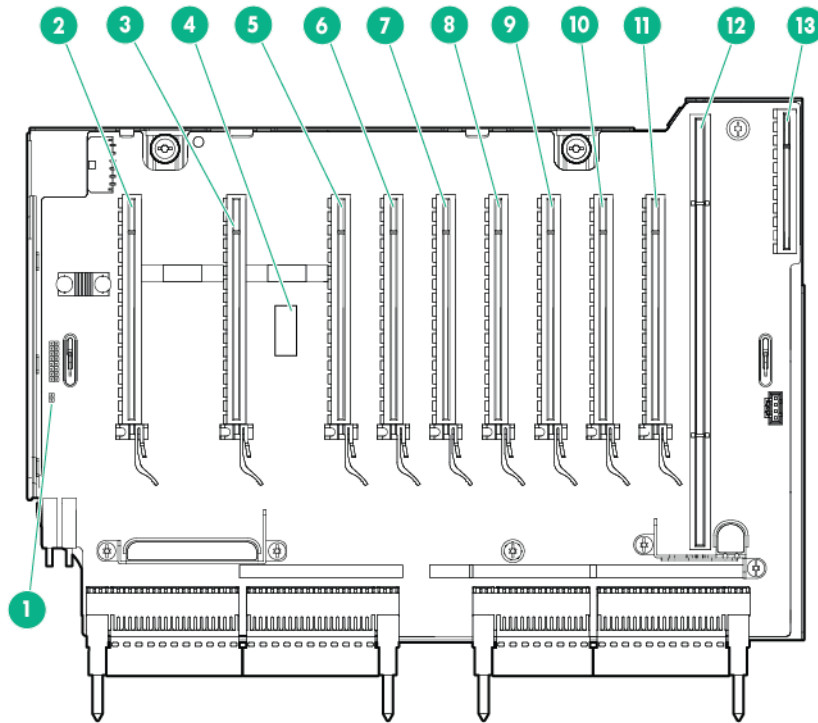
Item	Description
1	Expansion board slot 1
2	Expansion board slot 2
3	Expansion board slot 3
4	Expansion board slot 4
5	Expansion board slot 5
6	Expansion board slot 6
7	Expansion board slot 7
8	Expansion board slot 8
9	Expansion board slot 9
10	FlexibleLOM slot
11	SPI board
12	Power supply 1
13	Power supply 2
14	Power supply bay 3
15	Power supply bay 4

Power supply LED

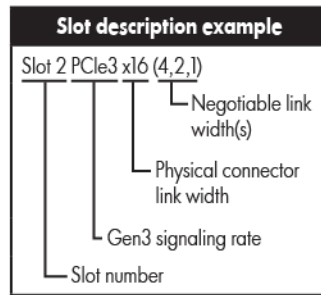


Fail LED-amber (Located on the SID)	Power LED-green (Located on the power supply)	Front external health LED (Located on the front panel)	Status
Off	Off	Off	No AC power to power supply units
Off	On	Green	• AC present/Standby outputs on • Power supply DC outputs on and OK
On	Off	• Amber (flashing) – redundant • Red (flashing) – non-redundant	Power supply failure (includes over voltage and over temperature)

I/O board components



Item	Description
1	NMI jumper
2	Slot 1 PCIe3 x16 (16, 8, 4, 2, 1 electrical)
3	Slot 2 PCIe3 x16 (16, 8, 4, 2, 1 electrical)
4	System maintenance switch
5	Slot 3 PCIe3 x16 (16, 8, 4, 2, 1 electrical)
6	Slot 4 PCIe3 x16 (8, 4, 2, 1 electrical)
7	Slot 5 PCIe3 x16 (8, 4, 2, 1 electrical)
8	Slot 6 PCIe3 x16 (16, 8, 4, 2, 1 electrical)
9	Slot 7 PCIe3 x16 (8, 4, 2, 1 electrical)
10	Slot 8 PCIe3 x16 (8, 4, 2, 1 electrical)
11	Slot 9 PCIe3 x16 (16, 8, 4, 2, 1 electrical)
12	SPI board connector
13	FlexibleLOM connector



System maintenance switch

The system maintenance switch (SW1) is a twelve-position switch that is used for system configuration. The default position for all twelve positions is Off.

Switch	Settings
1	- Off = iLO security enabled - On = iLO security disabled
2	- Off = Normal operation - On = The BIOS configuration is locked.
5	- Off = Normal operation - On = Password disabled
6	- Off = Normal operation - On = Clear CMOS and RAM
7*	- Off = Set factory default boot mode to UEFI. - On = Set factory default boot mode to Legacy.
3, 4, 8, 9, 10, 11, 12	Reserved

* The default position for switch 7 is set in the factory shipping configuration. This switch setting determines the BIOS mode the system defaults to when configuration memory is cleared to factory defaults. The User defined defaults setting in UEFI System Utilities supersedes this switch.



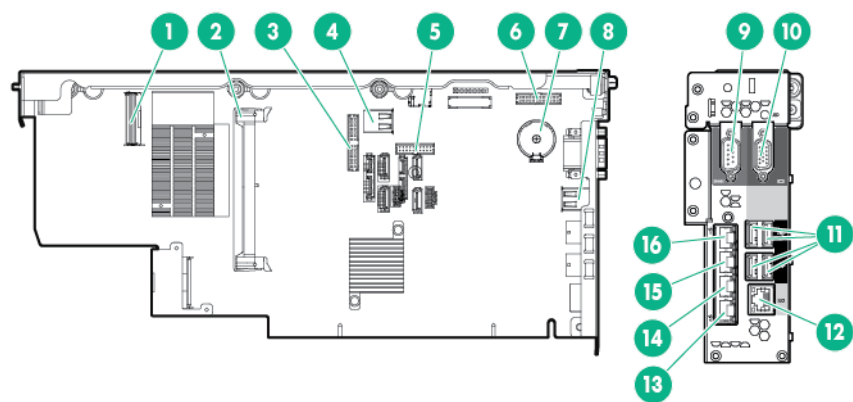
IMPORTANT: To avoid a mismatch between boot modes, Hewlett Packard Enterprise recommends setting system maintenance switch 7 to the same BIOS boot mode the server is deployed in. Otherwise, the storage controller may not recognize the OS installed on the storage media.

NMI jumper

The NMI jumper allows administrators to perform a memory dump before performing a hard reset. Crash dump analysis is an essential part of eliminating reliability problems, such as hangs or crashes in OSs, device drivers, and applications. Many crashes can freeze a system, requiring you to do a hard reset. Resetting the system erases any information that would support root cause analysis.

Systems running Microsoft® Windows® experience a blue-screen trap when the OS crashes. When this happens, Microsoft® recommends that system administrators perform an NMI event by temporarily shorting the NMI header with a jumper. The NMI event enables a hung system to become responsive again.

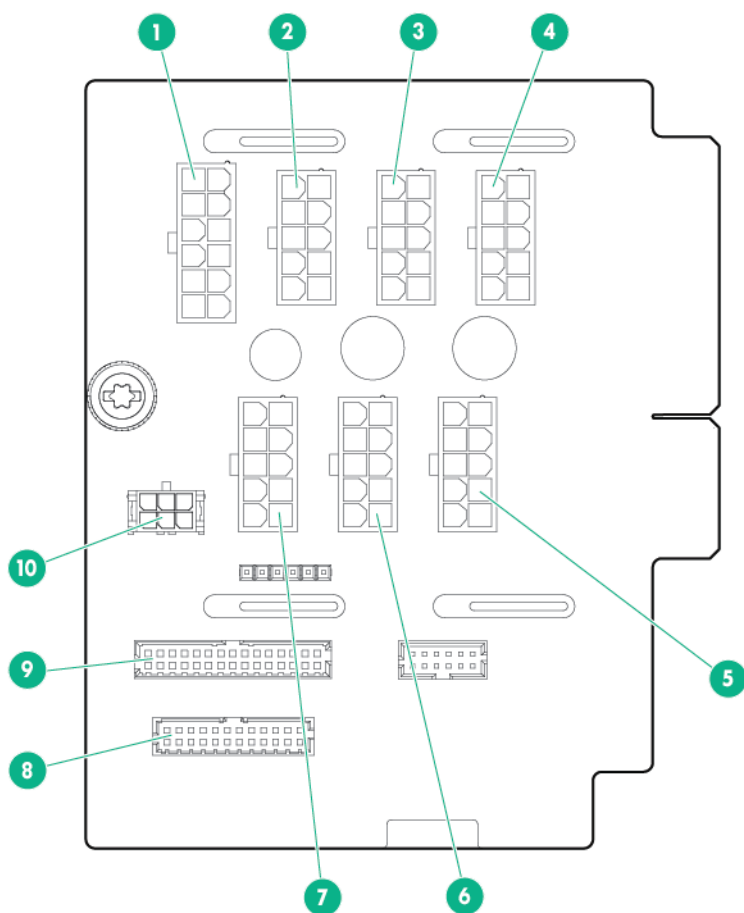
SPI board components



Item	Description
1	Top SAS backplane connector
2	SAS cache module connector
3	Systems Insight Display Power/UID connector
4	Internal USB connector
5	TPM connector
6	Front video/USB connector
7	Battery
8	Internal USB connector
9	Serial connector
10	Video connector
11	USB connectors (4)
12	iLO connector
13	FlexibleLOM port 1*
14	FlexibleLOM port 2*
15	FlexibleLOM port 3*
16	FlexibleLOM port 4*

*Port configuration is dependent on the installed FlexibleLOM and might differ from what is shown in the illustration.

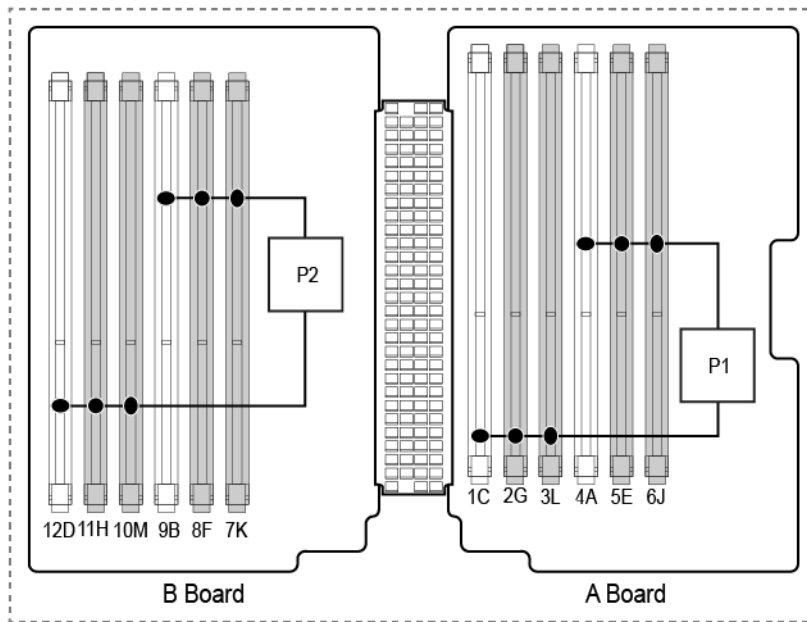
Power daughter board components



Item	Description
1	Upper SAS backplane power connector
2	I/O board auxiliary power connector
3	I/O board auxiliary power connector
4	I/O board auxiliary power connector
5	I/O board auxiliary power connector
6	I/O board auxiliary power connector
7	I/O board auxiliary power connector
8	Power backplane data connector
9	Power backplane data connector
10	I/O board power connector

DIMM slot locations

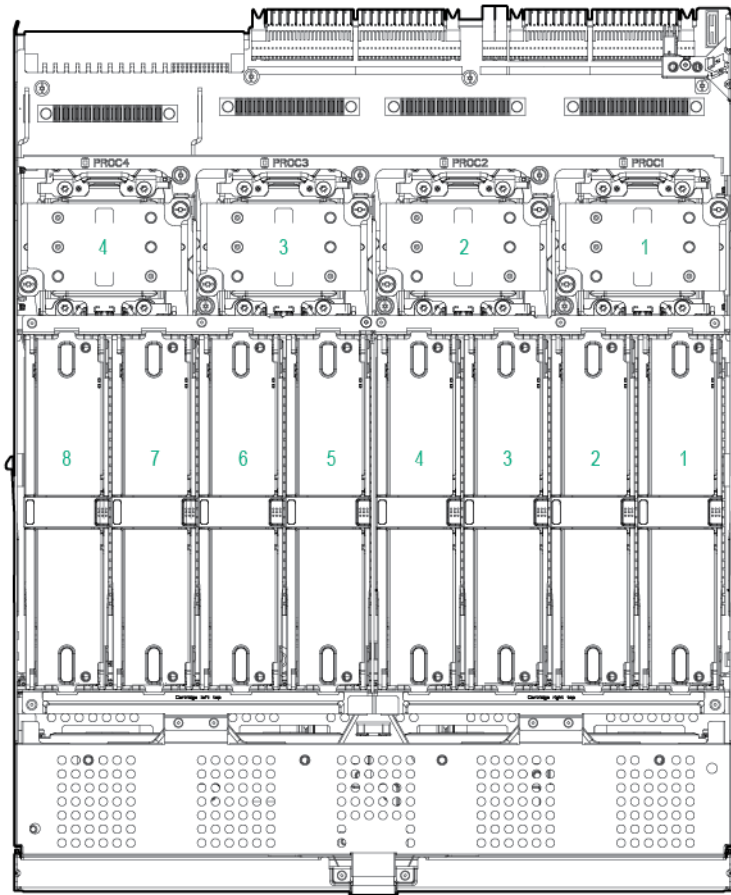
Each memory cartridge contains 12 DIMM slots. Install DIMMs in pairs in alphabetical order.



For installation guidelines, see "Memory options (on page [48](#))."

Processors and memory cartridges

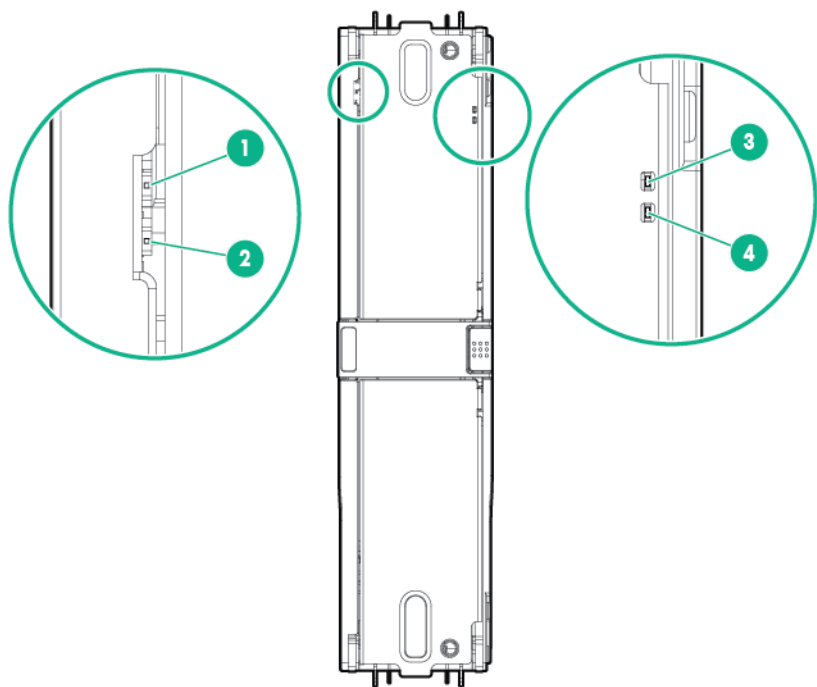
The processor memory drawer contains 4 processor sockets and 8 memory cartridges.



For DIMM numbering, see "DIMM slot locations (on page 15)."

For installation guidelines, see "Memory options (on page 48)."

DIMM fault LEDs

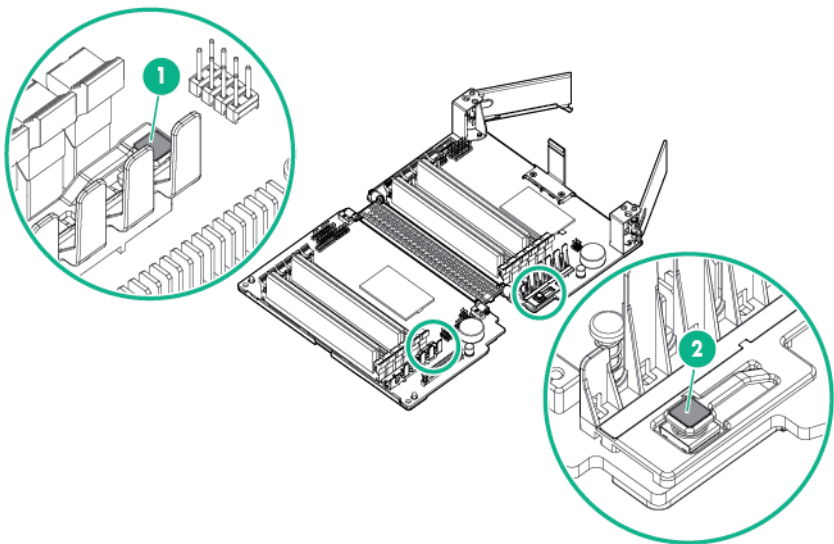


Item	Description	Status
1	Power fault LED (board B)	- Off = The DIMMs are operating normally. - Solid amber = One or more DIMMs in the cartridge is experiencing a power fault condition.
2	General board fault LED (board B)	- Off = The DIMMs are operating normally. - Solid amber = One or more DIMMs in the cartridge is experiencing a general fault condition.
3	General board fault LED (board A)	- Off = The DIMMs are operating normally. - Solid amber = One or more DIMMs in the cartridge is experiencing a general fault condition.
4	Power fault LED (board A)	- Off = The DIMMs are operating normally. - Solid amber = One or more DIMMs in the cartridge is experiencing a power fault condition.

To determine which DIMMs are experiencing a fault condition, see "DIMM fault identification button (on page 18)."

DIMM fault identification button

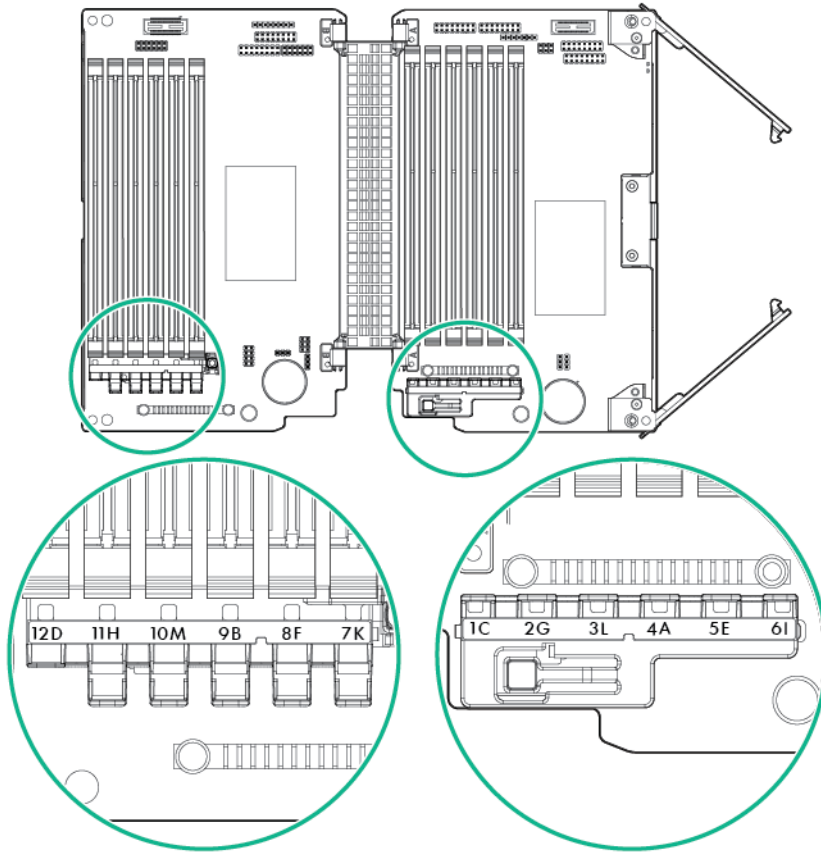
When the DIMM fault LEDs (on page 17) indicate that a DIMM is experiencing an error, press the DIMM fault identification button to illuminate the LED below the affected DIMM ("Memory error LEDs" on page 19).



Item	Description
1	Board B DIMM fault identification button
2	Board A DIMM fault identification button

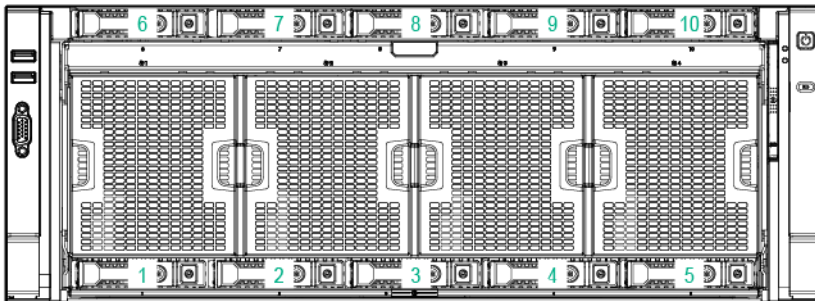
Memory error LEDs

When the DIMM fault LEDs (on page 17) indicate that a DIMM is experiencing an error, the memory error LED below the affected DIMM illuminates red when the DIMM fault identification button (on page 18) is pressed.

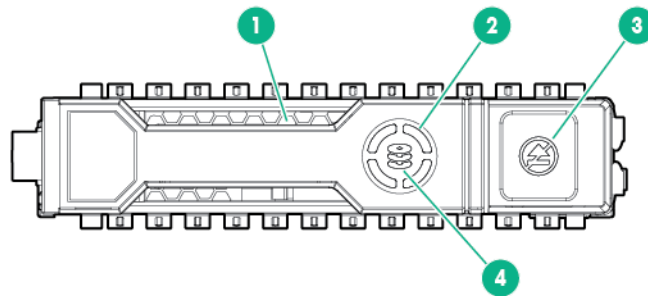


Drive bay numbering

Drives installed in bays 6 to 10 require the optional SAS backplane or Express Bay enablement option.



Hot-plug drive LED definitions

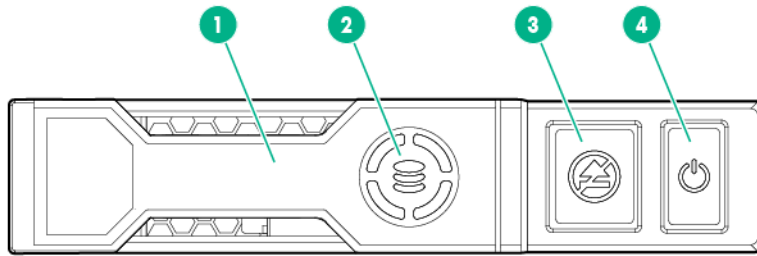


Item	LED	Status	Definition
1	Locate	Solid blue	The drive is being identified by a host application.
		Flashing blue	The drive carrier firmware is being updated or requires an update.
2	Activity ring	Rotating green	Drive activity
		Off	No drive activity
3	Do not remove	Solid white	Do not remove the drive.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

NVMe SSD components

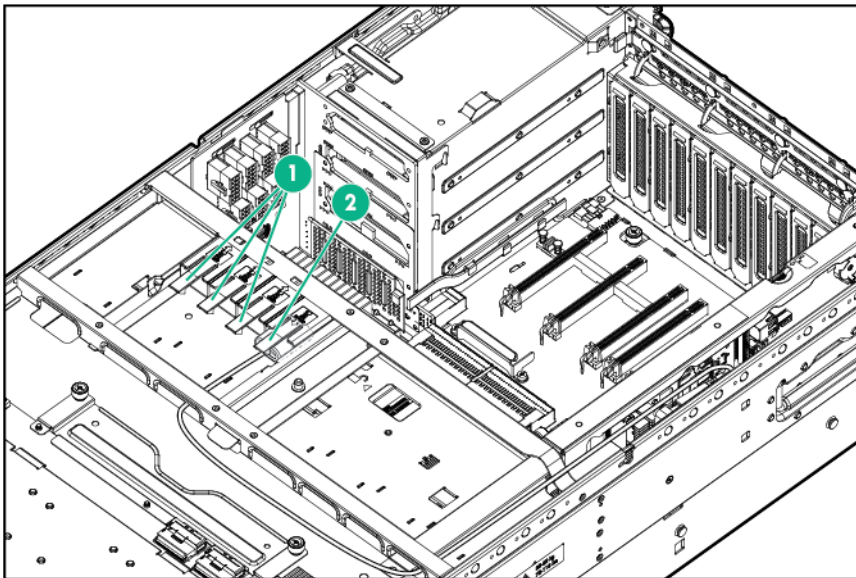
The NVMe SSD is a PCIe bus device. A device attached to a PCIe bus cannot be removed without allowing the device and bus to complete and cease the signal/traffic flow.

⚠ CAUTION: Do not remove an NVMe SSD from the drive bay while the Do Not Remove button LED is flashing. The Do Not Remove button LED flashes to indicate the device is still in use. Removal of the NVMe SSD before the device has completed and ceased signal/traffic flow can cause loss of data.



Item	Description
1	Release lever
2	Activity ring
3	Do Not Remove button
4	Power button

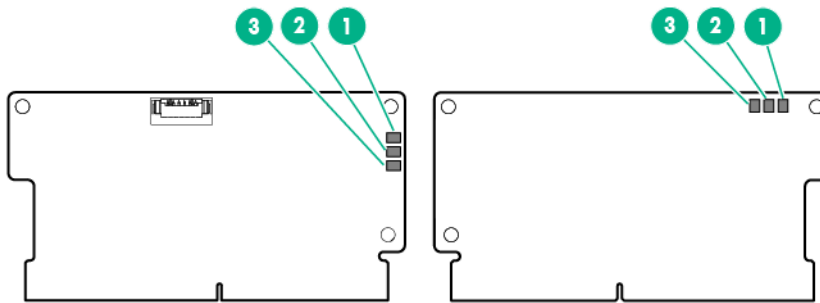
FBWC capacitor slots



Item	Description
1	Slots 2 to 4—Connect to optional SAS controllers
2	Slot 1—Connects to the SPI board

FBWC module LEDs

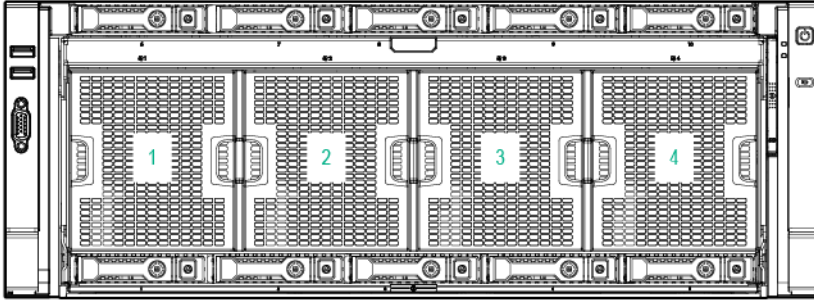
The FBWC module has three single-color LEDs (one amber and two green). The LEDs are duplicated on the reverse side of the cache module to facilitate status viewing.



1 - Amber	2 - Green	3 - Green	Interpretation
Off	Off	Off	The cache module is not powered.
Off	Flashing once every 2 seconds	Flashing once every 2 seconds	The cache microcontroller is executing from within its boot loader and receiving new flash code from the host controller.
Off	Flashing once per second	Flashing once per second	The cache module is powering up, and the capacitor pack is charging.
Off	Off	Flashing once per second	The cache module is idle, and the capacitor pack is charging.
Off	Off	On	The cache module is idle, and the capacitor pack is charged.
Off	On	On	The cache module is idle, the capacitor pack is charged, and the cache contains data that has not yet been written to the drives.
Off	Flashing once per second	Off	A backup of the DDR content on the cache module is in progress.
Off	On	Off	The current backup is complete with no errors.
Flashing once per second	Flashing once per second	Off	The current backup failed, and data has been lost.
Flashing once per second	Flashing once per second	On	A power error occurred during the previous or current boot. Data may be corrupt.
Flashing once per second	On	Off	An overtemperature condition exists.
Flashing twice per second	Flashing twice per second	Off	The capacitor pack is not attached.
Flashing twice per second	Flashing twice per second	On	The capacitor has been charging for 10 minutes, but has not reached sufficient charge to perform a full backup.
On	On	Off	The current backup is complete, but power fluctuations occurred during the backup.
On	On	On	The cache module microcontroller has failed.

Fans

Fan locations



Fan guidelines

The server has 4 fan modules with 2 rotors in each module. The fan modules operate in a 7+1 configuration.

Observe the following guidelines:

- If one rotor fails, the system runs with the fans in a degraded condition.
- If a second rotor fails, either in the same fan module or a different one, the system performs an OS type shutdown if the health OS agents are loaded. The chance of two rotors in the same module failing is low.
- If a fan module is missing, a message appears indicating that cooling is not adequate. Then, the system starts to shut down.
- If you remove a hot-plug fan module, you have approximately 60 seconds to replace the module. Otherwise, the system starts to shut down.

Operations

Powering up the server

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

Power down the server



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: If installing a hot-plug device, it is not necessary to power down the server.

1. Back up the server data.
2. Shut down the operating system. For more information, see the operating system documentation.

NOTE: If the operating system automatically places the server in Standby mode, omit the next step.

3. Press the Power On/Standby button to place the server in Standby mode. When the server activates Standby power mode, the system power LED changes to amber.



IMPORTANT: Pressing the UID button illuminates the blue UID LEDs on the front and rear panels. In a rack environment, this feature facilitates locating a server when moving between the front and rear of the rack.

4. Disconnect the power cords.

The system is now without power.

Remove the server from the rack



WARNING: To reduce the risk of personal injury or equipment damage, be sure that the rack is adequately stabilized before extending a component from the rack.



WARNING: To reduce the risk of personal injury, be careful when pressing the server rail-release latches and sliding the server into the rack. The sliding rails could pinch your fingers.



32.18-52.87 kg
70.94-116.56 lb

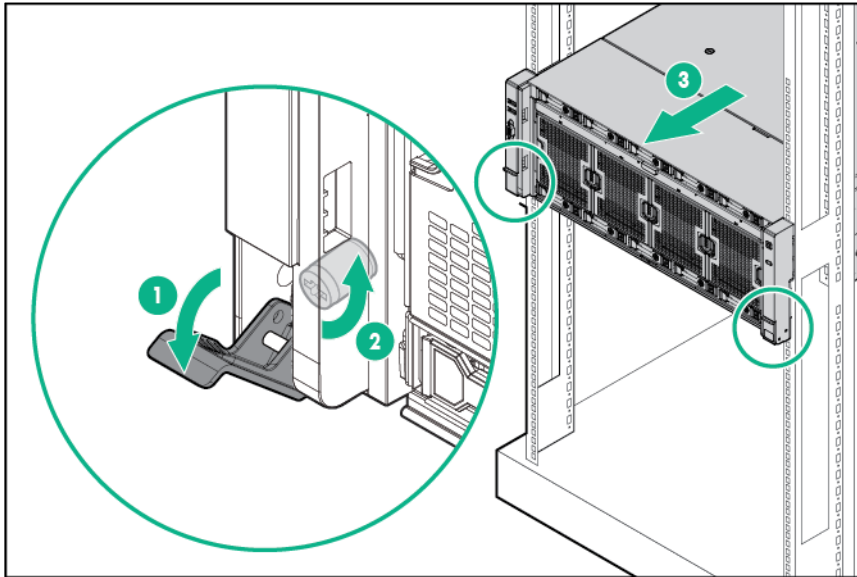
This symbol indicates that the component exceeds the recommended weight for one individual to handle safely.

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.

To remove the server from the rack:

1. Pull down the quick-release levers on each side of the server to release the server from the rack. If necessary, loosen the rack screws.

2. Extend the server on the rack rails until the server rail-release latches engage.



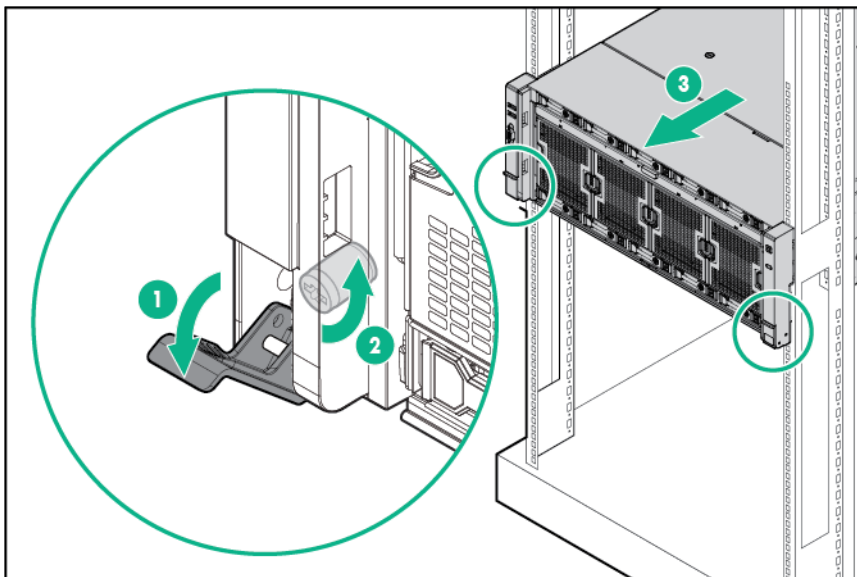
3. Remove the server from the rack.

Extend the server from the rack

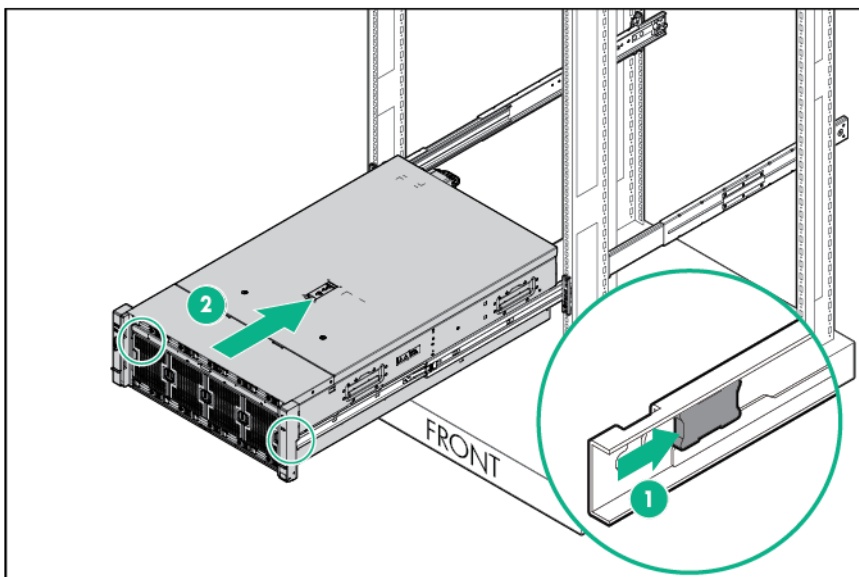
-
- ⚠ WARNING:** To reduce the risk of personal injury or equipment damage, be sure that the rack is adequately stabilized before extending a component from the rack.
-
- ⚠ WARNING:** To reduce the risk of personal injury, be careful when pressing the server rail-release latches and sliding the server into the rack. The sliding rails could pinch your fingers.
-

To extend the server from the rack:

1. Pull down the quick-release levers on each side of the server to release the server from the rack. If necessary, loosen the rack screws.
2. Extend the server on the rack rails until the server rail-release latches engage.



3. After performing the installation or maintenance procedure, slide the server into the rack by pressing the server rail-release latches.



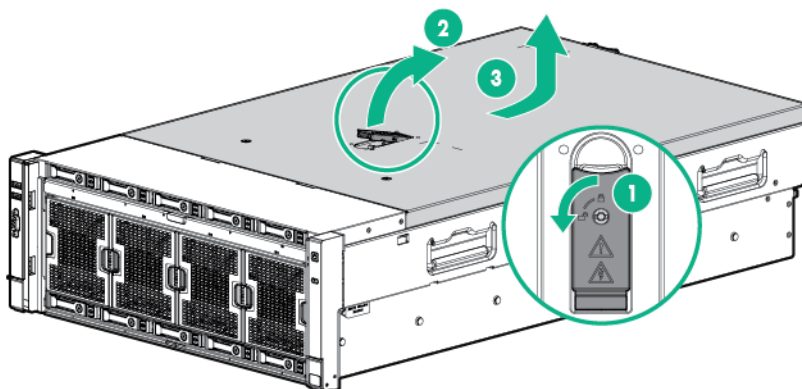
Remove the access panel

⚠ 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: 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.

To remove the component:

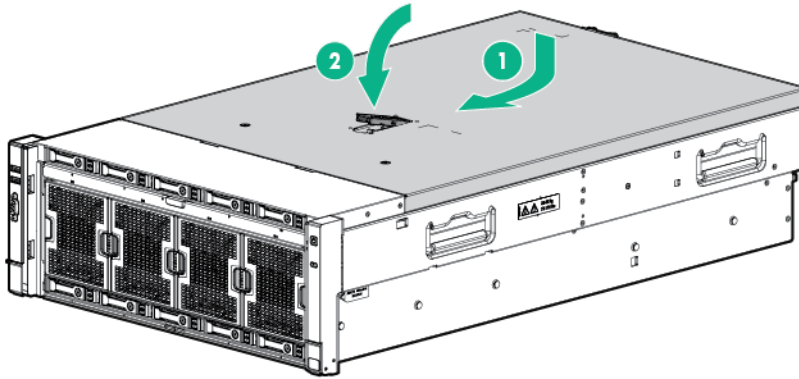
1. Power down the server (on page 24).
2. Extend the server from the rack (on page 25).
3. Remove the access panel. If the locking latch is locked, use a T-15 Torx screwdriver to unlock the latch.



Install the access panel

1. Ensure that the access panel latch is in the open position.

2. Align the hole in the access panel latch with the guide pin on the chassis.
3. Close the access panel latch. The access panel slides to a closed position.

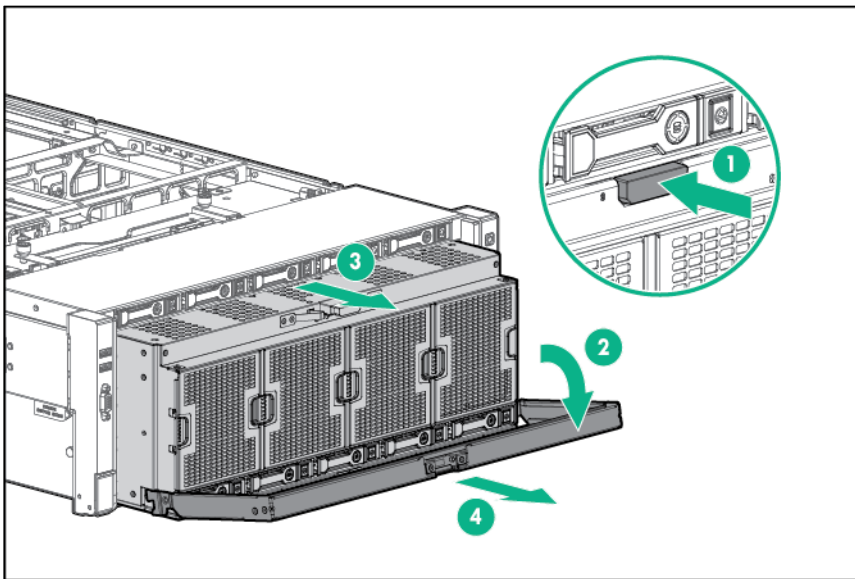


4. Use a T-15 Torx screwdriver to tighten the access panel latch screw.

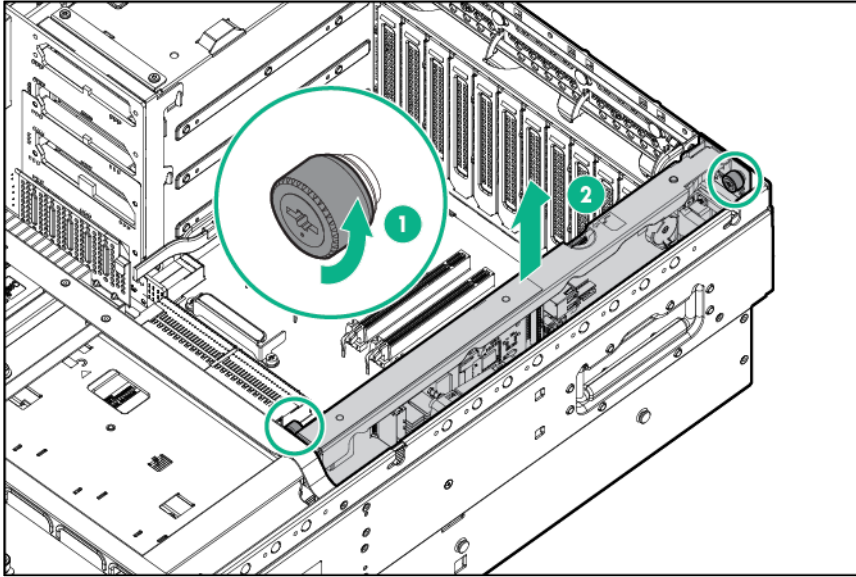
Remove the SPI board

To remove the component:

1. Power down the server (on page 24).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Extend the server from the rack (on page 25).
4. Remove the access panel (on page 26).
5. Remove the processor memory drawer shipping screws, if installed. Retain the screws for future use ("Processor memory drawer shipping screw locations" on page 30).
6. Extend the processor memory drawer approximately 2.54 to 5.1 cm (1 to 2 inches).



7. Loosen the thumbscrews on the SPI board, and then lift the SPI board to access the cables.



8. Disconnect all cables from the SPI board.



IMPORTANT: If replacing the SPI board or clearing NVRAM, you must re-enter the server serial number through the Advanced System ROM options in UEFI System Utilities ("Re-entering the server serial number and product ID" on page 101).

9. Remove the SPI board from the server.

Install the SPI board

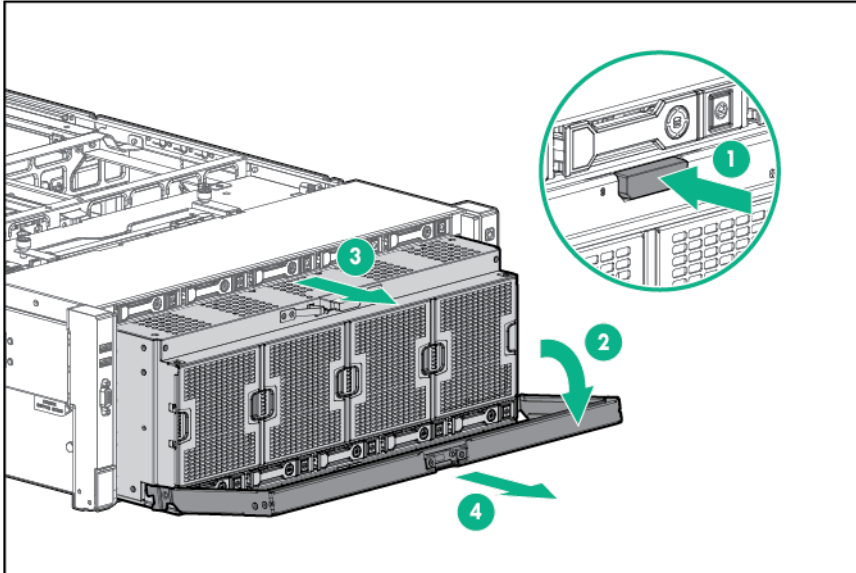


CAUTION: To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any system installation. Improper grounding can cause electrostatic discharge.

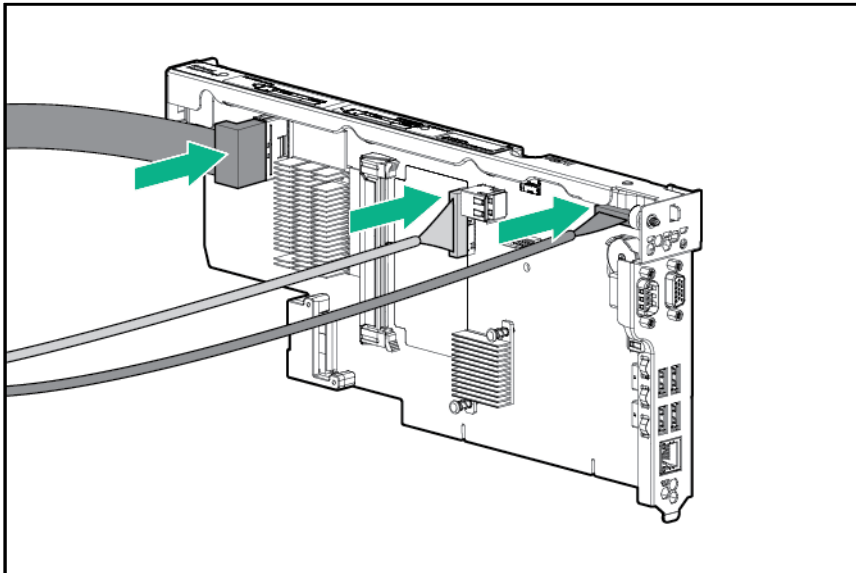
To install the component:

1. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
2. Do one of the following:
 - o Extend the server from the rack (on page 25).
 - o Remove the server from the rack (on page 24).
3. Remove the access panel (on page 26).
4. Remove the processor memory drawer shipping screws, if installed. Retain the screws for future use ("Processor memory drawer shipping screw locations" on page 30).

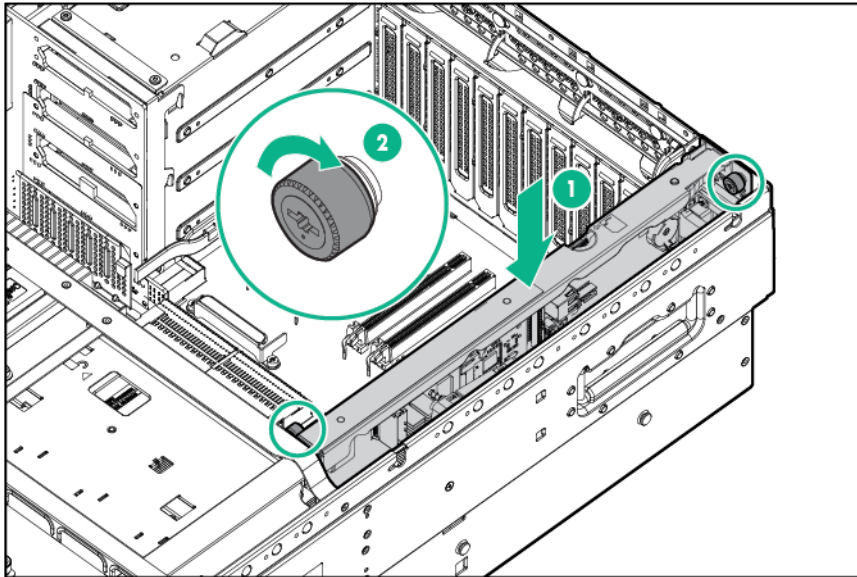
5. Extend the processor memory drawer approximately 2.54 to 5.1 cm (1 to 2 inches).



6. Connect the cables to the SPI board.



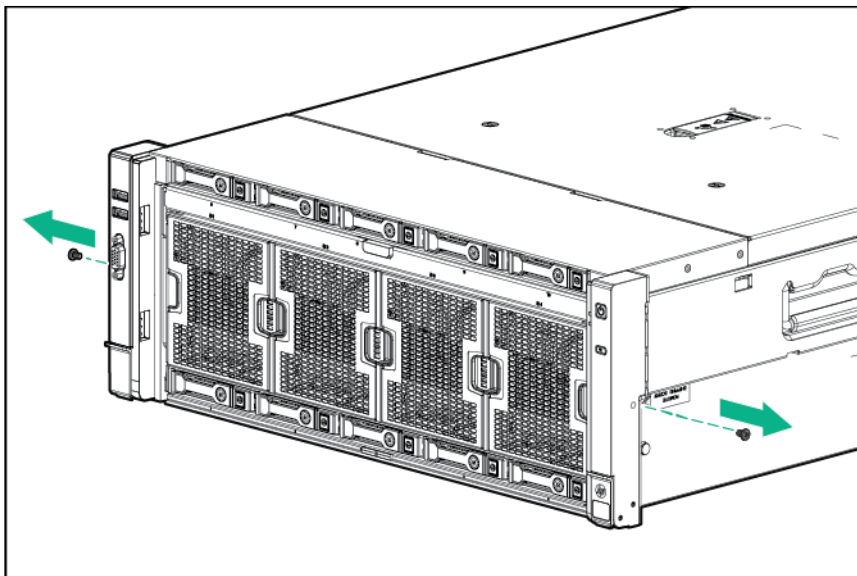
7. Install the SPI board and tighten the thumbscrews.



8. Install the processor memory drawer ("Remove the processor memory drawer cover" on page 32, on page 31).
9. Install the access panel (on page 26).
10. Install the server into the rack ("Installing the server into the rack" on page 38).
11. Connect each power cord to the server.
12. Connect each power cord to the power source.
13. Power up the server ("Powering up the server" on page 24).

Processor memory drawer shipping screw locations

Two orange shipping screws secure the processor memory drawer in place during shipping. You must remove the screws to access the processor memory drawer. Retain the screws for future use.

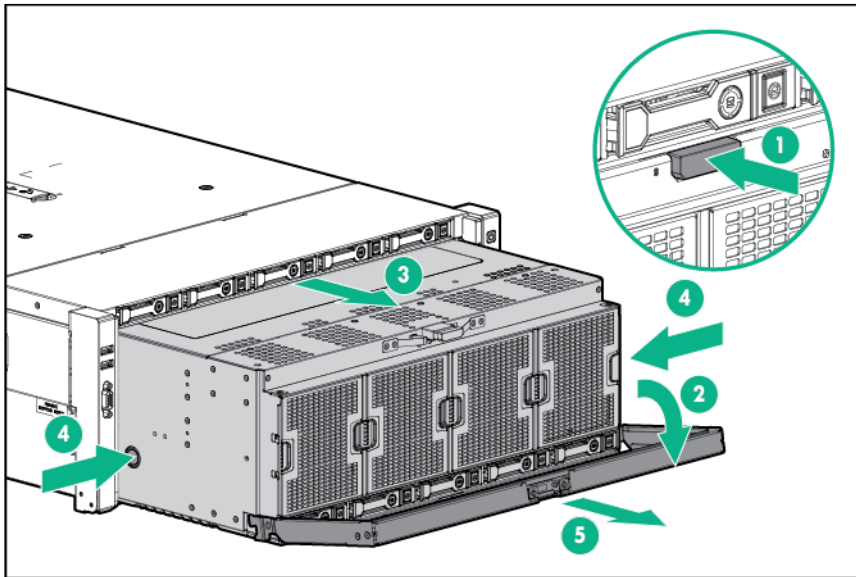


Remove the processor memory drawer



WARNING: The processor memory drawer weighs more than 11.3 kg (25.0 lb). Use extra caution when removing and replacing the processor memory drawer.

1. Remove the processor memory drawer shipping screws, if installed. Retain the screws for future use ("Processor memory drawer shipping screw locations" on page 30).
2. Push the button on the release lever.
3. Lower the handle, and then extend the processor memory drawer from the server until the release latches catch.
4. Firmly holding the processor memory drawer, press the release buttons, and then remove the drawer from the server.



Install the processor memory drawer

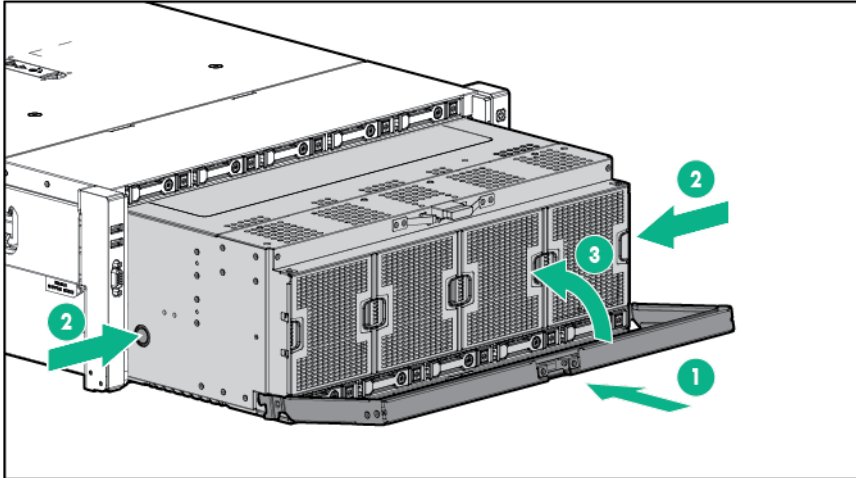


CAUTION: To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any system installation. Improper grounding can cause electrostatic discharge.

To install the component:

1. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
2. Do one of the following:
 - o Extend the server from the rack (on page 25).
 - o Remove the server from the rack (on page 24).
3. Remove the access panel (on page 26).

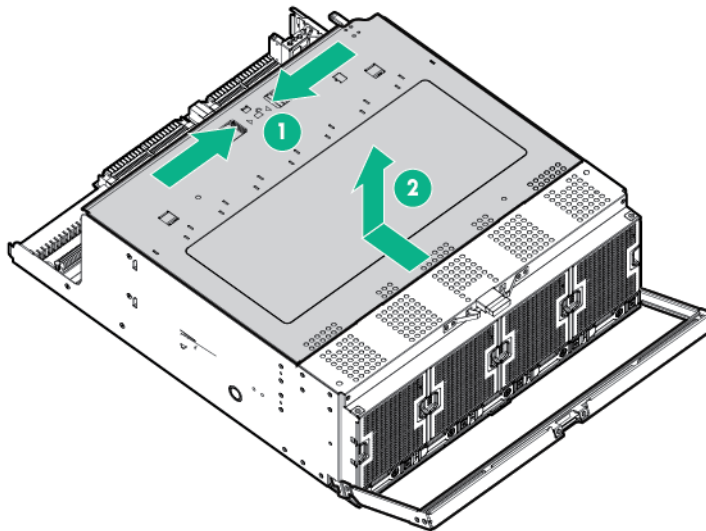
4. Install the processor memory drawer.



5. Install the access panel (on page 26).
6. Install the server into the rack ("Installing the server into the rack" on page 38).
7. Connect each power cord to the server.
8. Connect each power cord to the power source.
9. Power up the server ("Powering up the server" on page 24).

Remove the processor memory drawer cover

1. Remove the processor memory drawer shipping screws, if installed. Retain the screws for future use ("Processor memory drawer shipping screw locations" on page 30).
2. Remove the processor memory drawer (on page 31).
3. Remove the processor memory drawer cover.



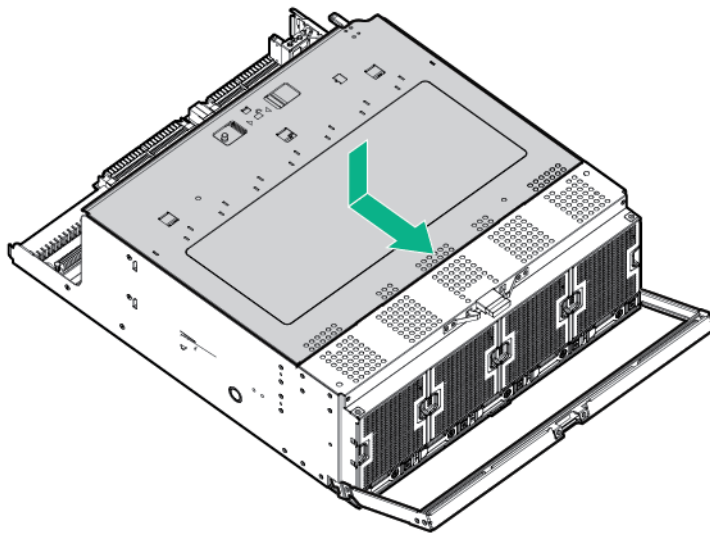
Install the processor memory drawer cover



CAUTION: To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any system installation. Improper grounding can cause electrostatic discharge.

To install the component:

1. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
2. Do one of the following:
 - o Extend the server from the rack (on page 25).
 - o Remove the server from the rack (on page 24).
3. Remove the access panel (on page 26).
4. Remove the processor memory drawer (on page 31).
5. Install the processor memory drawer cover.



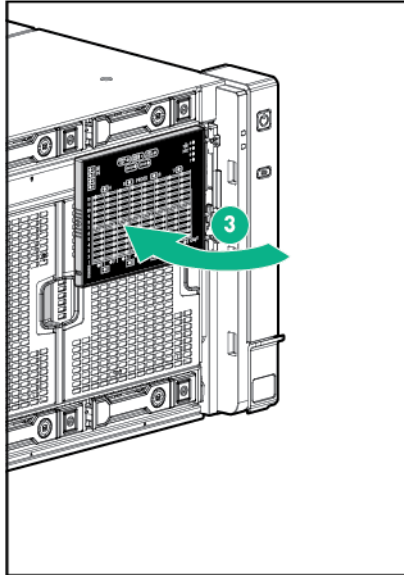
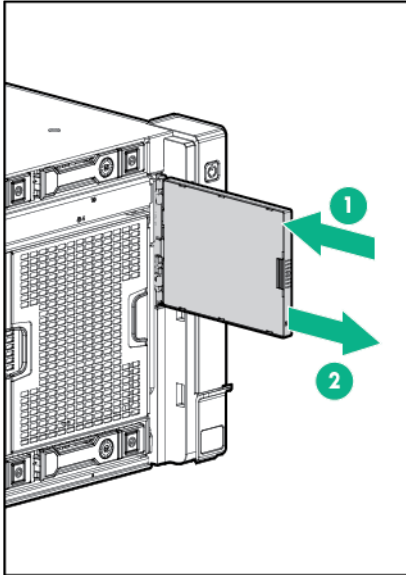
6. Install the processor memory drawer ("Remove the processor memory drawer cover" on page 32, on page 31).
7. Install the access panel (on page 26).
8. Install the server into the rack ("Installing the server into the rack" on page 38).
9. Connect each power cord to the server.
10. Connect each power cord to the power source.
11. Power up the server ("Powering up the server" on page 24).

Access the Systems Insight Display

To access the Systems Insight Display:

1. Press and release the panel.

2. After the display fully ejects, rotate the display to the left to view the LEDs.



Setup

Optional services

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

HPE support services offer upgraded service levels to expand the standard product warranty with easy-to-buy, easy-to-use support packages that will help you make the most of your server investments. Some of the HPE support services for hardware, software or both are:

- Foundation Care – Keep systems running.
 - 6-Hour Call-to-Repair
 - 4-Hour 24x7
 - Next Business Day
- Proactive Care – Help prevent service incidents and get you to technical experts when there is one.
 - 6-Hour Call-to-Repair
 - 4-Hour 24x7
 - Next Business Day
- Startup and implementation services for both hardware and software
- HPE Education Services – Help train your IT staff.

For more information on HPE support services, see the Hewlett Packard Enterprise website (<http://www.hpe.com/services>).

Rack planning resources

The rack resource kit ships with all HPE Intelligent Series racks. For more information on the content of each resource, see the rack resource kit documentation.

Optimum environment

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

Space and airflow requirements

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

- Leave a minimum clearance of 63.5 cm (25 in) in front of the rack.
- Leave a minimum clearance of 76.2 cm (30 in) behind the rack.
- Leave a minimum clearance of 121.9 cm (48 in) from the back of the rack to the back of another rack or row of racks.

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



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

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



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

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



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



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

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



IMPORTANT: The HPE ProLiant DL580 Gen9 Server cable management arm is not supported on Compaq branded 7000 series racks.

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 ambient operating temperature (TMRA) for most server products is 35°C (95°F). The temperature in the room where the rack 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 or to increase the internal rack temperature 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, refer to the product rating label or the user documentation supplied with that option.



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



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 may need 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, Hewlett Packard Enterprise 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.

Rack warnings



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

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



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

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

Identifying the contents of the server shipping carton

Unpack the server shipping carton and locate the materials and documentation necessary for installing the server. All the rack mounting hardware necessary for installing the server into the rack is included with the rack or the server.

The contents of the server shipping carton include:

- Server
- Power cord
- Hardware documentation and software products
- Rack-mounting hardware and documentation

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 42)."

Installing the server into the rack



CAUTION: Always plan the rack installation so that the heaviest item is on the bottom of the rack. Install the heaviest item first, and continue to populate the rack from the bottom to the top.

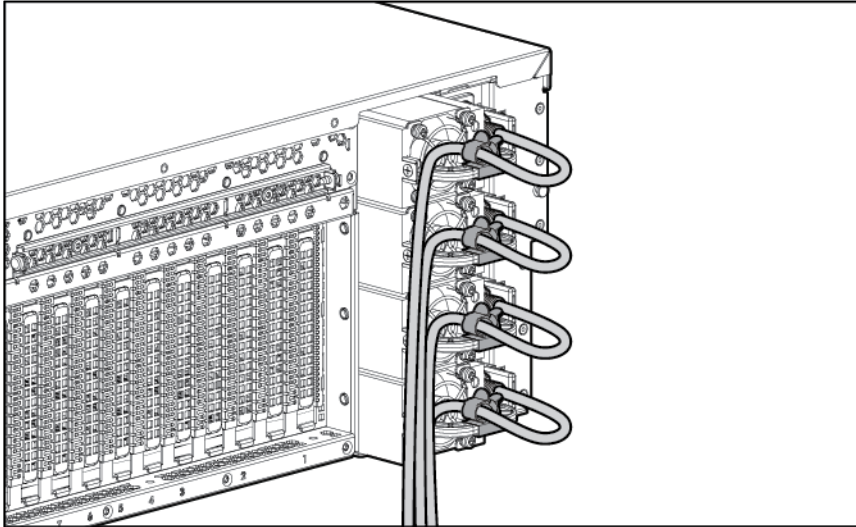
1. Install the server and cable management arm into the rack. For more information, see the installation instructions that ship with the Quick Deploy Rail System.
2. Connect peripheral devices to the server. For information on identifying connectors, see "SPI board components (on page 13)."



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

3. Connect the power cord to the rear of the server.

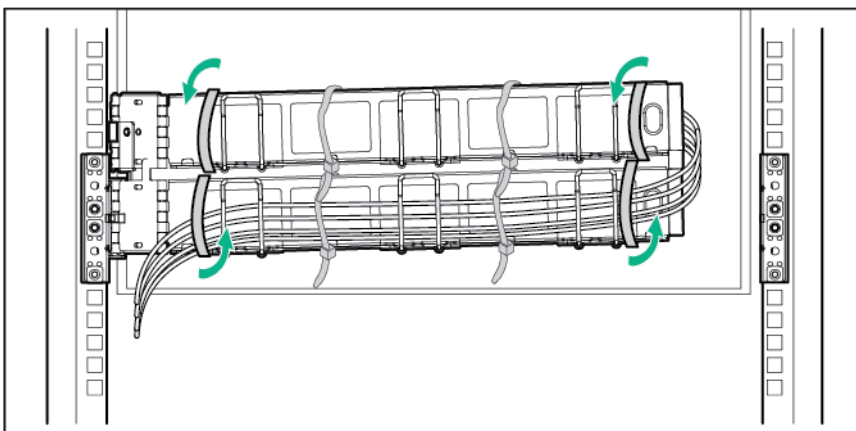
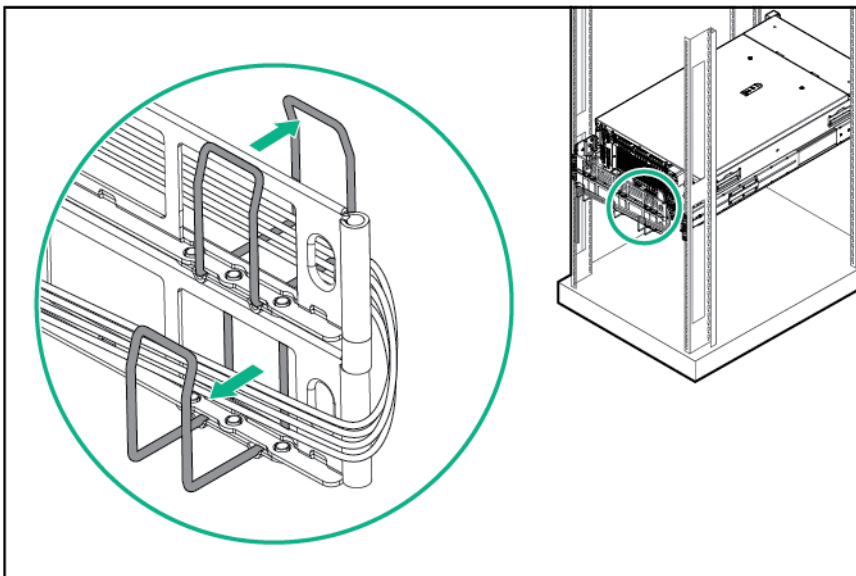
4. Install the power cord anchors.



5. Secure the cables to the cable management arm.



IMPORTANT: When using cable management arm components, be sure to leave enough slack in each of the cables to prevent damage to the cables when the server is extended from the rack.



6. 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 storage system.

Installing the operating system

This ProLiant server ships with Intelligent Provisioning installed. Everything needed to manage and install the system software and firmware is preloaded on the server.

To operate properly, the server must have a supported operating system. For the latest information on operating system support, see the Hewlett Packard Enterprise website (<http://www.hpe.com/info/supportos>).

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

- Intelligent Provisioning—iLO Management is a feature on ProLiant servers that contains Intelligent Provisioning for embedded server configuration, OS deployment, and provisioning capabilities. Intelligent Provisioning can configure the server and install an operating system, eliminating the need for SmartStart CDs and Smart Update Firmware DVDs used in past generations of ProLiant servers.

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

- a. Connect the Ethernet cable, and then power on the server.
 - b. During server POST, press the **F10** key.
 - c. Complete the initial Preferences and Registration portion of Intelligent Provisioning (on page 97).
 - d. At the 1 Start screen, click the **Configure and Install** button.
 - e. To finish the installation, follow the onscreen prompts. An Internet connection is required to update the firmware and systems software.
- Remote deployment installation—To remotely deploy an operating system, use Insight Control server provisioning for an automated solution.

For additional system software and firmware updates, download the Service Pack for ProLiant from the Hewlett Packard Enterprise website (<http://www.hpe.com/info/insightcontrol/docs>). Software and firmware must be updated before using the server for the first time, unless any installed software or components require an older version. For more information, see "Keeping the system current (on page 103)."

Powering on and selecting a boot option

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

For more information on automatic configuration, see the UEFI documentation on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/ProLiantUEFI/docs>).

Register the product

To experience quicker service and more efficient support, register the product at the Hewlett Packard Enterprise Product Registration website (<http://www.hpe.com/info/register>).

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.

Processor options

The server supports up to four processors. Observe the following processor installation guidelines:

- Processor socket 1 must be populated at all times so that the server functions properly.
- When installing PCIe boards, observe the PCIe board and processor population rules shown in the following table.

PCIe slot	Description	Processor	Memory cartridges
1 - FL/FH	PCIe3* x16 (16,8,4,2,1)	Processor 4	Memory cartridges 7 and 8
2 - FL/FH	PCIe3* x16 (16,8,4,2,1)	Processor 4	Memory cartridges 7 and 8
3 - FL/FH	PCIe3* x16 (16,8,4,2,1)	Processor 3	Memory cartridges 5 and 6
4 - FL/FH	PCIe3 x16 (8,4,2,1)	Processor 3	Memory cartridges 5 and 6
5 - FL/FH	PCIe3 x16 (8,4,2,1)	Processor 3	Memory cartridges 5 and 6
6 - FL/FH	PCIe3*x16 (16,8,4,2,1)	Processor 2	Memory cartridges 3 and 4
7 - FL/FH	PCIe3 x16 (8,4,2,1)	Processor 2	Memory cartridges 3 and 4
8 - FL/FH	PCIe3 x16 (8,4,2,1)	Processor 2	Memory cartridges 3 and 4
9 - FL/FH	PCIe3* x16 (16,8,4,2,1)	Processor 1	Memory cartridges 1 and 2

FL/FH = full-length, full-height PCIe board

HL/FH = half-length, full-height PCIe board

All PCIe connectors are capable of supplying up to 75W.

*High power double-width PCI cards (up to 300W) are supported in these slots with auxiliary power cables.

Installing the processor

The processors and memory are located in the drawer accessible from the front of the server. It is not necessary to extend or remove the server from the rack to install or replace processors and memory.



WARNING: Use caution when installing or removing the processor memory drawer. The processor memory drawer is very heavy when fully populated.



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



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



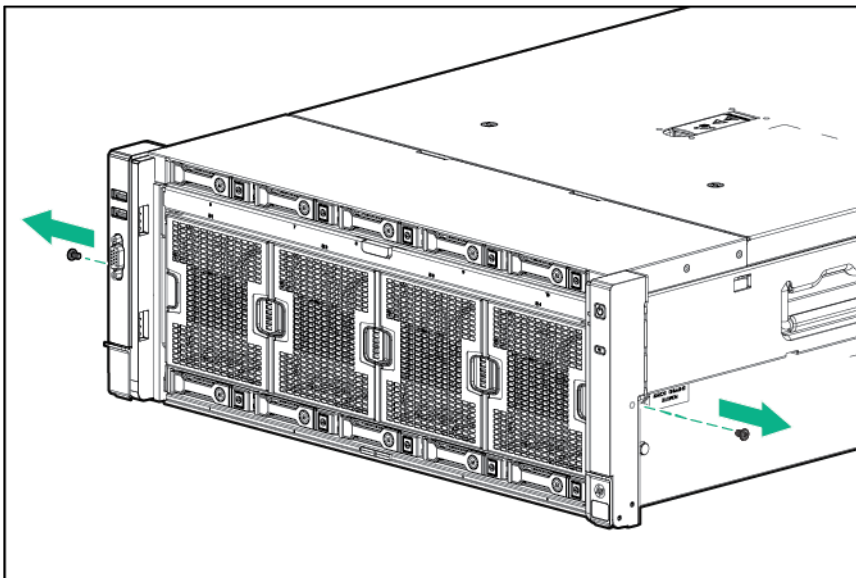
IMPORTANT: Update the system BIOS prior to installing processor generation upgrades.

To install the component:

1. Update the system ROM.

Locate and download the latest ROM version from the Hewlett Packard Enterprise Support Center website (<http://www.hpe.com/support/hpesc>). Follow the instructions on the website to update the system ROM.

2. Power down the server (on page 24).
3. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
4. Remove the processor memory drawer shipping screws, if installed. Retain the screws for future use.

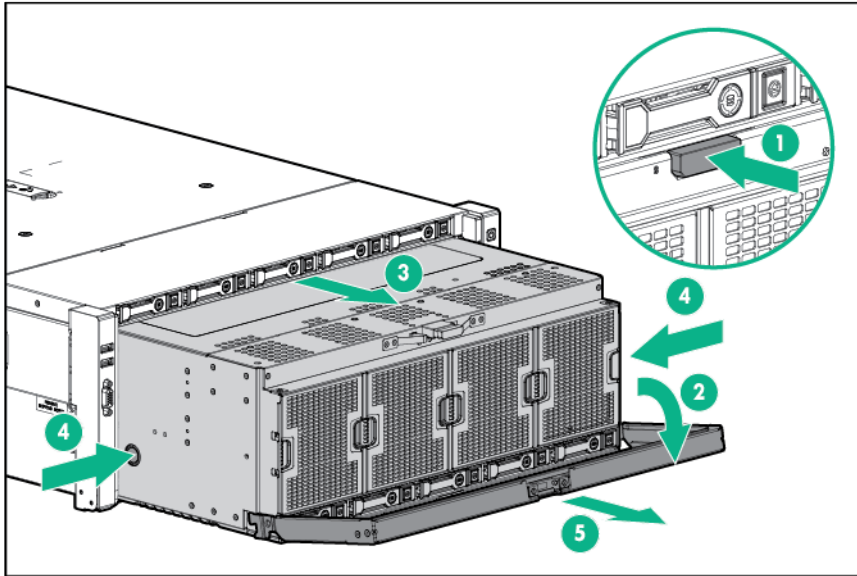


5. Push the button on the release lever.
6. Lower the handle, and then extend the processor memory drawer from the server until the release latches catch.

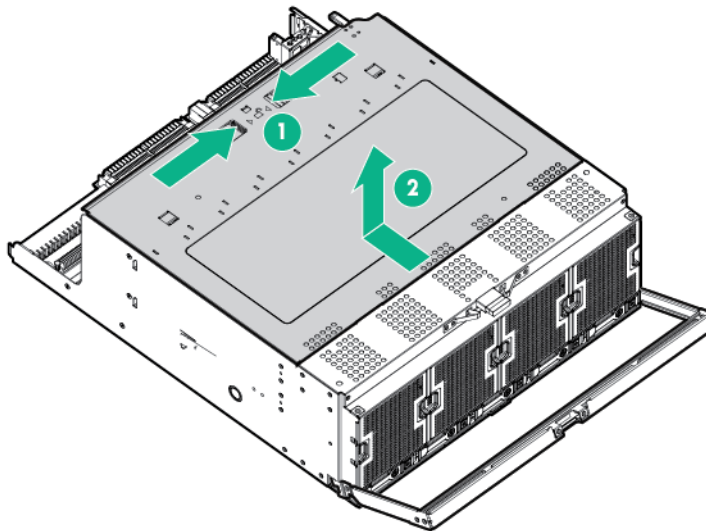


WARNING: The processor memory drawer weighs more than 11.3 kg (25.0 lb). Use extra caution when removing and replacing the processor memory drawer.

7. Firmly holding the processor memory drawer, press the release buttons and then remove the drawer from the server.

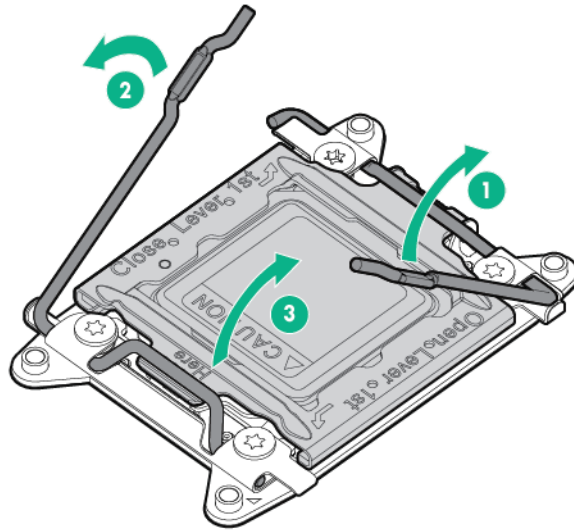


8. Remove the processor memory drawer cover.

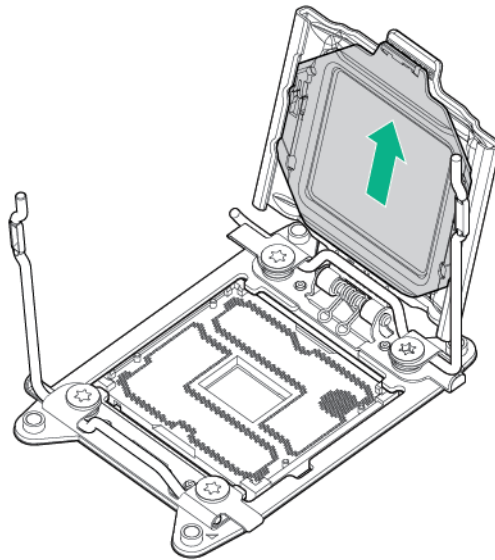


CAUTION: The pins on the processor socket are very fragile. Any damage to them may require replacing the system board.

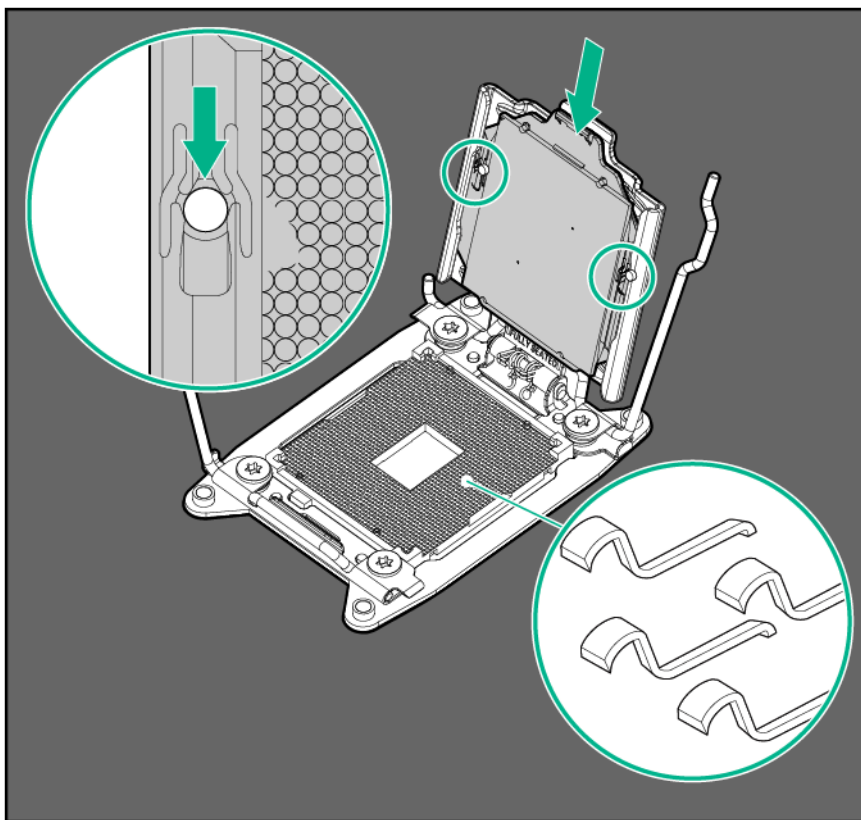
9. Open each of the processor locking levers in the order indicated, and then open the processor retaining bracket.



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



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



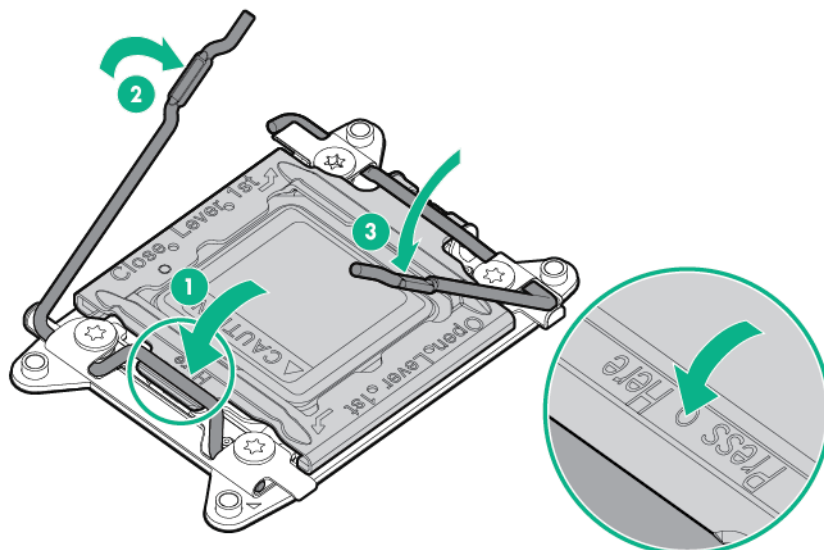
CAUTION: THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED. To avoid damage to the system board, do not touch the processor or the processor socket contacts.

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

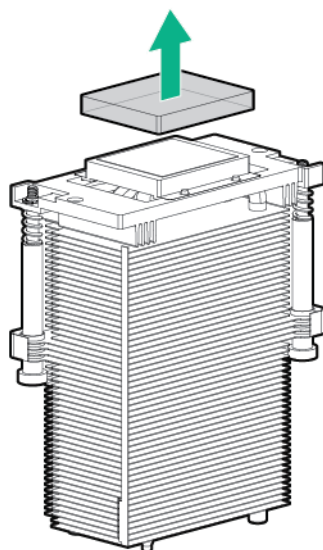


CAUTION: Do not press down on the processor. Pressing down on the processor may cause damage to the processor socket and the system board. Press only in the area indicated on the processor retaining bracket.

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

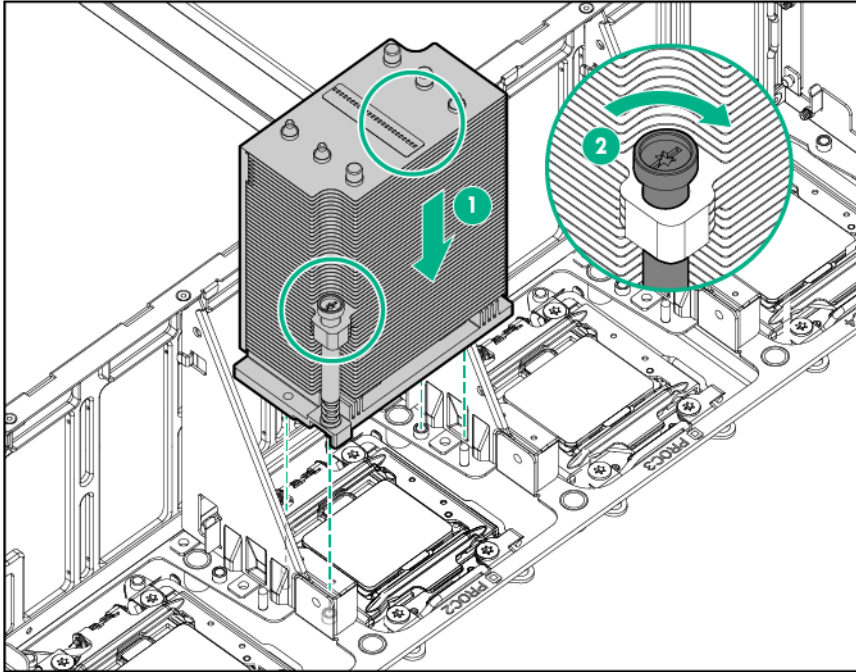


14. Remove the thermal interface protective cover from the heatsink.



CAUTION: To prevent the heatsink from tilting to one side during installation and removal procedures, alternate loosening and tightening the two spring-loaded screws. To prevent the screws from breaking off, do not over-tighten the screws. A maximum torque of 0.45 N m (4 in-lb) is set for the system.

15. Install the heatsink.



16. Install the processor memory drawer cover.
17. Install the processor memory drawer.
18. Connect each power cord to the server.
19. Connect each power cord to the power source.
20. Power up the server ("[Powering up the server](#)" on page 24).

Memory options

Memory configurations

To enhance server availability, the server provides the following AMP modes.

Performance mode - Advanced ECC mode default

The default memory mode for the server is Performance mode - Advanced ECC. Performance mode enables memory bandwidth 2x the DIMM clock speed. Advanced ECC memory can correct single-bit memory errors and multi-bit memory errors on a single x8 or two adjacent x4 DRAM devices. The server provides notification when correctable errors exceed a predefined threshold. When Advanced ECC detects uncorrectable errors, the server notifies the user and shuts down the operating system. Advanced ECC is available for maximum memory configurations.

Lockstep mode - DDDC

The server offers double device data correction (DDDC) with the Intel Xeon Processor E7 series in Lockstep mode. Memory bandwidth is reduced to equal clock speed of DIMMs. DDDC produces significantly less system downtime over Advanced ECC. It can tolerate soft and hard errors encountered in up to two x4 DRAM devices within any DIMM pair. Tolerating memory faults greatly extends system up-time.

Online spare memory

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

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

Mirrored Memory

Errors that are not corrected by ECC or SDDC cannot be corrected by Online Spare memory. Mirrored Memory provides the greatest protection against memory failure beyond ECC, SDDC, and Online Spare memory by providing added redundancy in the memory sub-system. Upon detecting an uncorrectable memory error from a DIMM in a memory cartridge, the processor avoids a system crash by reading the mirrored DIMM. In this case, the system management routine disables the failed DIMM. Further memory reads and writes will only occur on the mirrored DIMM.

Limitations to Mirrored Memory mode are as follows:

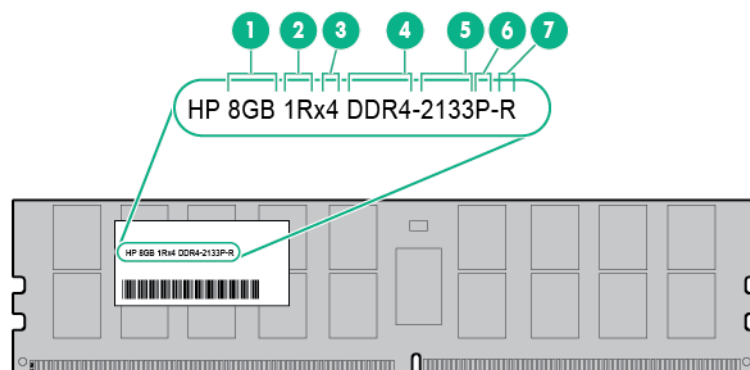
- In Mirrored Memory mode, half of the memory is allocated to memory protection.
- The available memory bandwidth is reduced by up to 50% in this mode.
- Mirrored Memory and Online Spare mode cannot be enabled simultaneously.

Advanced Memory Protection options are configured in BIOS/Platform Configuration (RBSU) in UEFI System Utilities. From the System Utilities screen, select **System Configuration > BIOS/Platform Configuration (RBSU)/System Options/Advanced Memory Protection**. If the requested AMP mode is not supported by the installed DIMM configuration, the server boots in Advanced ECC mode.

For more information on the UEFI System Utilities, see the *UEFI System Utilities User Guide* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/uefi/docs>).

DIMM identification

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



Item	Description	Definition
1	Capacity	• 8 GB • 16 GB • 32 GB
2	Rank	• 1R = Single-rank • 2R = Dual-rank • 4R = Quad-rank • 8R = Octal-rank

Item	Description	Definition
3	Data width	• x4 = 4-bit • x8 = 8-bit
4	Memory generation	DDR4
5	Maximum memory speed	2133 MT/s
6	CAS latency	P=15
7	DIMM type	• R = RDIMM (registered) • L = LRDIMM (load reduced)

For the latest supported memory information, see the QuickSpecs on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/qs>).

DIMM ranks

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

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

Quad- and dual-rank LRDIMMs provide the greatest capacity with the existing memory technology. For example, if current DRAM technology supports 8 GB single-rank DIMMs, a dual-rank DIMM would be 16 GB, a quad-rank DIMM would be 32 GB, and an octal-rank LRDIMM would be 64 GB.

LRDIMMs are labeled as quad- and octal-rank DIMMs. There are four and eight ranks of DRAM on the DIMM, but the LRDIMM buffer creates an abstraction that allows the DIMM to appear as a logical dual-rank DIMM to the system. This is called Rank Multiplication. The LRDIMM buffer also isolates the electrical loading of the DRAM from the system to allow for faster operation. These two changes allow the system to support up to three LRDIMMs per memory channel, providing for greater memory capacity and higher memory operating speed compared to quad-rank RDIMMs.

Memory-processor compatibility information

The server processor determines the type of DIMM that will be supported in the server.

For the latest memory configuration information, see the product QuickSpecs on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/qs>).

DIMM type

- Intel Xeon E7 v3 processors support:
 - Single-rank and dual-rank PC4-2133P (DDR4-2133) RDIMMs
 - Quad-rank and octal-rank PC4-2133P (DDR4-2133) LRDIMMs
- Intel Xeon E7 v4 processors support:
 - Single-rank and dual-rank PC4-2133P (DDR4-2133) RDIMMs
 - Quad-rank and octal-rank PC4-2133P (DDR4-2133) LRDIMMs
 - Single-rank and dual-rank PC4-2400T (DDR4-2400) RDIMMs
 - Quad-rank and octal-rank PC4-2400T (DDR4-2400) LRDIMMs

Install only DDR4-2133 or DDR-2400 DIMMs in the server. Mixing DIMM speeds is not supported.

Maximum memory capacity

The maximum memory capacity is a function of the DIMM capacity, number of installed DIMMs, memory type, and number of installed processors.

DIMM type	DIMM rank	Capacity (GB)	One processor (GB)	Two Processors (GB)	Three processors (GB)	Four processors (GB)
RDIMM	Single	8	192	384	576	768
RDIMM	Dual	16	384	768	1152	1536
RDIMM	Dual	32	768	1536	2304	3072
LRDIMM	Quad	32	768	1536	2304	3072
LRDIMM	Octal	64	1536	3072	4608	6144

DIMM population guidelines for Memory Modes



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

Observe the following guidelines for all memory modes:

- UDIMMs are not supported on this server.
- Do not mix LRDIMMs and RDIMMs.
- LRDIMMs support higher densities than single- and dual-rank RDIMMs, and higher speeds than quad-rank RDIMMs. This support enables you to install more high-capacity DIMMs, resulting in higher system capacities and higher bandwidth.
- White DIMM slots denote the first slot of a channel (CH 4-A, CH 9-B, CH 1-C, CH 12-D...).
- All types are referred to as DIMMs when the information applies to all types. When specified as LRDIMM or RDIMM, the information applies to that type only. All memory installed in the server must be the same type.

Memory channel	DIMM 1	DIMM 2	DIMM 3
1	4A	5E	6J
2	9B	8F	7K
3	1C	2G	3L
4	12D	11H	10M

DIMM channel groups

Populate all cartridges identically.

DIMM pair installation order	Performance and Mirroring Modes	Lockstep Mode
1	DIMMs: 4A, 9B	DIMMs: 4A, 1C
2	DIMMs: 1C, 12D	DIMMs: 9B, 12D
3	DIMMs: 5E, 8F	DIMMs: 5E, 2G
4	DIMMs: 2G, 11H	DIMMs: 8F, 11H
5	DIMMs: 6J, 7K	DIMMs: 6J, 3L
6	DIMMs: 3L, 10M	DIMMs: 7K, 10M

DIMM population

Populated DIMM speed (MT/s) for Performance (P) and Lockstep (L) memory modes.

DIMM type	DIMM rank	1 DIMM per channel (P)	1 DIMM per channel (L)	2 DIMMs per channel (P)	2 DIMMs per channel (L)	3 DIMMs per channel (P)	3 DIMMs per channel (L)
RDIMM	Single (8 GB)	1600 MT/s	1866 MT/s	1600 MT/s	1866 MT/s	1600 MT/s	1600 MT/s
RDIMM	Dual (16 GB)	1600 MT/s	1866 MT/s	1600 MT/s	1866 MT/s	1333 MT/s	1333 MT/s
RDIMM	Dual (32 GB)	1600 MT/s	1866 MT/s	1600 MT/s	1866 MT/s	1333 MT/s	1333 MT/s
LRDIMM	Quad (32 GB)	1600 MT/s	1866 MT/s	1600 MT/s	1866 MT/s	1600 MT/s	1600 MT/s
LRDIMM	Octal (64 GB)	1600 MT/s	1866 MT/s	1600 MT/s	1866 MT/s	1333 MT/s	1333 MT/s

DDR4 memory speeds correlate to mode and channel population.

Performance mode population guidelines

For Performance mode memory configurations, observe the following guidelines:

- Populate DIMMs according to the DIMM population table for Performance mode.
- DIMMs may be installed individually. Hewlett Packard Enterprise recommends installing DIMMs in pairs.

Lockstep population guidelines

For Lockstep memory mode configuration, observe the following guidelines:

- All memory cartridges must be populated identically across all processors.
- Populate DIMMs according to the DIMM population guidelines for Lockstep mode.
- Lockstep memory bandwidth is reduced approximately in half for DDDC error correction architecture, compared to Performance mode.
- Initially, install four DIMMs in 4A, 9B, 1C, and 12D for performance. Thereafter, install DIMMs in pairs alternating between boards A & B in the following order:
 - 5E, 2G
 - 8F, 11H
 - 6J, 3L
 - 7K, 10M

Online Spare memory mode population guidelines

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

- Populate DIMMs according to the DIMM population guidelines for Performance or Lockstep memory modes.
- Each memory channel must have a valid online spare configuration.
- Each populated channel must have a spare rank:
 - A single dual-rank DIMM is not a valid sparing configuration.
 - Two or more multi-rank DIMMs are recommended per channel.
 - All LRDIMMs (dual-, quad-, octal-rank) are treated as dual-rank DIMMs.

Mirrored Memory population guidelines

To configure memory for Mirrored Memory mode, observe these additional constraints:

- For the server to support Mirrored Memory, all processors must have a valid mirroring configuration.
- The minimum allowable configuration is two memory cartridges per processor.
- Both memory cartridges for each processor must be populated with identical DIMM configurations.
- Both memory risers inside the memory cartridge must be populated identically. Following general DIMM slot population guidelines accomplishes this if DIMMs are installed in pairs in each cartridge.

Achieving optimum memory performance

The server includes 96 DIMM slots across four multi-core processors. While there are multiple DIMM population configurations that might provide an ideal memory size, you can only achieve optimal performance when populating DIMMs that can take advantage of the Intel Xeon Processor E7 series architecture.

For optimum performance, Hewlett Packard Enterprise recommends the following practices (listed in order of significance for memory performance):

- Use both memory controllers inside the processor and populate two memory cartridges for each installed processor.
- Populate each DDR4 channel in each memory cartridge. To achieve this, the minimum DIMM count per cartridge is four DIMMs installed.
- Populate DIMMs in cartridges identically across all processors.
- RDIMMs have lower latency, LRDIMMs have higher capacity.

Installing a DIMM

To determine the ideal Memory RAS features for your setup, see "DIMM population guidelines for memory modes."

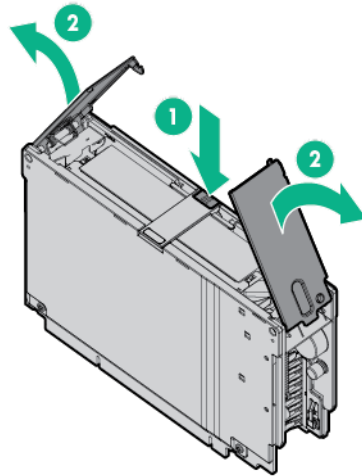


WARNING: Use caution when installing or removing the processor memory drawer. The processor memory drawer is very heavy when fully populated.

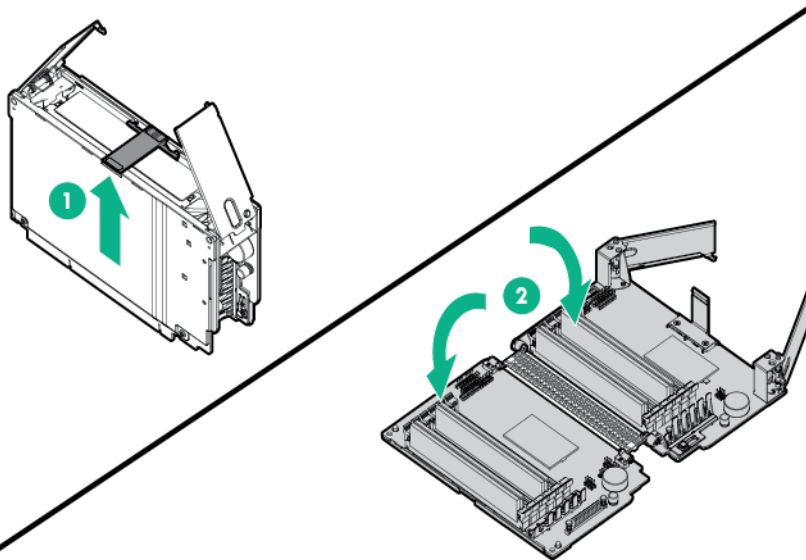
To install the component:

1. Power down the server (on page [24](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Remove the processor memory drawer shipping screws, if installed. Retain the screws for future use ("Processor memory drawer shipping screw locations" on page [30](#)).
4. Remove the processor memory drawer (on page [31](#)).
5. Remove the processor memory drawer cover (on page [32](#)).

6. Press the release button, and then lift the handles on the memory cartridge.

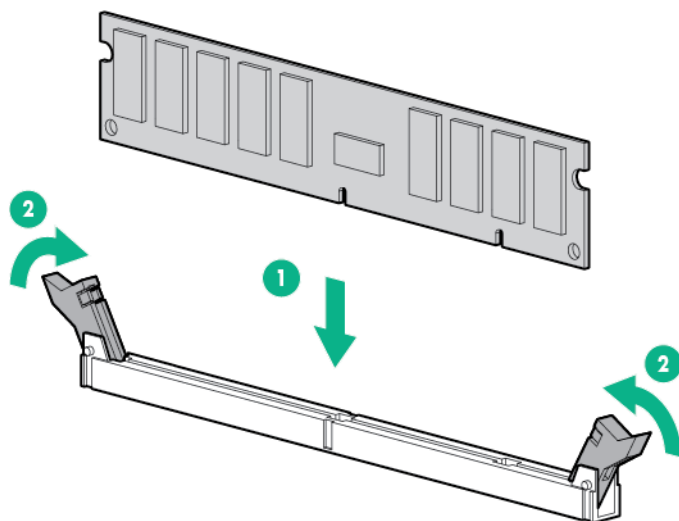


7. Raise the lift tab on the memory cartridge, and then open the cartridge.



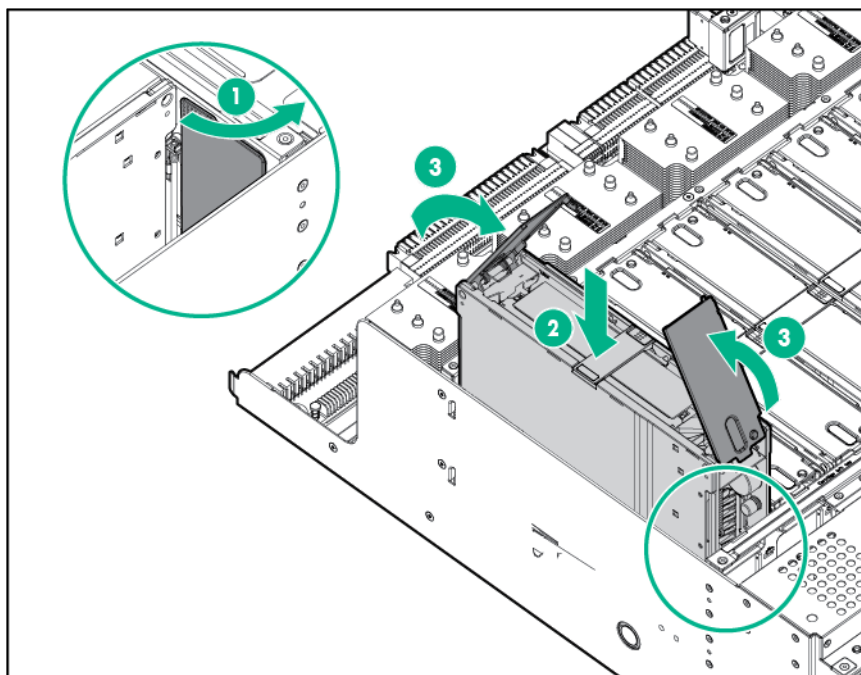
8. Open the DIMM slot latches.

9. Install the DIMM.



CAUTION: When closing the memory cartridge cover, be sure the plastic fingers under the cover do not catch on the top edge of the DIMMs.

10. Close the memory cartridge.
11. While holding the baffle door open, install the memory cartridge.



12. Install the processor memory drawer cover ("[Remove the processor memory drawer cover](#)" on page [32](#)).
13. Install the processor memory drawer ("[Remove the processor memory drawer cover](#)" on page [32](#), on page [31](#)).
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. Power up the server ("[Powering up the server](#)" on page [24](#)).

Memory cartridge option

Memory cartridge population guidelines

When installing memory cartridges, observe the following guidelines:

- Memory cartridges installed without a corresponding processor are not utilized:
 - Processor 1 corresponds to memory cartridges 1 and 2.
 - Processor 2 corresponds to memory cartridges 3 and 4.
 - Processor 3 corresponds to memory cartridges 5 and 6.
 - Processor 4 corresponds to memory cartridges 7 and 8.
- To determine the ideal Memory RAS features for your setup, see "DIMM population guidelines for memory modes."

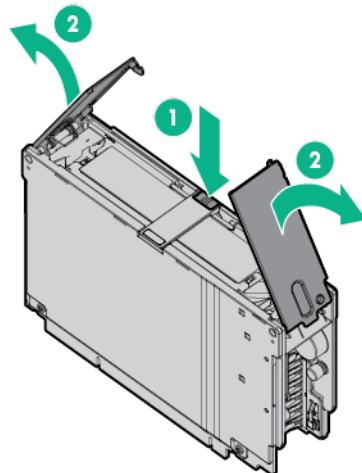
Installing a memory cartridge



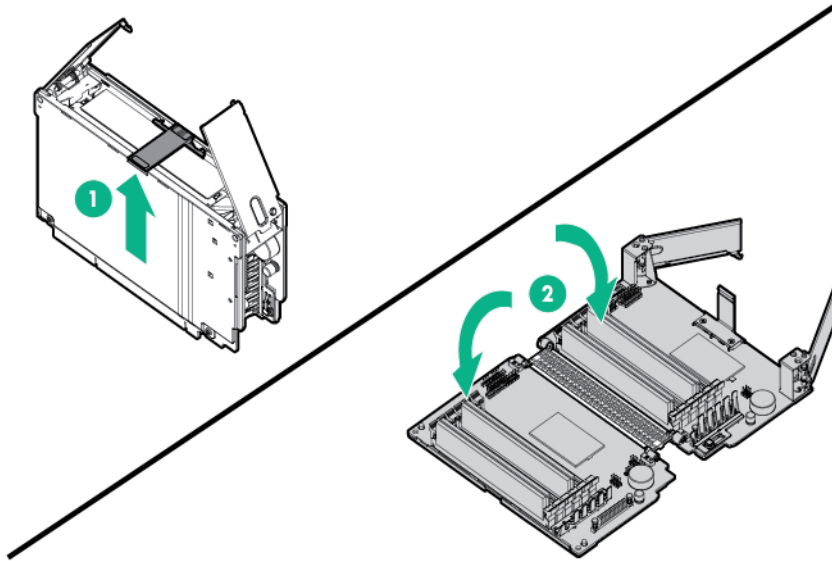
WARNING: Use caution when installing or removing the processor memory drawer. The processor memory drawer is very heavy when fully populated.

To install the component:

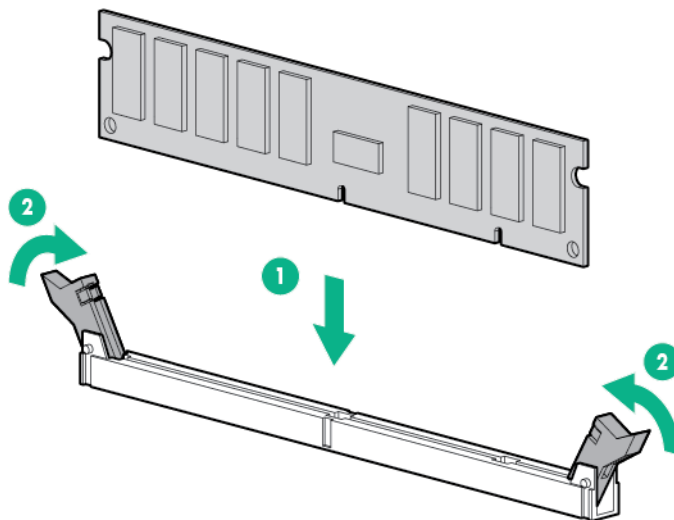
1. Power down the server (on page 24).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Remove the processor memory drawer shipping screws, if installed. Retain the screws for future use ("Processor memory drawer shipping screw locations" on page 30).
4. Remove the processor memory drawer (on page 31).
5. Remove the processor memory drawer cover (on page 32).
6. Press the release button, and then lift the handles of the new memory cartridge.



7. Raise the lift tab on the new memory cartridge, and then open the cartridge.



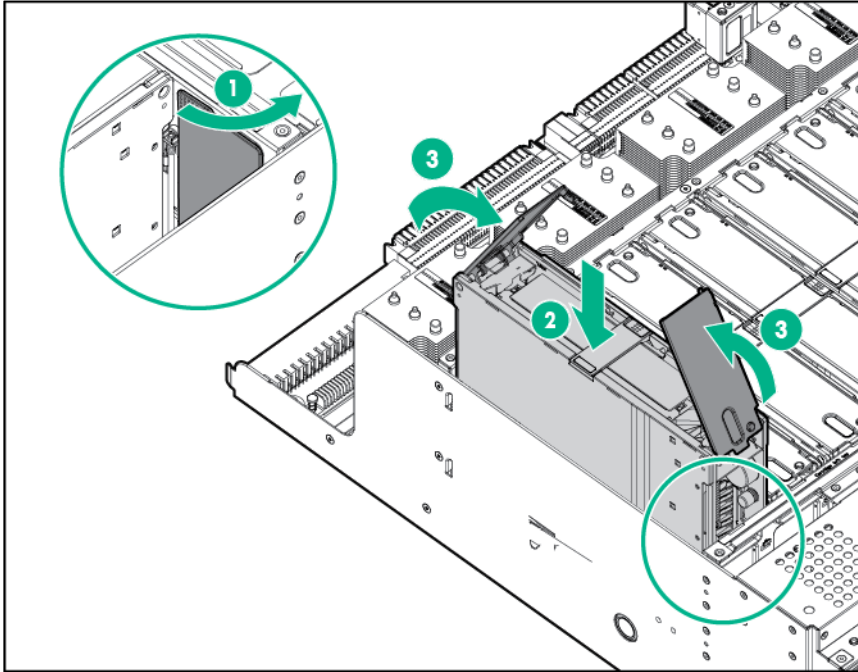
8. Open the DIMM slot latches.
9. Install the DIMM.



CAUTION: When closing the memory cartridge cover, be sure the plastic fingers under the cover do not catch on the top edge of the DIMMs.

10. Close the new memory cartridge.

11. While holding the baffle door open, install the new memory cartridge.



12. Install the processor memory drawer cover ("[Remove the processor memory drawer cover](#)" on page [32](#)).
13. Install the processor memory drawer ("[Remove the processor memory drawer cover](#)" on page [32](#), on page [31](#)).
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. Power up the server ("[Powering up the server](#)" on page [24](#)).

SAS drive backplane option

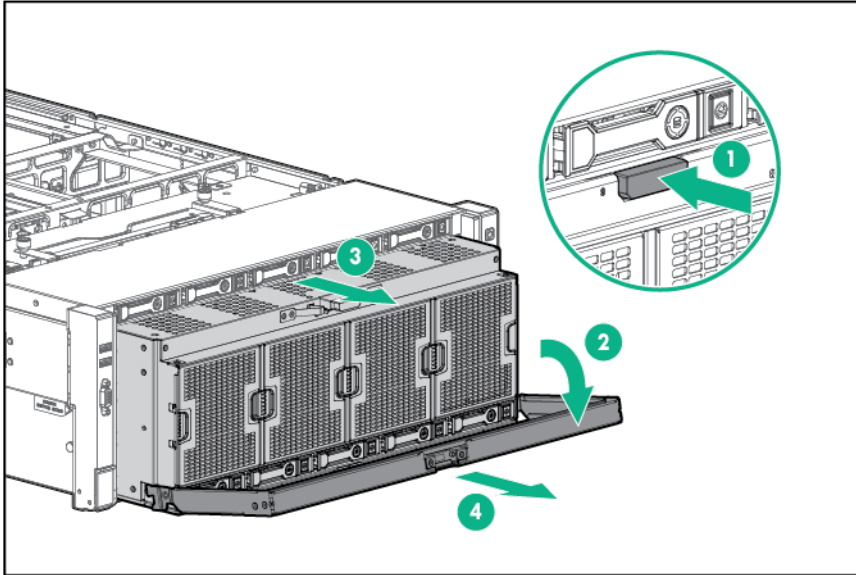


CAUTION: To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any system installation. Improper grounding can cause electrostatic discharge.

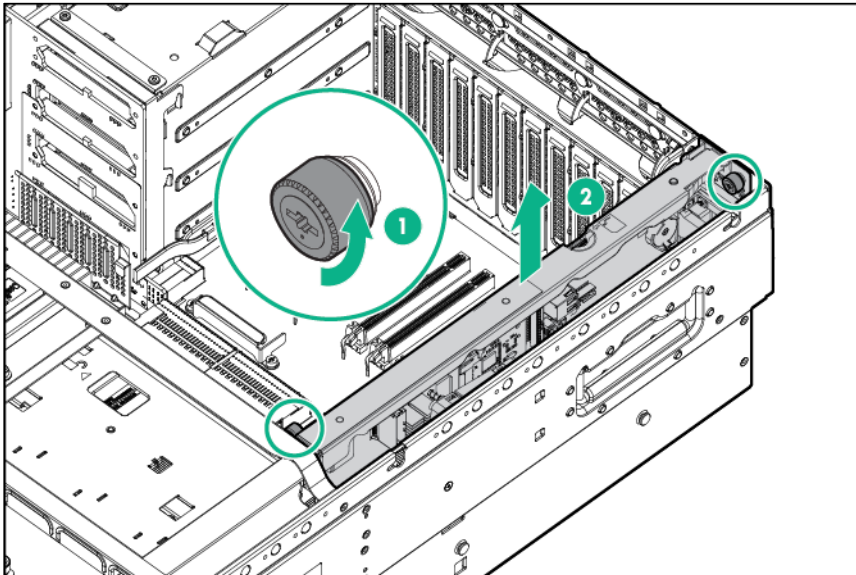
To install the component:

1. Power down the server (on page [24](#)).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Remove the access panel (on page [26](#)).

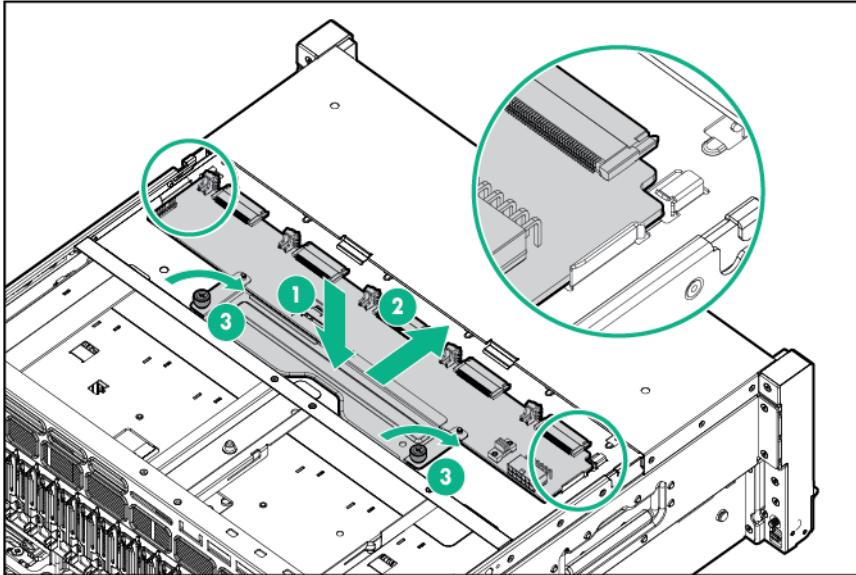
4. Extend the processor memory drawer approximately 2.54 to 5.1 cm (1 to 2 inches).



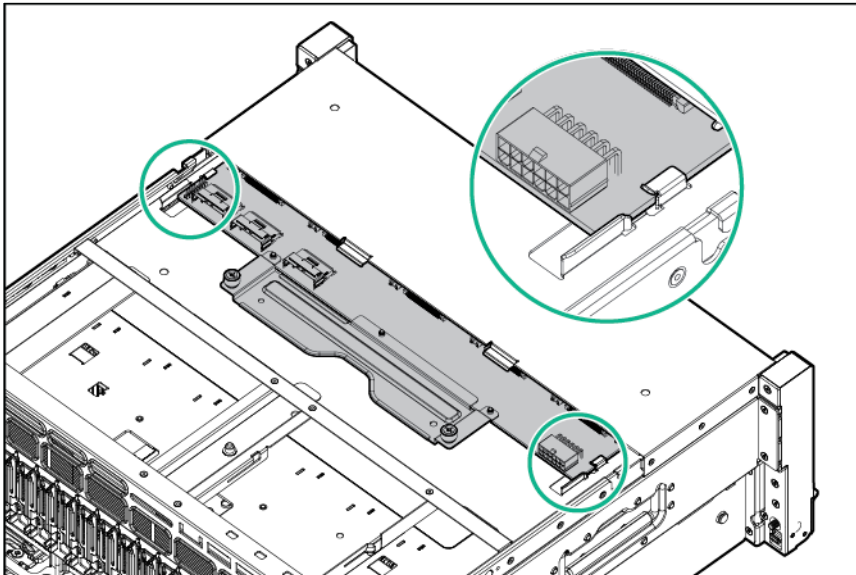
5. Remove the SPI board.



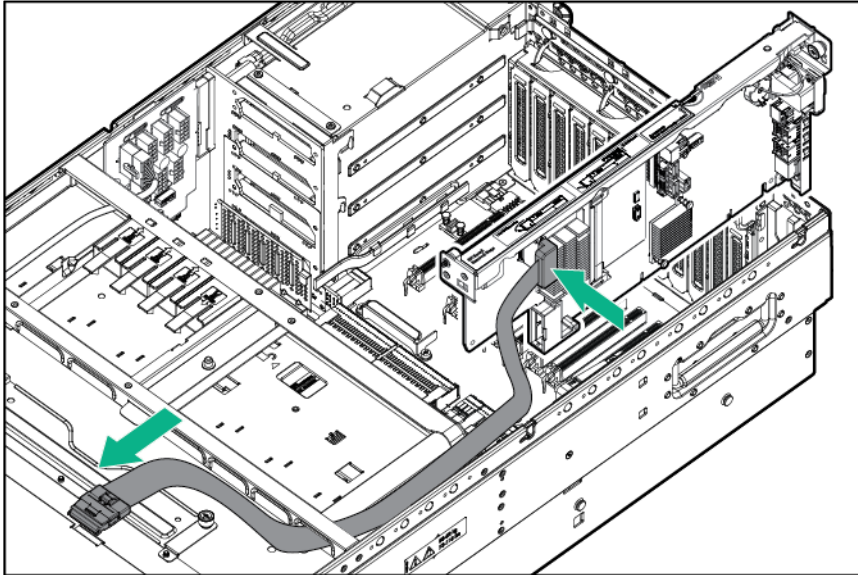
6. Install the backplane, and then tighten the thumbscrews.



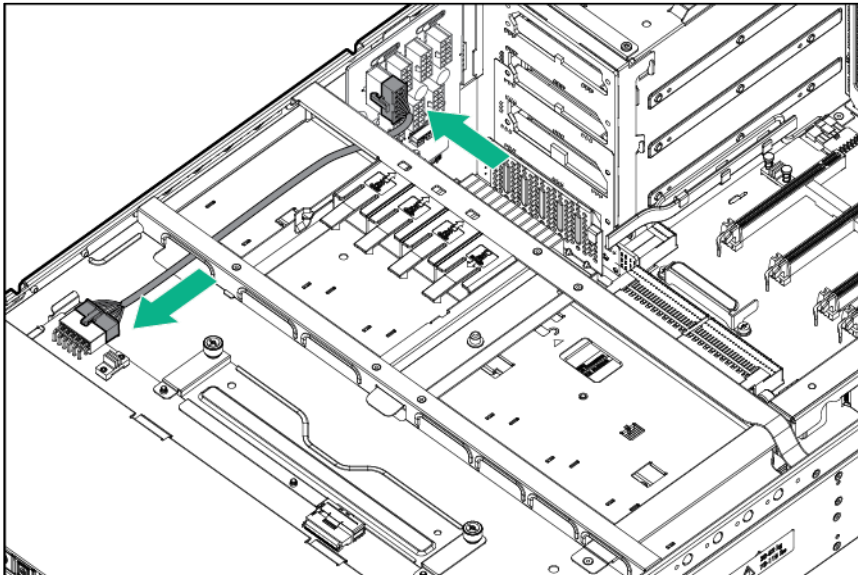
Be sure the corners of the backplane are aligned under the tabs.



7. Connect the data cable.

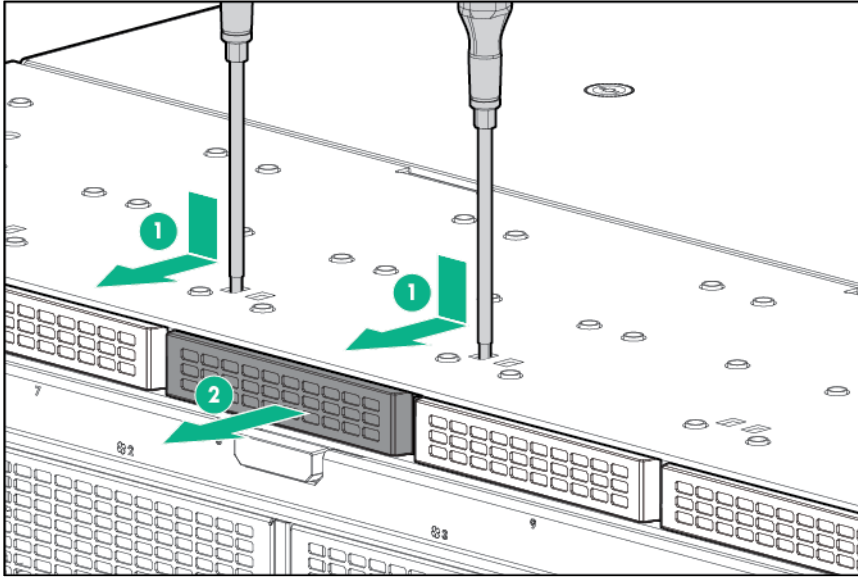


8. Connect the power cable.

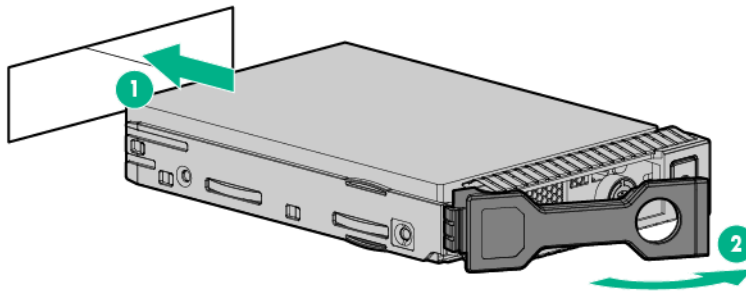


9. Install the SPI board (on page 28).
10. Install the processor memory drawer ("Remove the processor memory drawer cover" on page 32, on page 31).
11. Install the access panel (on page 26).

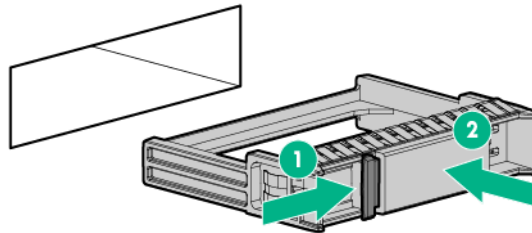
12. Remove all bezel blanks.



13. Install the drives ("Drive option" on page 72, "Drive option" on page 73).



14. Install blanks in unused drive bays.



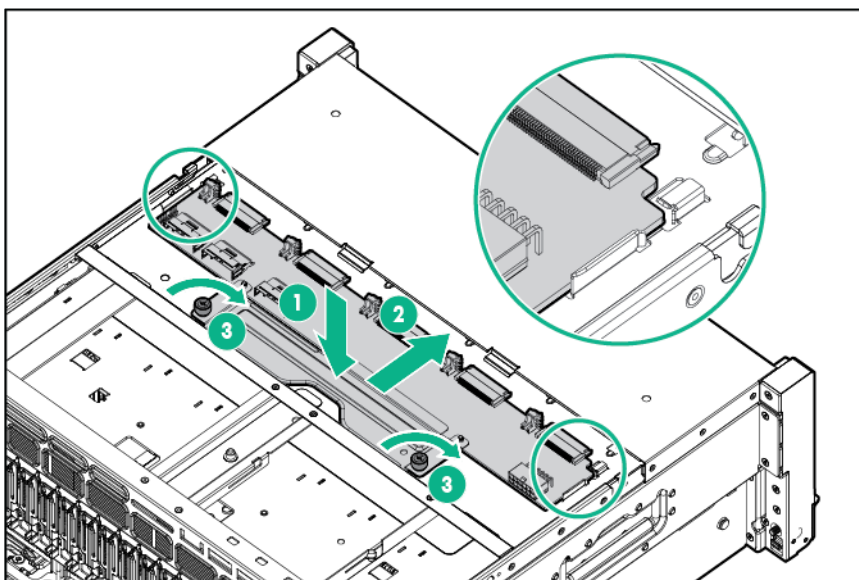
15. Connect each power cord to the server.
16. Connect each power cord to the power source.
17. Power up the server ("Powering up the server" on page 24).

Express Bay enablement option

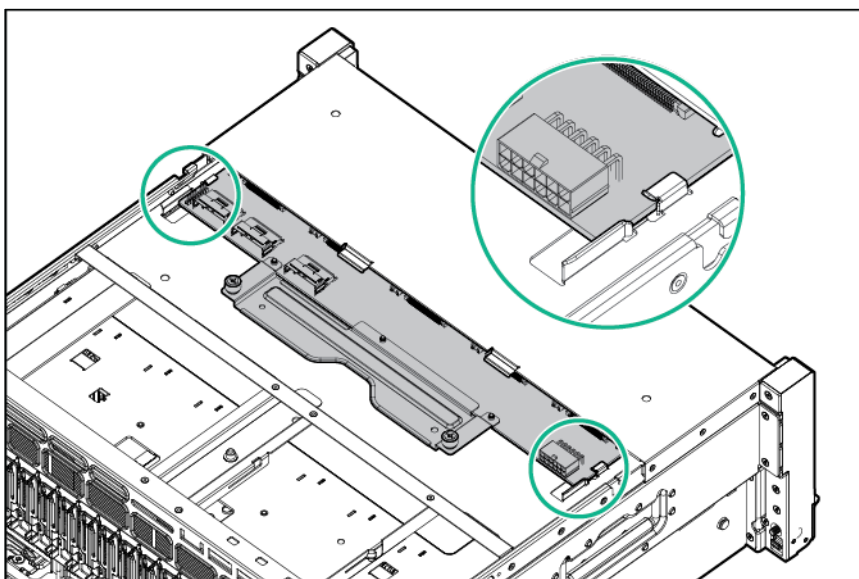


CAUTION: To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any system installation. Improper grounding can cause electrostatic discharge.

1. Power down the server (on page 24).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Remove the server from the rack (on page 24).
4. Remove the access panel (on page 26).
5. Install the backplane, and then tighten the thumbscrews.

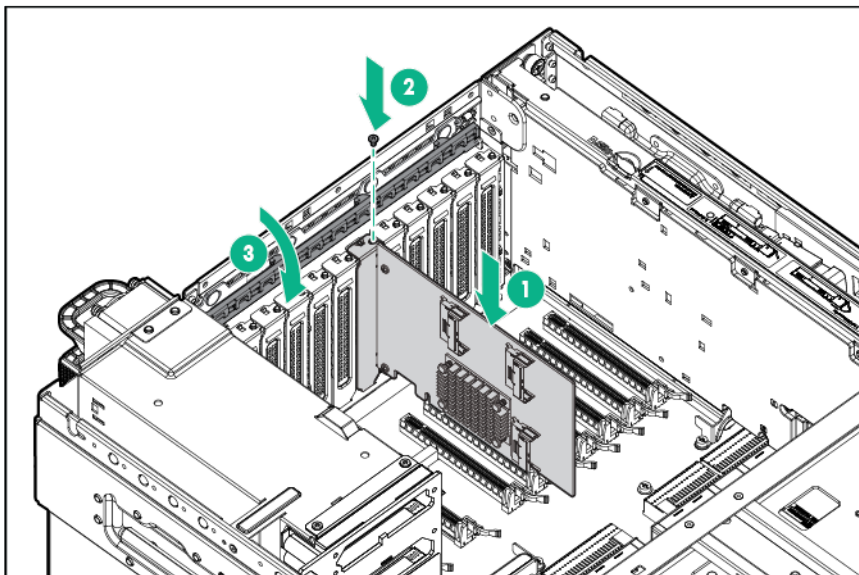


Be sure the corners of the backplane are aligned under the tabs.

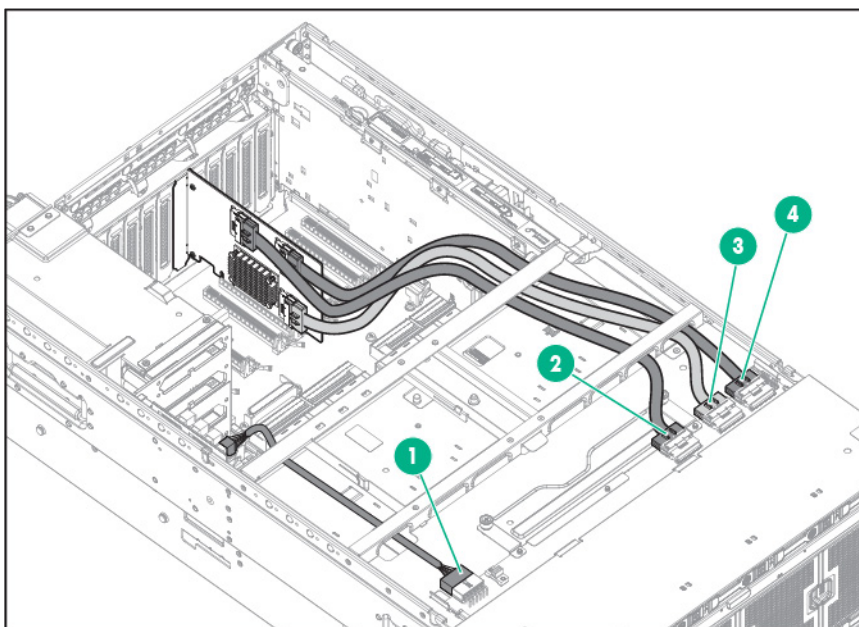


IMPORTANT: The Express Bay Bridge Card should only be installed in a slot with a x16 electrical connection, and with the required processor installed. For example, slot 1 is a x16 connection but requires processor 4 to also be installed.

6. Install the card into an available negotiable link PCI. For slot identification, see "I/O board components (on page 11)."



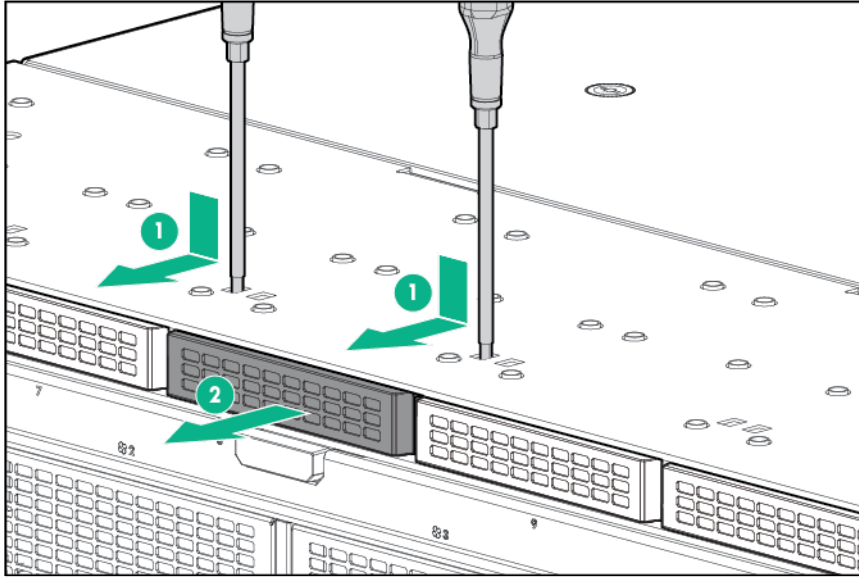
7. Connect the power and data cables.



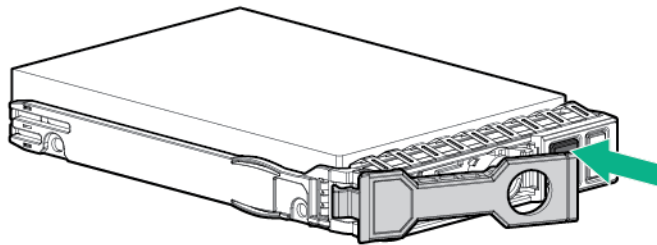
Item	Description
1	Power connection to the system board
2	Data connection to drives 6 and 7
3	Data connection to drives 8 and 9
4	Data connection to drive 10

8. Install the access panel (on page 26).

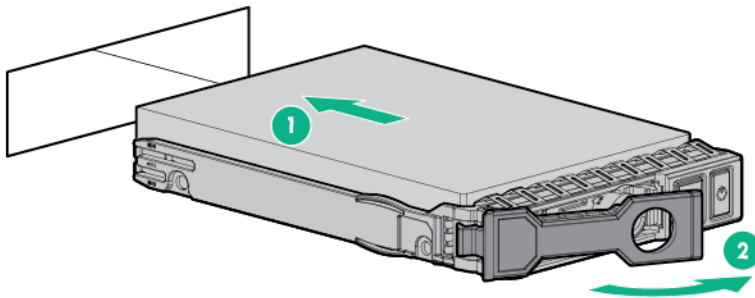
9. Remove all bezel blanks.



10. Press the Do Not Remove button to open the release handle.

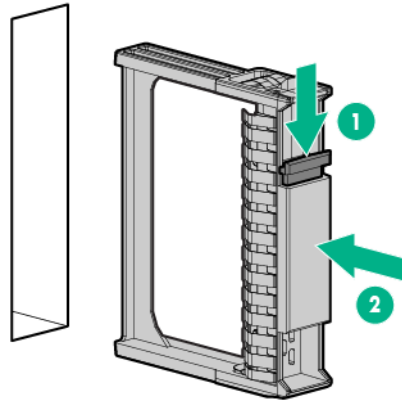


11. Install the drives.



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 drive blank in any unused drive bays.



13. Connect each power cord to the server.
14. Connect each power cord to the power source.
15. Power up the server ("[Powering up the server](#)" on page 24).

Stand-up SAS controller cable option

The SAS controller cable option is required to enable a PCIe slot-based controller to drive the internal top bay drives. Otherwise, the drive indicator signaling will not correctly match the accessed drive. The bottom bay SAS drives cannot be controlled by a PCIe slot-based controller.

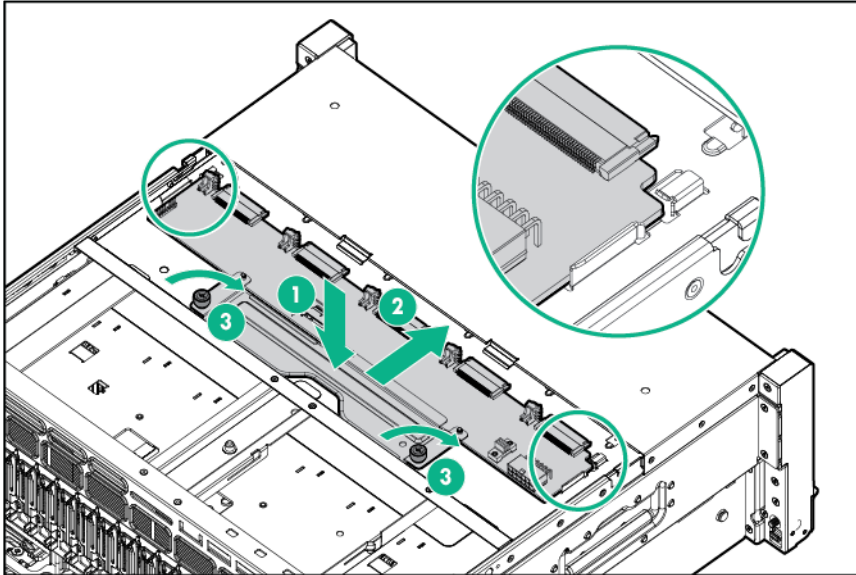


CAUTION: To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any system installation. Improper grounding can cause electrostatic discharge.

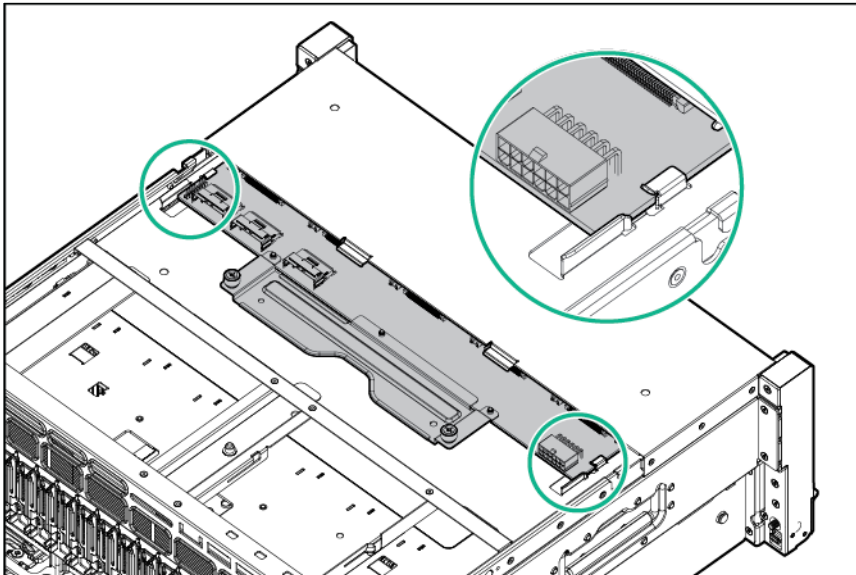
To install the component:

1. Power down the server (on page 24).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Remove the access panel (on page 26).

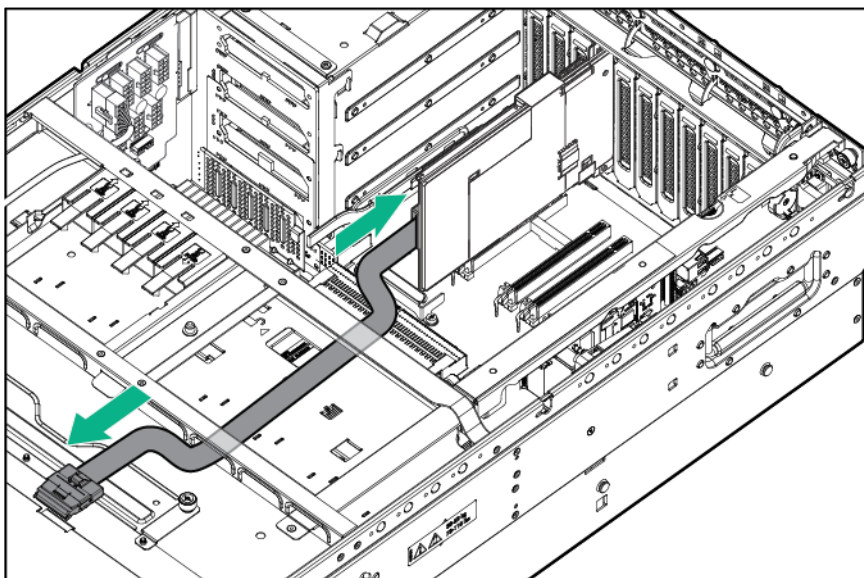
4. Install the backplane, and then tighten the thumbscrews.



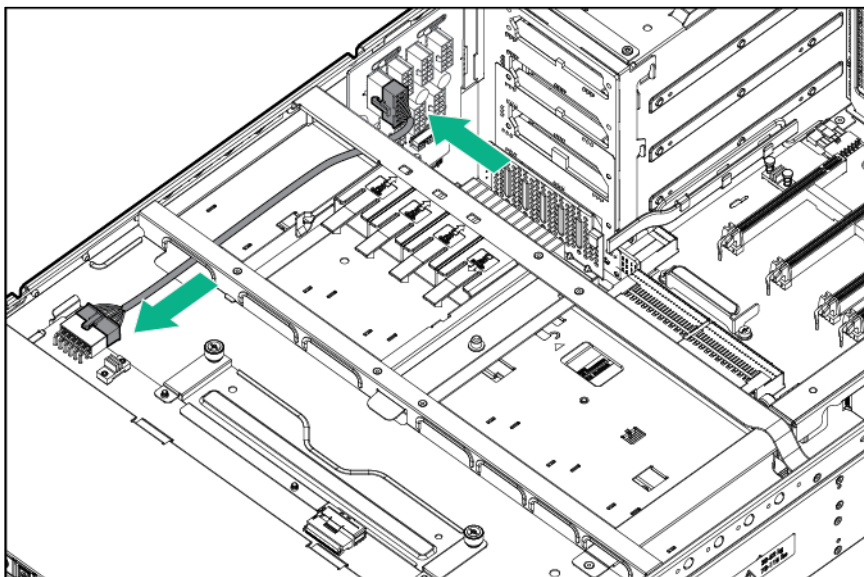
Be sure the corners of the backplane are aligned under the tabs.



5. Connect the optional SAS controller cable.

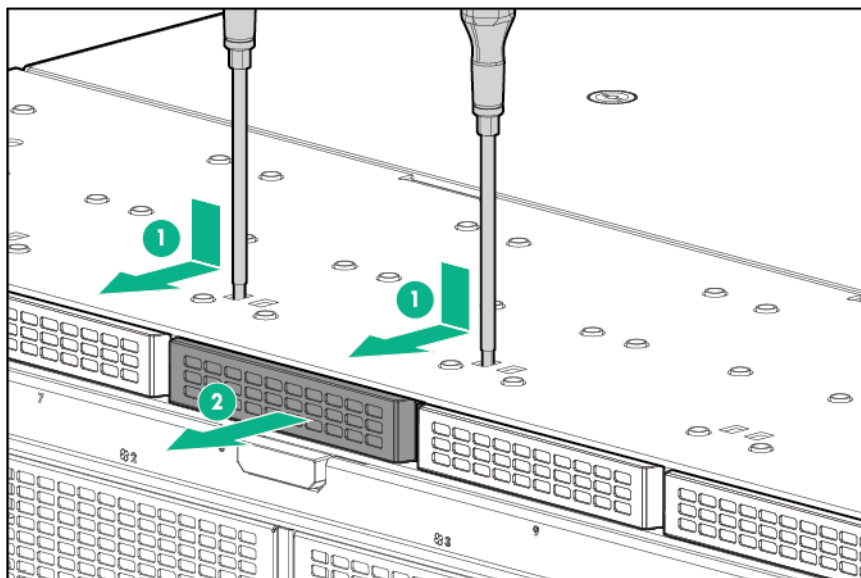


6. Connect the power cable.

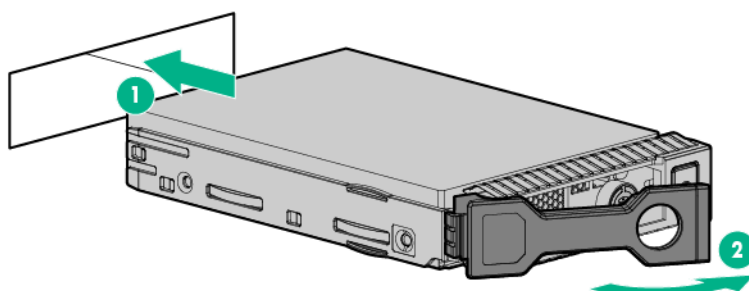


7. Install the access panel (on page [26](#)).

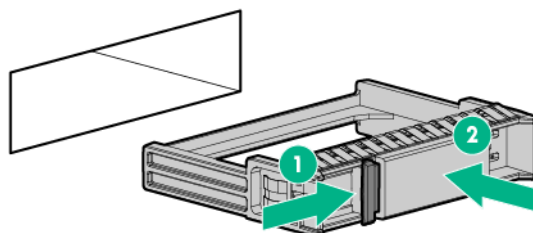
8. Remove all bezel blanks.



9. Install the drives ("Drive option" on page 72, "Drive option" on page 73).



10. Install blanks in unused drive bays.



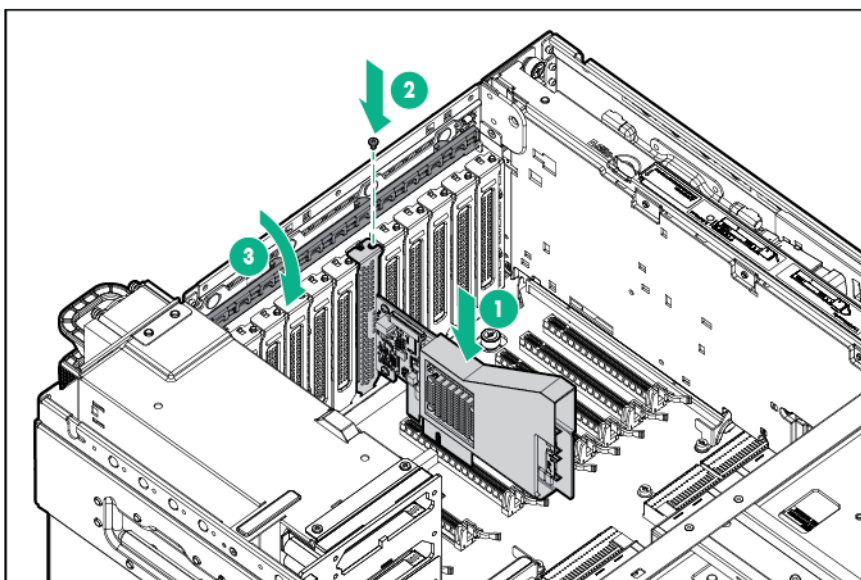
11. Connect each power cord to the server.
12. Connect each power cord to the power source.
13. Power up the server ("Powering up the server" on page 24).

Stand-up H240 HBA cable option

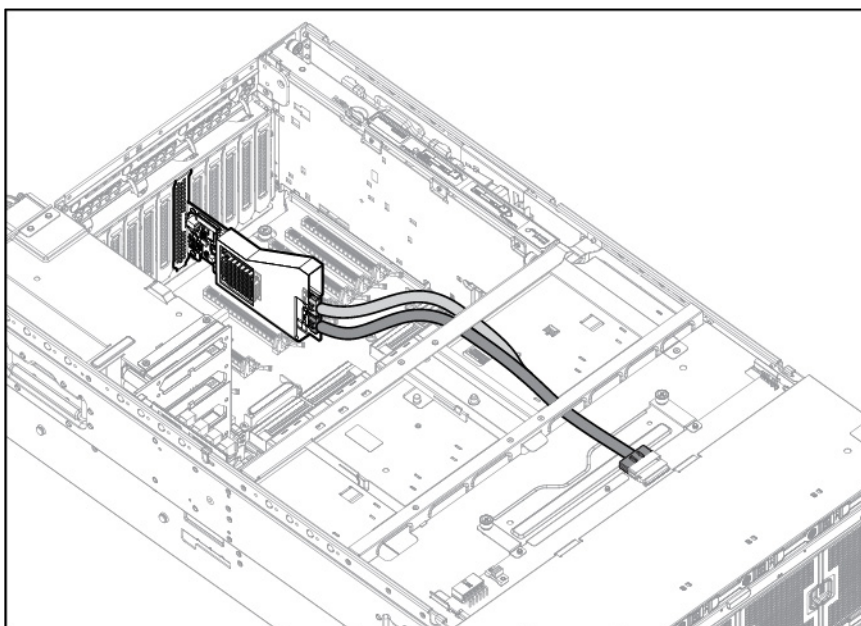
CAUTION: To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any system installation. Improper grounding can cause electrostatic discharge.

To install the component:

1. Power down the server (on page 24).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Remove the server from the rack (on page 24).
4. Remove the access panel (on page 26).
5. Disconnect the existing SAS cable from the SPI board and drive backplane.
6. Install the Mini-SAS cable:
 - a. Connect the cable to the host bus adapter by attaching the cable end marked Port 1I to the upper connector on the HBA, and then attaching the cable end marked Port 2I to the lower connector on the HBA.
 - b. Install the HBA.



- c. Route the Mini-SAS cable to the upper drive backplane.



7. Install the access panel (on page 26).
8. Connect each power cord to the server.
9. Connect each power cord to the power source.
10. Power up the server ("Powering up the server" on page 24).

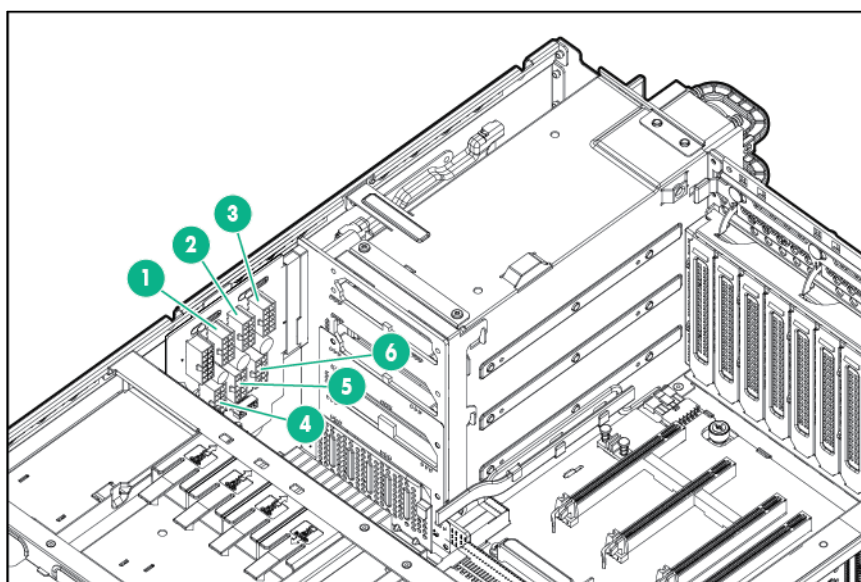
Power adapter cables option



WARNING: Do not install these cables in servers that do not specifically identify them in the server documentation. Improper installation of these cables results in damage to the servers and connecting cards and voids the warranty.

To install the component:

1. Power down the server (on page 24).
2. Remove all power:
 - a. Disconnect the power cord from the power source.
 - b. Disconnect the power cord from the server.
3. Remove the server from the rack (on page 24).
4. Remove the access panel (on page 26).
5. Locate the I/O board auxiliary power connectors.



Item	Description
1	I/O board auxiliary power connector
2	I/O board auxiliary power connector
3	I/O board auxiliary power connector
4	I/O board auxiliary power connector
5	I/O board auxiliary power connector
6	I/O board auxiliary power connector



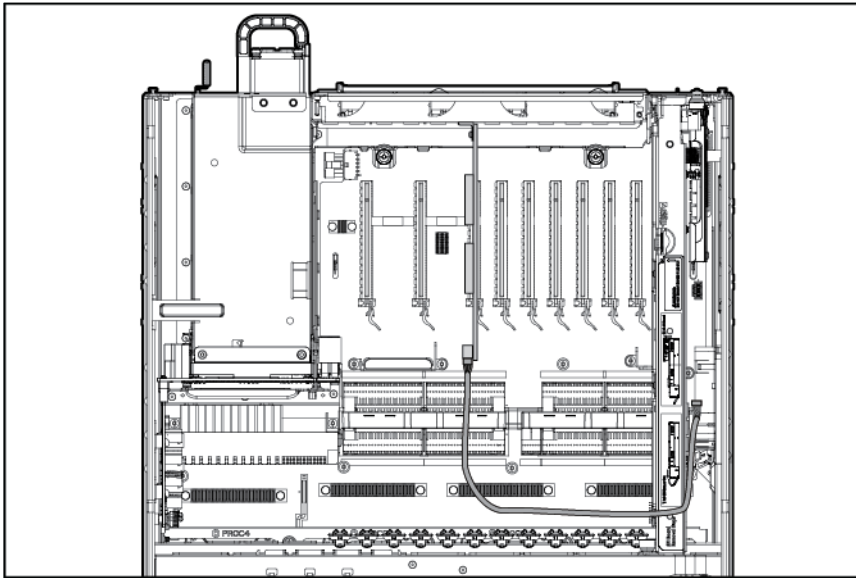
IMPORTANT: The PCIe slots provide 75W of power. The remaining wattage is supplied by the power cable to obtain the total wattage required.



IMPORTANT: High power PCIe cables report power allocation information used by the server to calculate power supply redundancy rules. For the server to calculate the accurate number of power supplies needed, use the lowest wattage power cable possible for the high-powered PCIe card.

For example: if a user installs a 150-W PCIe card in the server and connects it to a 300-W power cable, the server calculates the power needed as 300 watts instead of the 150 watts the card uses. This situation results in the server requiring more power supplies than needed for operation or redundancy when, in fact, the server may be sufficient with fewer power supplies. Hewlett Packard Enterprise recommends fully populating the server with power supplies when using high power PCIe cards.

6. Connect the power cable.



7. Install the access panel.
8. Install the server into the rack ("[Installing the server into the rack](#)" on page 38).
9. Connect each power cord to the server.
10. Connect each power cord to the power source.
11. Power up the server ("[Powering up the server](#)" on page 24).

Drive option

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

- The system automatically sets all device numbers.
- If only one hard drive is used, install it in the bay with the lowest device number.
- Hard drives must be SFF types.

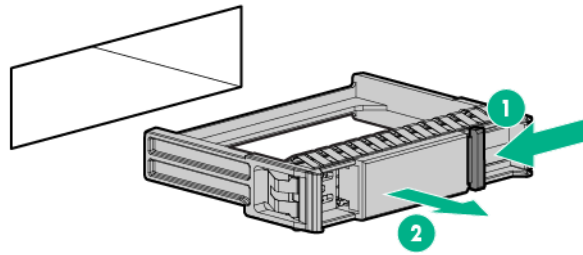
Drives should be the same capacity to provide the greatest storage space efficiency when drives are grouped together into the same drive array.

For drive numbers, see "[Drive bay numbering](#) (on page 19)."

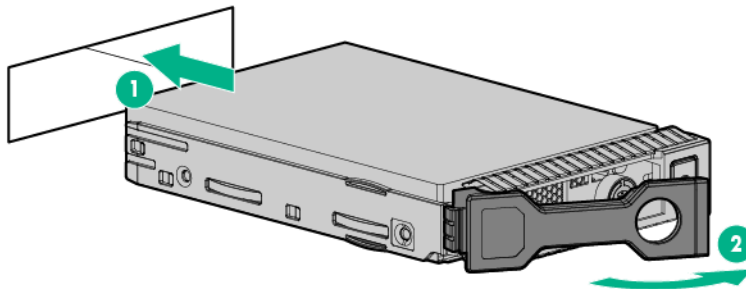
Drive option

To install the component:

1. Remove the drive blank.



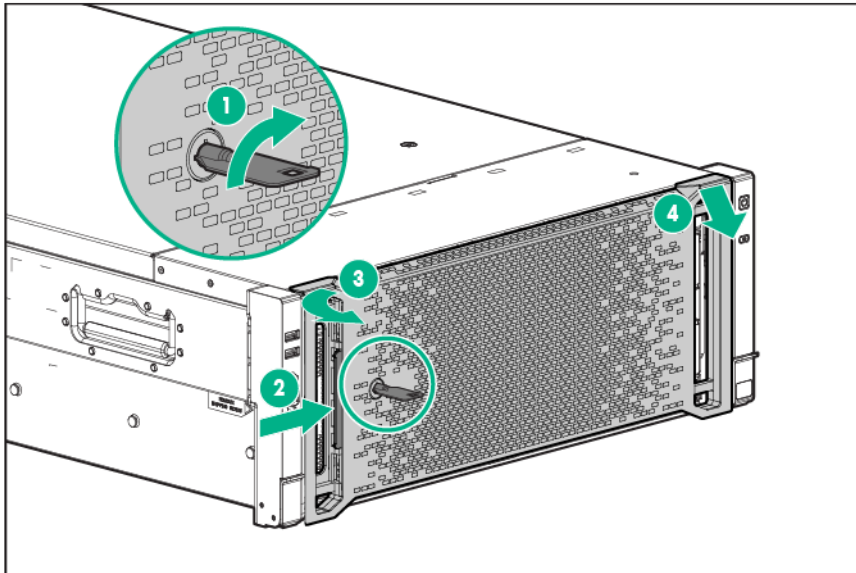
2. Install the drive.



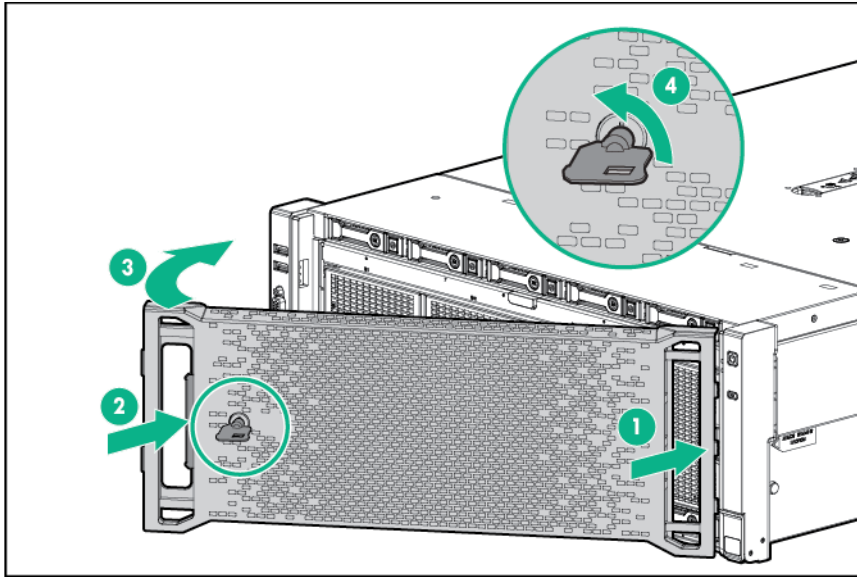
3. Determine the status of the drive from the hot-plug SAS drive LED combinations ("[Hot-plug drive LED definitions](#)" on page 20).

4U rack bezel option

Removing the 4U rack bezel



Installing the 4U rack bezel



Redundant hot-plug power supply option

The server supports up to four hot-plug power supplies. Install all power supplies to provide full redundancy.

Hewlett Packard Enterprise recommends installing redundant hot-plug power supplies in pairs.

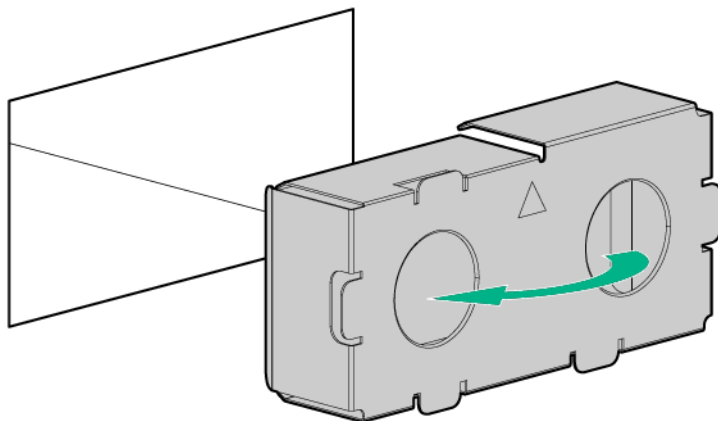
To confirm the redundancy of your configuration, see the power advisor at the Hewlett Packard Enterprise website (<http://www.hpe.com/info/poweradvisor/online>).



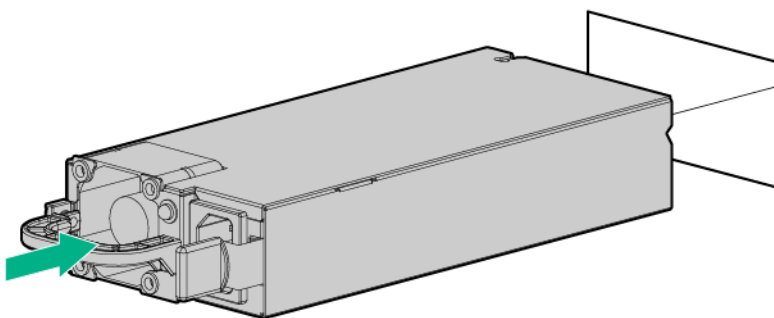
WARNING: To reduce the risk of electric shock or damage to the equipment:

- 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.

1. Remove the power supply blank.



2. Slide the power supply into the power supply bay until the device locks into place.



3. Connect the power cord to the power supply.
4. Connect the power cord to the power source.
5. Be sure that the power supply LED is green.
6. Be sure that the front panel external health LED is green ("[Front panel LEDs and buttons](#)" on page [7](#)).

DC power supply option

Adding an additional power supply provides redundant power support to the unit if the primary power supply fails. You do not have to power down the server before removing or installing a redundant hot-plug power supply.



WARNING: To reduce the risk of electric shock, fire, and damage to the equipment, you must install this product in accordance with the following guidelines:

- This power supply is intended only for installation in Hewlett Packard Enterprise servers located in a restricted access location.
- This power supply is not intended for direct connection to the DC supply branch circuit. Only connect this power supply to a power distribution unit (PDU) that provides an independent overcurrent-protected output for each DC power supply. Each output overcurrent-protected device in the PDU must be suitable for interrupting fault current available from the DC power source and must be rated no more than 60A.
- The PDU output must have a shut-off switch or a circuit breaker to disconnect power for each power supply. To completely remove power from the power supply, disconnect power at the PDU. The end product may have multiple power supplies. To remove all power from the product, disconnect the power for each power supply.
- In accordance with applicable national requirements for Information Technology Equipment and Telecommunications Equipment, this power supply only connects to DC power sources that are classified as SELV or TNV. Generally, these requirements are based on the International Standard for Information Technology Equipment, IEC 60950-1. In accordance with local and regional electric codes and regulations, the DC source must have one pole (Neutral/Return) reliably connected to earth ground.
- You must connect the power supply ground screw located on the front of the power supply to a suitable ground (earth) terminal. In accordance with local and regional electric codes and regulations, this terminal must be connected to a suitable building ground (earth) terminal. Do not rely on the rack or cabinet chassis to provide adequate ground (earth) continuity.



WARNING: To reduce the risk of personal injury from hot surfaces, observe the thermal labels on each power supply or module.



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



WARNING: Remove power from the power supply before performing any installation steps or maintenance on the power supply.



CAUTION: Electrostatic discharge (ESD) can damage electronic components. Be sure that you are properly grounded (earthed) before beginning any installation procedure.

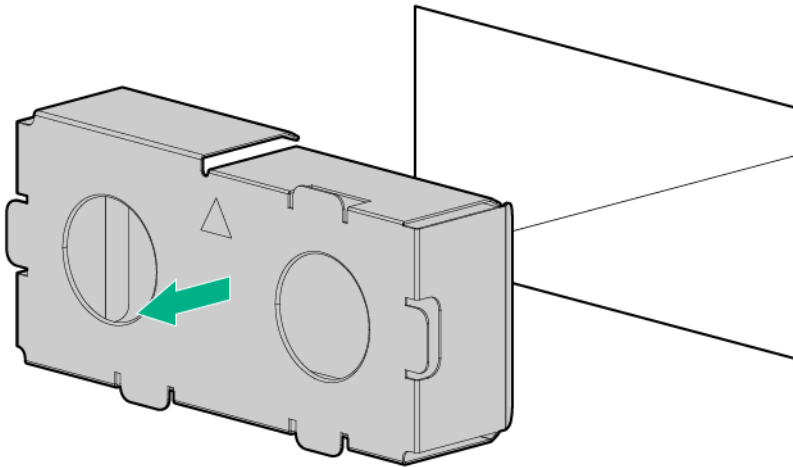
The following optional input can be purchased from an authorized reseller:

J6X42A—3 m (9.85 ft) 48 VDC Power Cable Kit

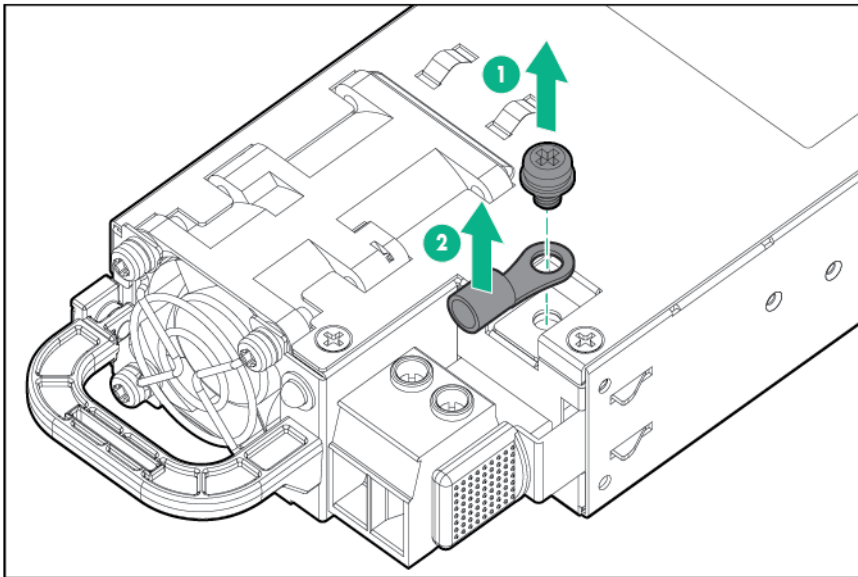
If you are not using an optional input cable, then cabling should be made in consultation with a licensed electrician and be compliant with local code.

To install the component:

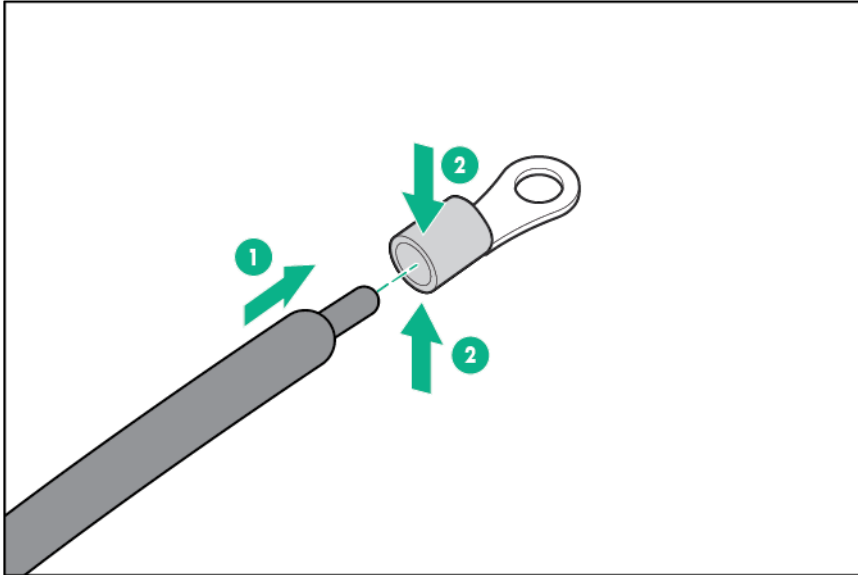
1. Remove the blank.



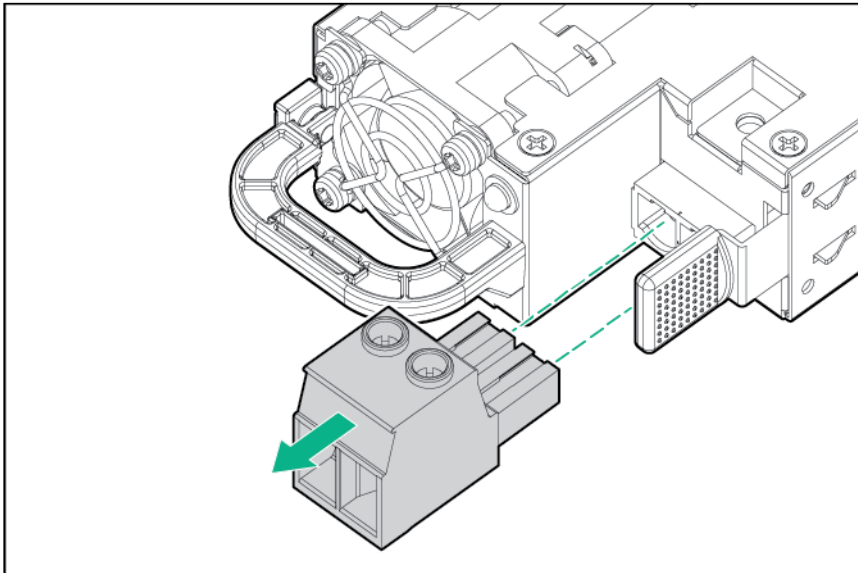
2. Remove the ring tongue from the top of the PSU.



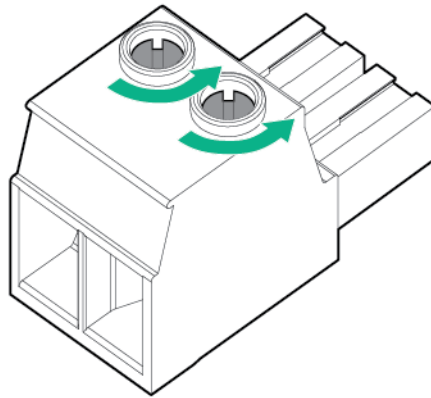
3. Crimp the ring tongue to the ground cable from the 48 V power source.



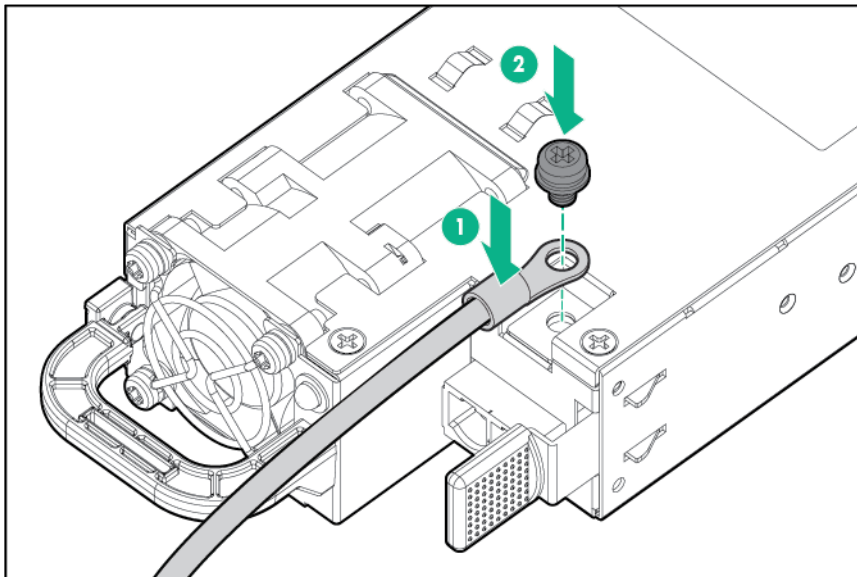
4. Remove the black connector from the rear of the PSU.



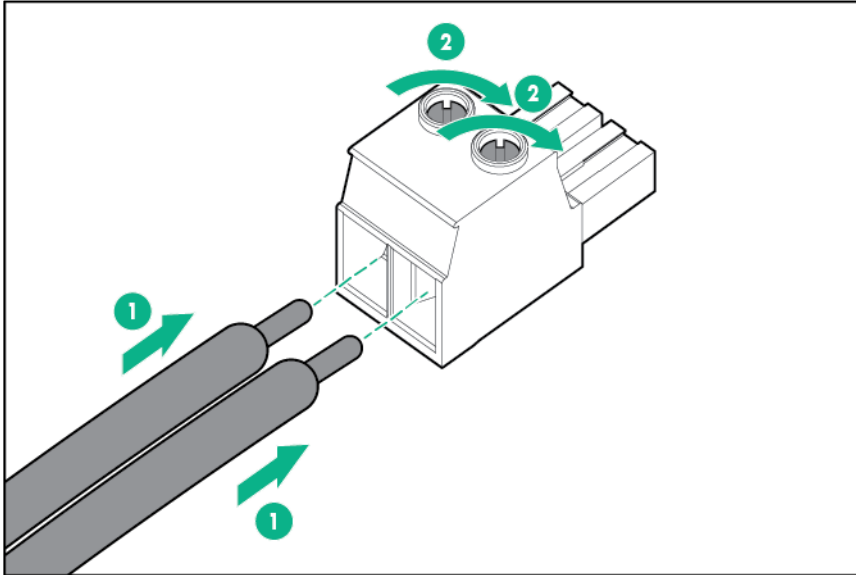
5. Loosen the screws on the connector.



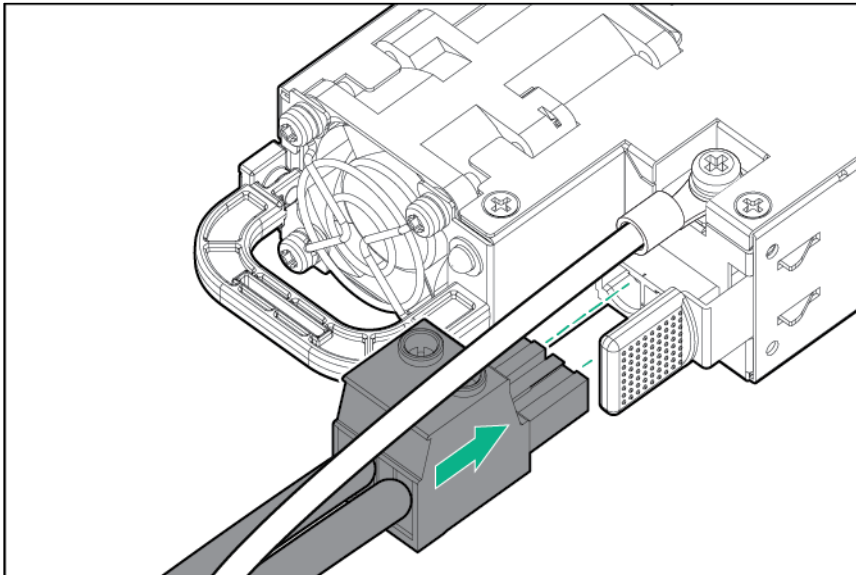
6. Attach the ground (earthed) wire to the ground screw and washer and tighten to 13 lb-in of torque. The ground wire must be connected before connecting the positive or negative lead wires.



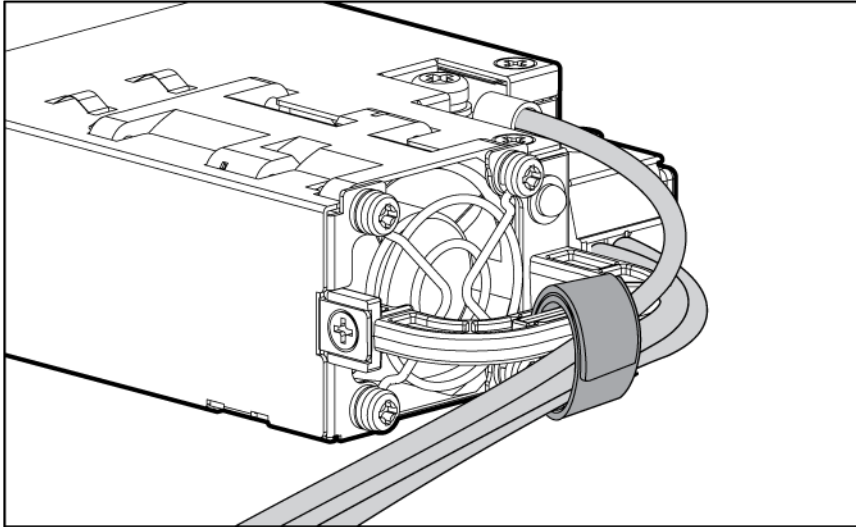
7. Insert the wires into the connector block and tighten the screws to 10 lb-in of torque.



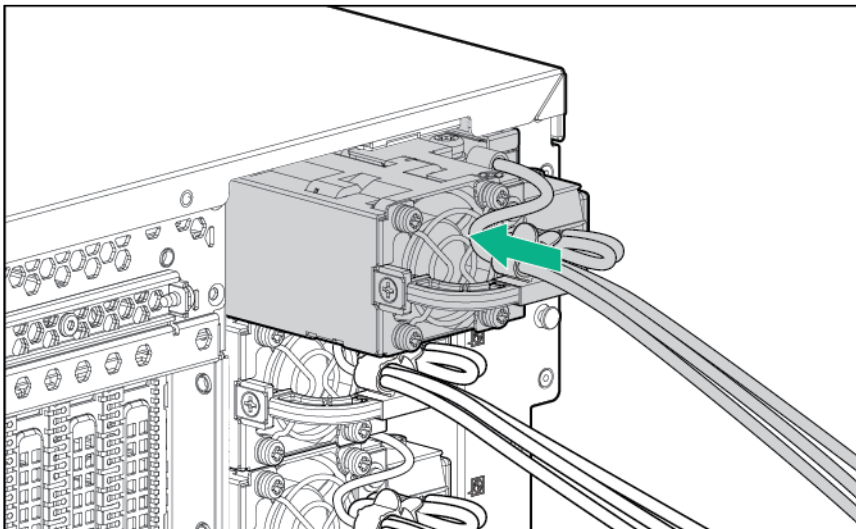
8. Insert the connector into the PSU.



9. Attach the cables to the power supply handle with the hook-and-loop strap.



10. Insert the power supply into the power supply bay until it clicks into place.



11. Route the power cord. Use best practices when routing power cords and other cables. A cable management arm is available to help with routing.
12. Make sure the 48 V DC power source is off or the PDU breaker is in the off position, and then connect the power cord to the 48 VDC power source or PDU.
13. Turn on the 48 V power source or switch the PDU breaker to the on position to supply 48 V to the power supply.
14. Be sure that the green power supply LED is on.

Expansion board option

The server ships with 9 PCI Express expansion slots. Slots 1, 2, 3, 6, and 9 support dual-width expansion boards. If a dual-width expansion board is installed in slot 6 or 9, a x8 slot is lost.

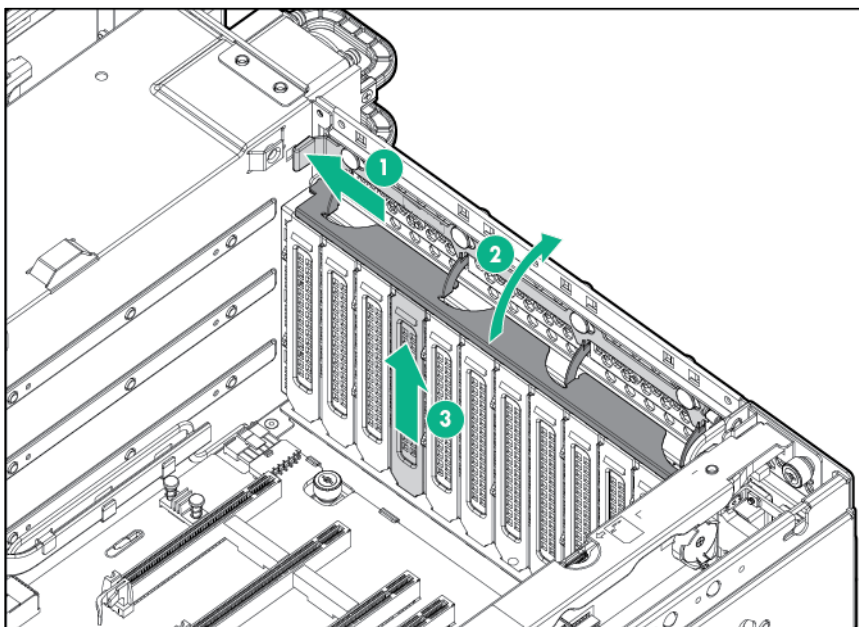
For more information, see "I/O board components (on page 11)."



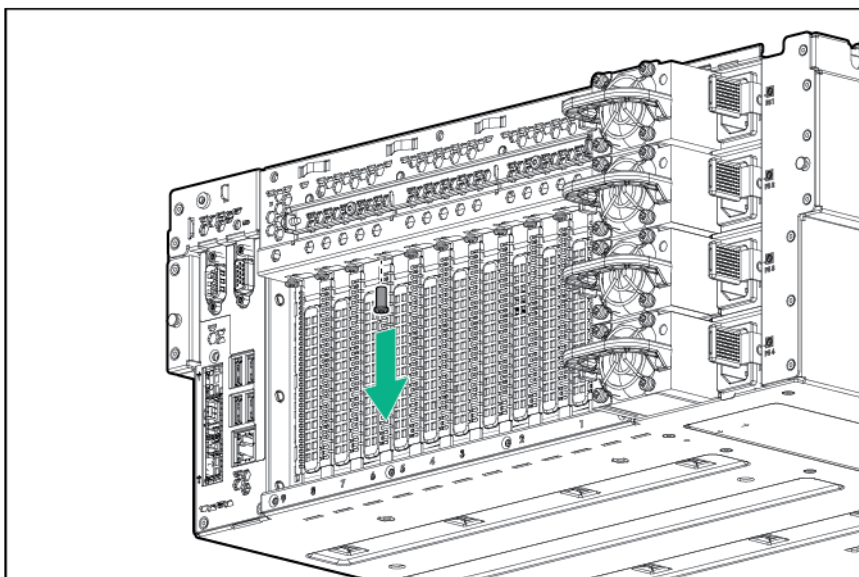
CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all expansion slots have either an expansion slot cover or an expansion board installed.

To install the component:

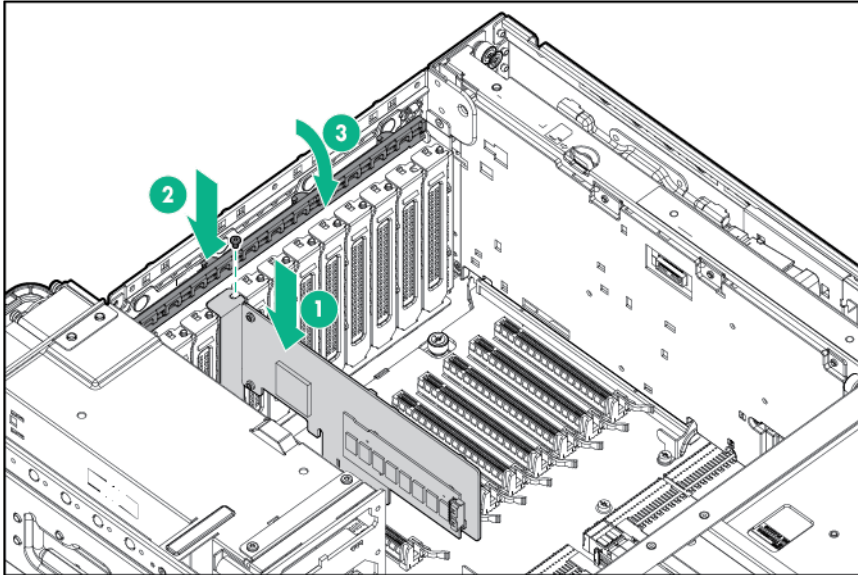
1. Power down the server (on page 24).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Extend or remove the server from the rack ("[Operations](#)" on page 24).
4. Remove the access panel (on page 26).
5. Open the expansion board retainer, and then remove the expansion slot cover.



6. Remove the PCI retainer screw.



7. Install the expansion board.



8. Close the expansion slot retainer.
9. Connect any required internal or external cables to the expansion board.
10. Install the access panel (on page 26).
11. Install the server in the rack ("[Installing the server into the rack](#)" on page 38).
12. Connect each power cord to the server.
13. Connect each power cord to the power source.
14. Power up the server ("[Powering up the server](#)" on page 24).

Installing an expansion board

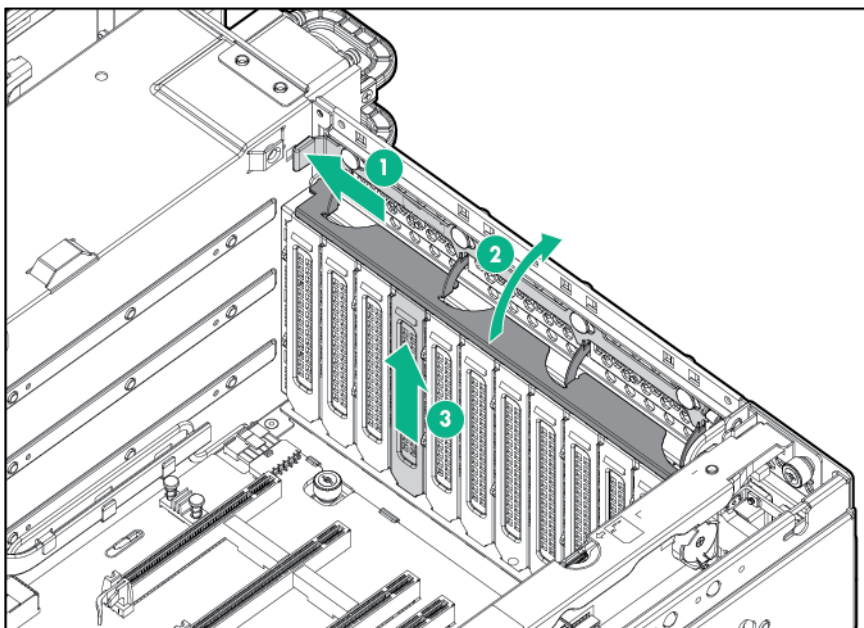


CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all expansion slots have either an expansion slot cover or an expansion board installed.

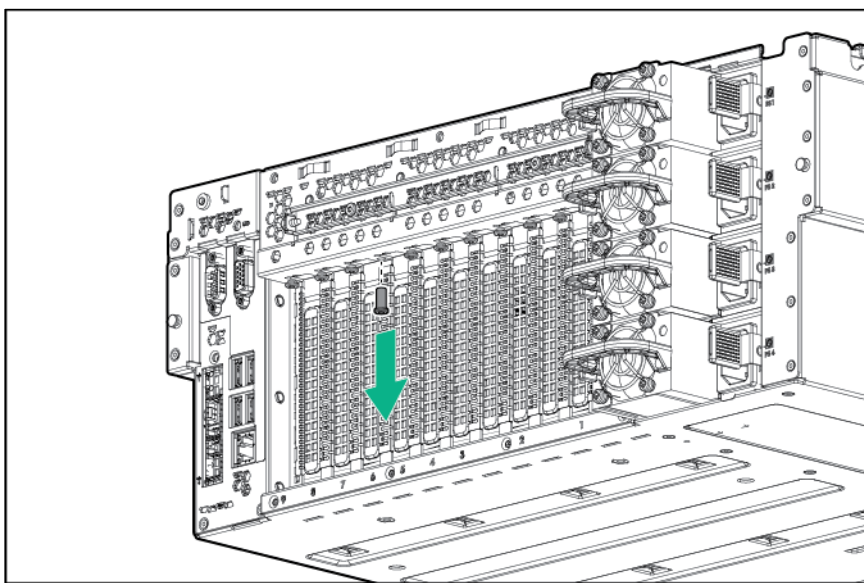
To install the component:

1. Power down the server (on page 24).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Extend or remove the server from the rack ("[Operations](#)" on page 24).
4. Remove the access panel (on page 26).

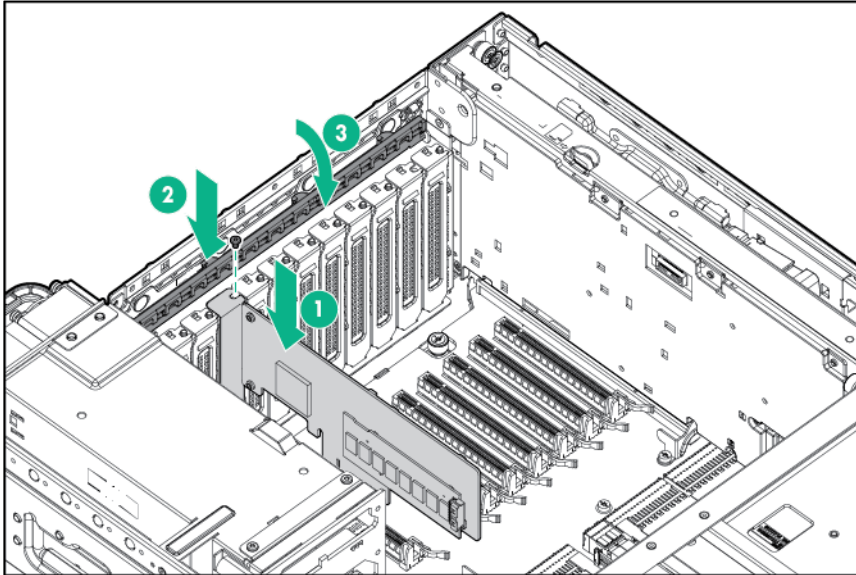
5. Open the expansion board retainer, and then remove the expansion slot cover.



6. Remove the PCI retainer screw.



7. Install the expansion board.



8. Close the expansion slot retainer.
9. Connect any required internal or external cables to the expansion board.
10. Install the access panel (on page 26).
11. Install the server in the rack ("[Installing the server into the rack](#)" on page 38).
12. Connect each power cord to the server.
13. Connect each power cord to the power source.
14. Power up the server ("[Powering up the server](#)" on page 24).

FBWC module and capacitor pack option



CAUTION: The cache module connector does not use the industry-standard DDR3 mini-DIMMs. 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.

To install the component:

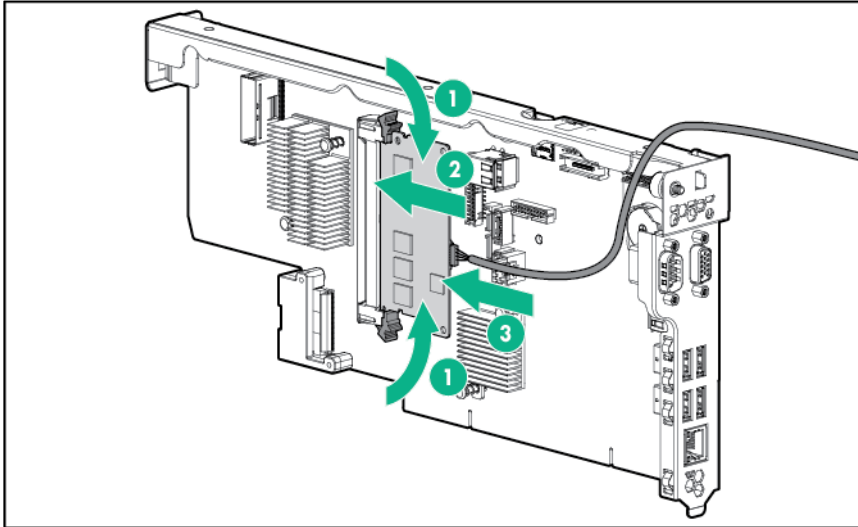
1. Back up all data.
2. Close all applications.
3. Power down the server (on page 24).
4. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.



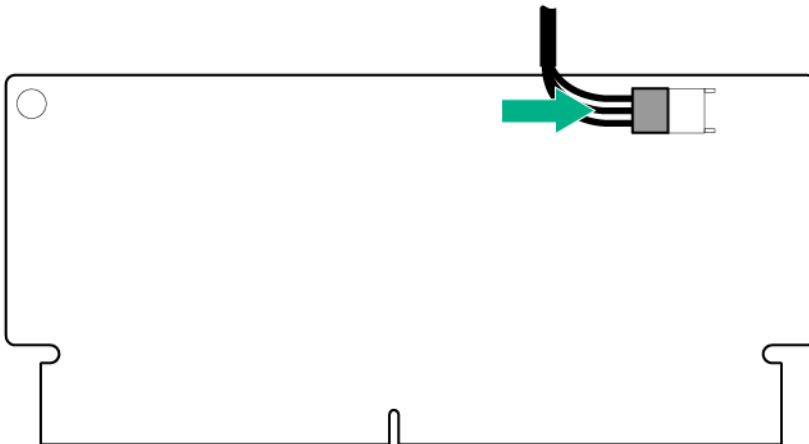
CAUTION: In systems that use external data storage, be sure that the server is the first unit to be powered down and the last to be powered back up. Taking this precaution ensures that the system does not erroneously mark the drives as failed when the server is powered up.

5. Extend the server from the rack (on page 25).
6. Remove the access panel (on page 26).
7. Remove the SPI board (on page 27).

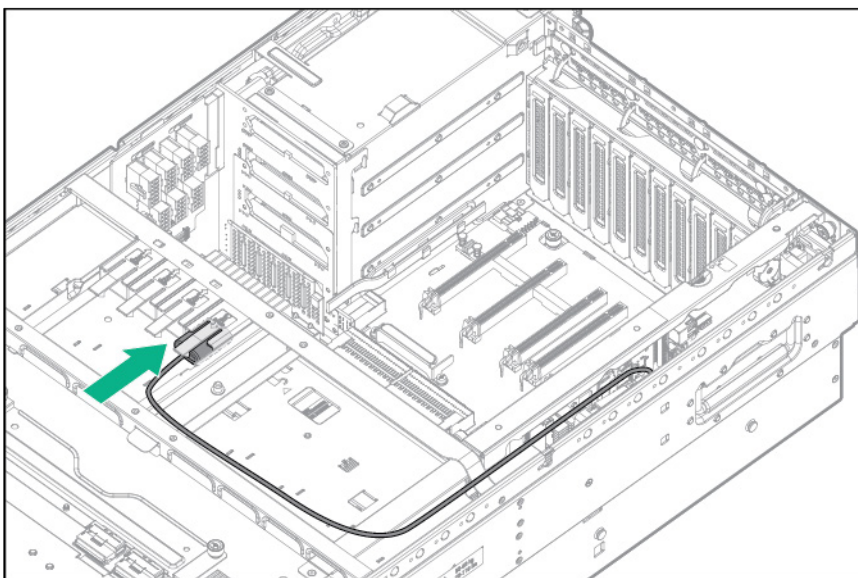
8. Install the cache module.



9. Connect the cable.



10. Install the capacitor pack.



11. Install the SPI board (on page 28).
12. Install the access panel (on page 26).
13. Slide the server into the rack.
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. Power up the server ("Powering up the server" on page 24).

Trusted Platform Module option

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/qs>).

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

1. Installing the Trusted Platform Module board (on page 88).
2. Retaining the recovery key/password (on page 87).
3. Enabling the Trusted Platform Module (on page 89).

Enabling the TPM requires accessing BIOS/Platform Configuration (RBSU) in the UEFI System Utilities ("HPE UEFI System Utilities" on page 98).

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, Hewlett Packard Enterprise 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, Hewlett Packard Enterprise 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.
- Hewlett Packard Enterprise 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.

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.

Installing the Trusted Platform Module board

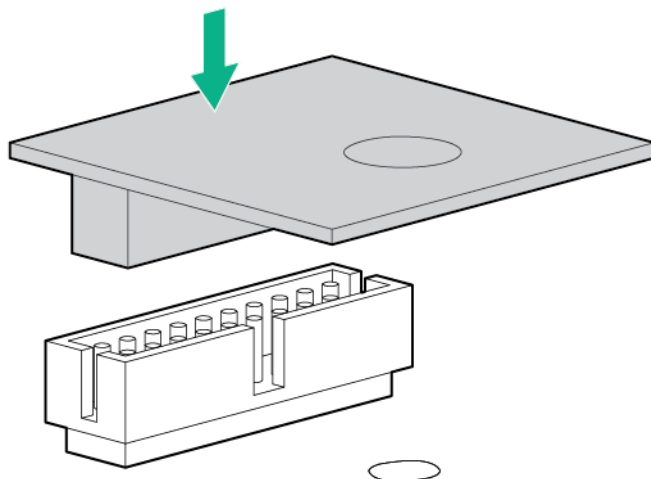
⚠ WARNING: To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active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

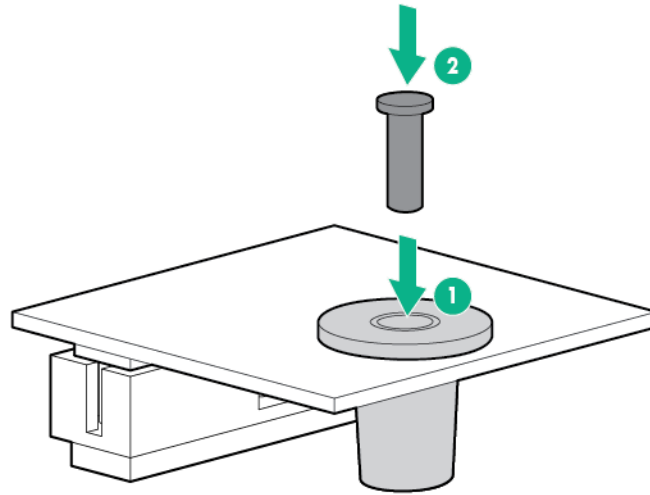
1. Power down the server (on page 24).
2. Remove the access panel (on page 26).
3. Extend the server from the rack (on page 25).
4. Remove the SPI board (on page 27).
5. Locate the TPM connector.

⚠ 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 SPI board (on page 28).
9. Install the access panel.
10. Slide the server into the rack.
11. Power up the server ("Powering up the server" on page 24).

Enabling the Trusted Platform Module

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

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

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



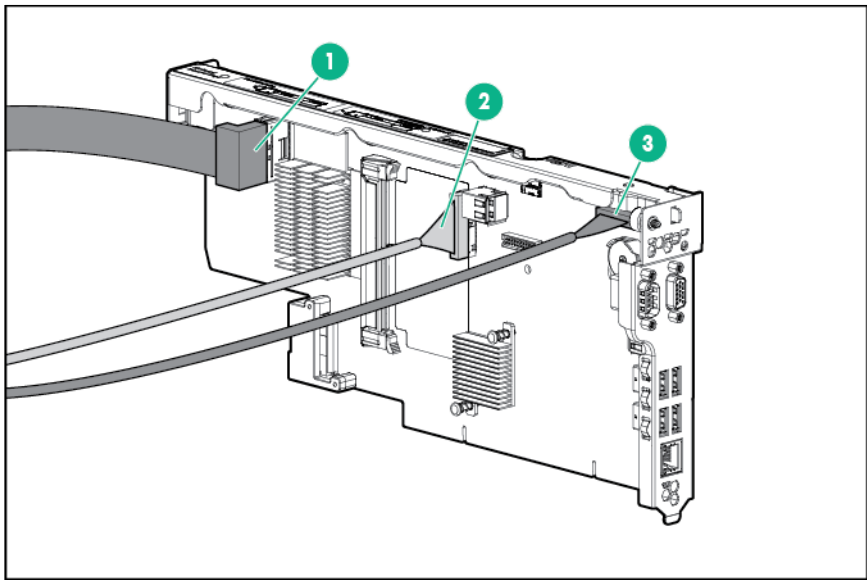
CAUTION: When a TPM is installed and enabled on the server, data access is locked if you fail to follow the proper procedures for updating the system or option firmware, replacing the system board, replacing a hard drive, or modifying OS application TPM settings.

For more information on firmware updates and hardware procedures, see the *HP Trusted Platform Module Best Practices White Paper* on the Hewlett Packard Enterprise Support Center website (<http://www.hpe.com/support/hpesc>).

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

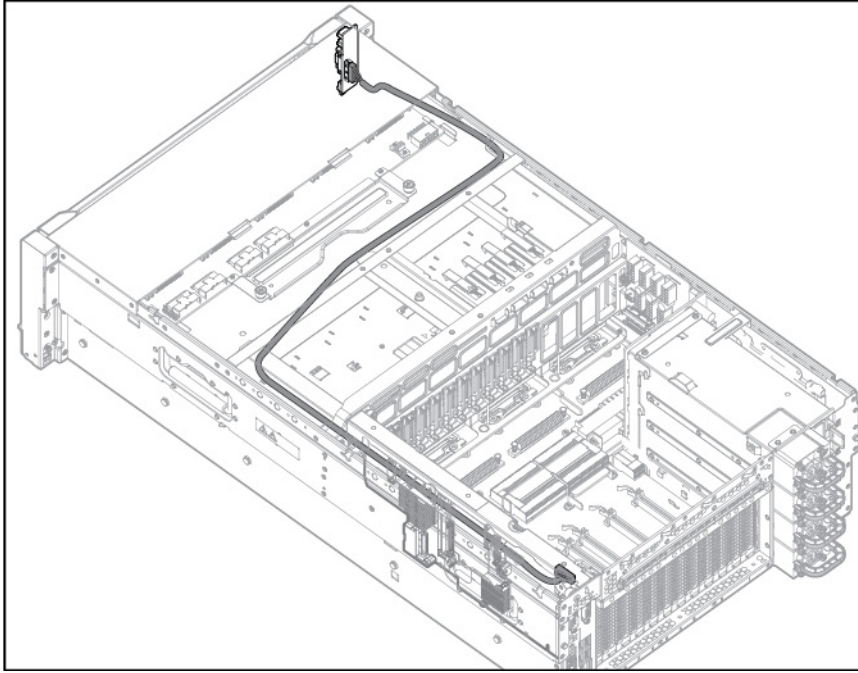
Cabling

SPI board cabling

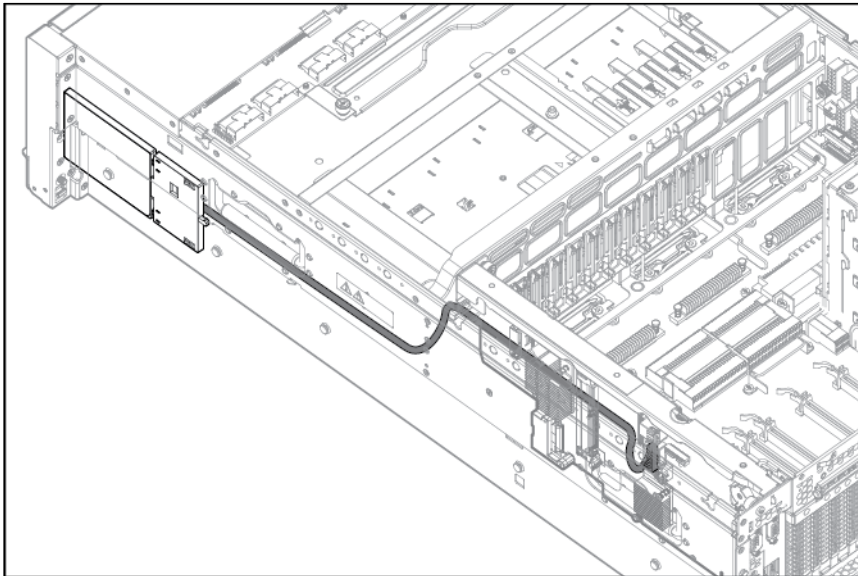


Item	Description
1	Top SAS backplane connector
2	System Insights Display Power/UID connector
3	Front video/USB connector

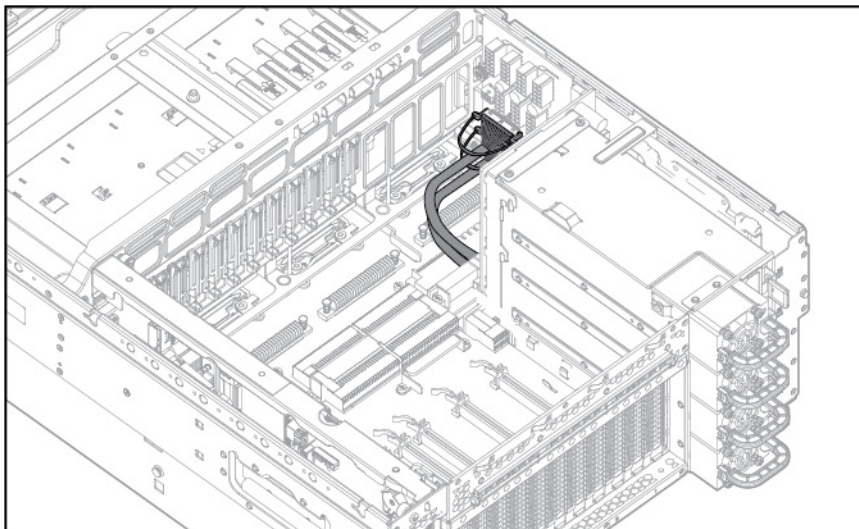
Front video/USB cabling



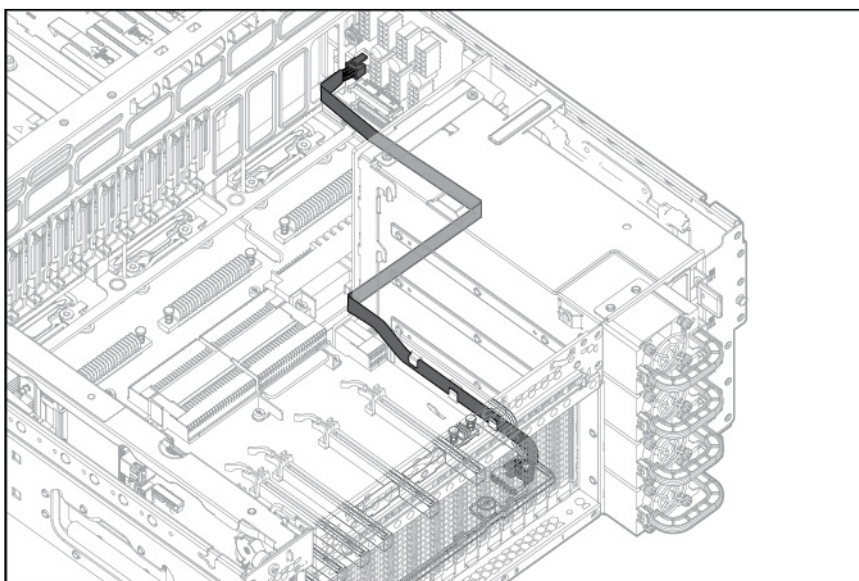
Systems Insight Display cabling



Power supply data cabling



Standby power cabling



Software and configuration utilities

Product QuickSpecs

For more information about product features, specifications, options, configurations, and compatibility, see the product QuickSpecs on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/qs>).

Server mode

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

Software or configuration utility	Server mode
HPE iLO (on page 93)	Online and Offline
Active Health System (on page 93)	Online and Offline
RESTful API support for iLO ("iLO RESTful API support" on page 94)	Online and Offline
Integrated Management Log (on page 95)	Online and Offline
HPE Insight Remote Support (on page 95)	Online
HPE Insight Online ("Insight Online" on page 96)	Online
Intelligent Provisioning (on page 97)	Offline
HPE Insight Diagnostics (on page 96)	Online and Offline
Erase Utility (on page 97)	Offline
Scripting Toolkit for Windows and Linux (on page 97)	Online
Service Pack for ProLiant (on page 98)	Online and Offline
HP Smart Update Manager (on page 98)	Online and Offline
HPE UEFI System Utilities (on page 98)	Offline
HPE Smart Storage Administrator (on page 101)	Online and Offline
FWUPDATE utility (on page 103)	Offline

HPE iLO

iLO is a remote server management processor embedded on the system boards of HPE ProLiant and Synergy servers. iLO enables the monitoring and controlling of servers from remote locations. HPE iLO management is a powerful tool that provides multiple ways to configure, update, monitor, and repair servers remotely. iLO (Standard) comes preconfigured on HPE servers **without an additional cost or license**.

Features that enhance server administrator productivity are licensed. For more information, see the iLO documentation on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/ilo-docs>).

Active Health System

The HPE Active Health System provides the following features:

- Combined diagnostics tools/scanners

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

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

The Active Health System collects the following types of data:

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

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

The data that is collected is managed according to the Hewlett Packard Enterprise Data Privacy policy. For more information see the Hewlett Packard Enterprise website (<http://www.hpe.com/info/privacy>).

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

The Agentless Management Service is available in the SPP, which can be downloaded from the Hewlett Packard Enterprise website (<http://www.hpe.com/servers/spp/download>). The Active Health System log can be downloaded manually from iLO 4 or HPE Intelligent Provisioning and sent to Hewlett Packard Enterprise.

For more information, see the following documents:

- *iLO User Guide* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/ilo/docs>)
- *Intelligent Provisioning User Guide* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/intelligentprovisioning/docs>)

iLO RESTful API support

HPE iLO 4 firmware version 2.00 and later includes the iLO RESTful API. The iLO RESTful API is a management interface that server management tools can use to perform configuration, inventory, and monitoring of the ProLiant server via iLO. The iLO RESTful API uses basic HTTPS operations (GET, PUT, POST, DELETE, and PATCH) to submit or return JSON-formatted data with iLO web server.

HPE iLO 4 2.30 and later is Redfish 1.0-conformant while remaining backward compatible with the existing iLO RESTful API.

HPE iLO 4 supports the iLO RESTful API with ProLiant Gen8 and later servers. For more information about the iLO RESTful API, see the Hewlett Packard Enterprise website (<http://www.hpe.com/info/restfulinterface/docs>).

Integrated Management Log

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

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

- From within HPE SIM
- From within UEFI System Utilities ("[HPE UEFI System Utilities](#)" on page 98)
- From within the Embedded UEFI shell (on page 100)
- From within operating system-specific IML viewers:
 - For Windows: IML Viewer
 - For Linux: IML Viewer Application
- From within the iLO web interface
- From within Insight Diagnostics ("[HPE Insight Diagnostics](#)" on page 96)

HPE Insight Remote Support

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

For more information, see *Insight Remote Support and Insight Online Setup Guide for ProLiant Servers and BladeSystem c-Class Enclosures* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/insightremotesupport/docs>). Insight Remote Support is available as part of Hewlett Packard Enterprise Warranty, HPE support services, or Hewlett Packard Enterprise contractual support agreement.

HPE Insight Remote Support central connect

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

For more information, see *Insight Remote Support Release Notes* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/insightremotesupport/docs>).

HPE Insight Online direct connect

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

For more information, see the product documentation on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/insightremotesupport/docs>).

Insight Online

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

For more information about using Insight Online, see *Insight Online User's Guide* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/enterprise/docs>).

HPE ProLiant Pre-boot Health Summary

If the server will not start up, you can use iLO to display diagnostic information on an external monitor. This feature is supported on servers that support external video and have a UID button or an SUV connector. When power is available to the server but the server is not powered on, iLO runs on auxiliary power and can take control of the server video adapter to display the HPE ProLiant Pre-boot Health Summary.

For additional information, see the following documents:

- *iLO 4 User Guide* — See the Hewlett Packard Enterprise website (<http://www.hpe.com/info/ilo/docs>).
- *ProLiant Gen9 Troubleshooting Guide, Volume I: Troubleshooting* — See "Troubleshooting Resources (on page 107)."

HPE Insight Diagnostics

The 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.

The Insight Diagnostics Offline Edition performs various in-depth system and component testing while the OS is not running. To run this utility, boot the server using Intelligent Provisioning (on page 97).

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

For more information or to download the utility, see the Hewlett Packard Enterprise website (<http://www.hpe.com/info/InsightDiagnostics>). The Insight Diagnostics Online Edition is also available in the SPP ("[Service Pack for ProLiant](#)" on page 98).

HPE Insight Diagnostics survey functionality

HPE Insight Diagnostics (on page 96) provides survey functionality that gathers critical hardware and software information on ProLiant servers.

This functionality supports operating systems that are supported by the server. For operating systems supported by the server, see the Hewlett Packard Enterprise website (<http://www.hpe.com/info/supportos>).

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

Survey functionality is installed with every Intelligent Provisioning-assisted Insight Diagnostics installation, or it can be installed through the SPP ("[Service Pack for ProLiant](#)" on page 98).

Intelligent Provisioning

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

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

For more information about Intelligent Provisioning software, see the Hewlett Packard Enterprise website (<http://www.hpe.com/servers/intelligentprovisioning>). For Intelligent Provisioning recovery media downloads, see the Resources tab on the Hewlett Packard Enterprise website (<http://www.hpe.com/servers/intelligentprovisioning>). For consolidated drive and firmware update packages, see the Smart Update: Server Firmware and Driver Updates page on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/SmartUpdate>).

Erase Utility



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

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

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

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

For more information about the Erase Utility, see the *Intelligent Provisioning User Guide* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/intelligentprovisioning/docs>).

Scripting Toolkit for Windows and Linux

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

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

For more information, and to download the Scripting Toolkit, see the Hewlett Packard Enterprise website (<http://www.hpe.com/servers/proliant/stk>).

Service Pack for ProLiant

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

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

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

- Service Pack for ProLiant download page (<http://www.hpe.com/servers/spp/download>)
- Smart Update: Server Firmware and Driver Updates page (<http://www.hpe.com/info/SmartUpdate>)

HP Smart Update Manager

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

For more information about HP SUM, see the product page on the Hewlett Packard Enterprise website (<http://www.hpe.com/servers/hpsum>).

To download HP SUM, see the Hewlett Packard Enterprise website (<http://www.hpe.com/servers/hpsum/download>).

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

HPE UEFI System Utilities

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

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

For more information on the UEFI System Utilities, see the *HPE UEFI System Utilities User Guide for HPE ProLiant Gen9 Servers* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/uefi/docs>).

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

Using UEFI System Utilities

To use the UEFI System Utilities, use the following keys.

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

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

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

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

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

Flexible boot control

This feature enables you to do the following:

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

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

After pre-POST, the boot options screen appears. During this time, you can access the UEFI System Utilities by pressing the **F9** key.
- Choose between supported modes: Legacy BIOS Boot Mode or UEFI Boot Mode



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

For more information, see the *HPE UEFI System Utilities User Guide for HPE ProLiant Gen9 Servers* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/uefi/docs>).

Restoring and customizing configuration settings

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

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

Secure Boot configuration

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

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

Once enabled, only firmware components and operating systems with boot loaders that have an appropriate digital signature can execute during the boot process. Only operating systems that support Secure Boot and have an EFI boot loader signed with one of the authorized keys can boot when Secure Boot is enabled. For more information about supported operating systems, see the *HPE UEFI System Utilities and Shell Release Notes for HPE ProLiant Gen9 Servers* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/uefi/docs>).

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

When Secure Boot is enabled, the System Maintenance Switch does not restore all manufacturing defaults when set to the ON position. For security reasons, the following are not restored to defaults when the System Maintenance Switch is in the ON position:

- Secure Boot is not disabled and remains enabled.
- The Boot Mode remains in UEFI Boot Mode even if the default boot mode is Legacy Boot Mode.
- The Secure Boot Database is not restored to its default state.
- iSCSI Software Initiator configuration settings are not restored to defaults.

Embedded UEFI shell

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

For more information, see the following documents:

- *HPE UEFI Shell User Guide for HPE ProLiant Gen9 Servers* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/uefi/docs>)
- *UEFI Shell Specification* on the UEFI website (<http://www.uefi.org/specifications>)

Embedded Diagnostics option

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

For more information on the Embedded Diagnostics option, see the *HPE UEFI System Utilities User Guide for HPE ProLiant Gen9 Servers* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/uefi/docs>).

iLO RESTful API support for UEFI

The ProLiant Gen9 servers include support for a UEFI compliant System BIOS, along with UEFI System Utilities and Embedded UEFI Shell pre-boot environments. ProLiant Gen9 servers also support configuring the UEFI BIOS settings using the iLO RESTful API, a management interface that server management tools can use to perform configuration, inventory, and monitoring of a ProLiant server. The iLO RESTful API uses basic HTTPS operations (GET, PUT, POST, DELETE, and PATCH) to submit or return JSON-formatted data with iLO web server.

For more information about the iLO RESTful API and the RESTful Interface Tool, see the Hewlett Packard Enterprise website (<http://www.hpe.com/info/restfulinterface/docs>).

Re-entering the server serial number and product ID

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

1. During the server startup sequence, press the **F9** key to access UEFI System Utilities.
2. Select the **System Configuration > BIOS/Platform Configuration (RBSU) > Advanced Options > Advanced System ROM Options > Serial Number**, and then press the **Enter** key.
3. Enter the serial number and press the **Enter** key. The following message appears:
`The serial number should only be modified by qualified service personnel.
This value should always match the serial number located on the chassis.`
4. Press the **Enter** key to clear the warning.
5. Enter the serial number and press the **Enter** key.
6. Select **Product ID**. The following warning appears:
`Warning: The Product ID should ONLY be modified by qualified service
personnel. This value should always match the Product ID located on the
chassis.`
7. Enter the product ID and press the **Enter** key.
8. Press the **F10** key to confirm exiting System Utilities. The server automatically reboots.

Utilities and features

HPE Smart Storage Administrator

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

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

Some HPE SSA features include the following:

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

For more information about HPE SSA, see the Hewlett Packard Enterprise website (<http://www.hpe.com/servers/ssa>).

Automatic Server Recovery

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

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

USB support

Hewlett Packard Enterprise 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, Hewlett Packard Enterprise 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, Hewlett Packard Enterprise provides legacy USB functionality for the following:

- POST (system boot)
- UEFI System Utilities
- Pre-boot UEFI shell
- DOS
- Operating environments which do not provide native USB support

External USB functionality

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

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

Redundant ROM support

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

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

Safety and security benefits

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

Keeping the system current

Access to Hewlett Packard Enterprise Support Materials

Access to some updates for ProLiant Servers may require product entitlement when accessed through the Hewlett Packard Enterprise Support Center support portal. Hewlett Packard Enterprise recommends that you have an HP Passport set up with relevant entitlements. For more information, see the Hewlett Packard Enterprise website (<http://www.hpe.com/support/AccessToSupportMaterials>).

Updating firmware or System ROM

Multiple methods exist to update the firmware or System ROM:

- Service Pack for ProLiant (on page 98)
- FWUPDATE utility (on page 103)
- FWUpdate command from within the Embedded UEFI shell (on page 104)
- Firmware Update application in UEFI System Utilities ("Firmware Update application in the UEFI System Utilities" on page 104)
- Online Flash components (on page 104)

Product entitlement is required to perform updates. For more information, see "Accessing updates (on page 115)."

FWUPDATE utility

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

To use the utility to upgrade the firmware:

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

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

To download the flash components, see the Hewlett Packard Enterprise Support Center website (<http://www.hpe.com/support/hpesc>).

For more information about the One-Time Boot Menu, see the *HPE UEFI System Utilities User Guide for HPE ProLiant Gen9 Servers* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/uefi/docs>).

FWUpdate command from within the Embedded UEFI Shell

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

1. Access the System ROM Flash Binary component for your server from the Hewlett Packard Enterprise Support Center website (<http://www.hpe.com/support/hpesc>). When searching for the component, always select **OS Independent** to locate the binary file.
2. Copy the binary file to a USB media or iLO virtual media.
3. Attach the media to the server.
4. Boot to Embedded Shell.
5. To obtain the assigned file system volume for the USB key, enter `Map -r`. For more information about accessing a file system from the shell, see the *HPE UEFI Shell User Guide for HPE ProLiant Gen9 Servers* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/uefi/docs>).
6. Change to the file system that contains the System ROM Flash Binary component for your server. Enter one of the fsx file systems available, such as `fs0` or `fs1`, and press **Enter**.
7. Use the `cd` command to change from the current directory to the directory that contains the binary file.
8. Enter `fwupdate -d BIOS -f <filename>` to flash the system ROM.
For help on the FWUPDATE command, enter the command:
`help fwupdate -b`
9. Reboot the server. A reboot is required after the firmware update for the updates to take effect and for hardware stability to be maintained.

For more information about the commands used in this procedure, see the *HPE UEFI Shell User Guide for HPE ProLiant Gen9 Servers* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/uefi/docs>).

Firmware Update application in the UEFI System Utilities

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

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

Online Flash components

This component provides updated system firmware that can be installed directly on supported operating systems. Additionally, when used in conjunction with the HP SUM ("HP Smart Update Manager" on page 98), this Smart Component allows the user to update firmware on remote servers from a central location. This remote deployment capability eliminates the need for the user to be physically present at the server to perform a firmware update.

Drivers



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

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

If you are installing an Intelligent Provisioning-supported OS, use Intelligent Provisioning (on page 97) and its Configure and Install feature to install the OS and latest supported drivers.

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

If you are installing drivers from SPP, be sure that you are using the latest SPP version that your server supports. To verify that your server is using the latest supported version and for more information about SPP, see the Hewlett Packard Enterprise website (<http://www.hpe.com/servers/spp/download>).

To locate the drivers for a particular server, go to the Hewlett Packard Enterprise Support Center website (<http://www.hpe.com/support/hpesc>). Under **Select your HPE product**, enter the product name or number and click **Go**.

Software and firmware

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

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

- Download the SPP ("Service Pack for ProLiant" on page 98) from the Hewlett Packard Enterprise website (<http://www.hpe.com/servers/spp/download>).
- Download individual drivers, firmware, or other systems software components from the server product page in the Hewlett Packard Enterprise Support Center website (<http://www.hpe.com/support/hpesc>).

Operating System Version Support

For information about specific versions of a supported operating system, refer to the operating system support matrix (<http://www.hpe.com/info/ossupport>).

Version control

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

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

For more information about version control tools, see the *Systems Insight Manager User Guide*, the *Version Control Agent User Guide*, and the *Version Control Repository Manager User Guide* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/enterprise/docs>).

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

Operating systems and virtualization software support for ProLiant servers

For information about specific versions of a supported operating system, see the Hewlett Packard Enterprise website (<http://www.hpe.com/info/ossupport>).

HPE Technology Service Portfolio

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

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

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

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

Change control and proactive notification

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

For more information, see the Hewlett Packard Enterprise website (<http://www.hpe.com/info/pcn>).

Troubleshooting

Troubleshooting resources

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

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

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

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

Battery replacement

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

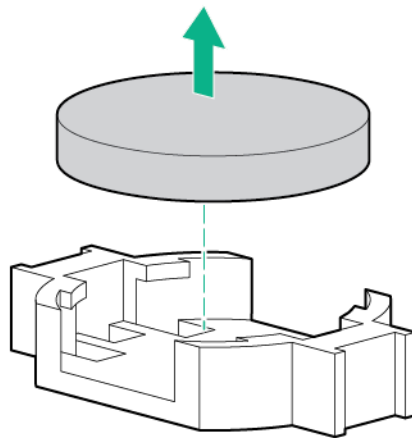


WARNING: The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:

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

To remove the component:

1. Power down the server (on page 24).
2. Remove all power:
 - a. Disconnect each power cord from the power source.
 - b. Disconnect each power cord from the server.
3. Extend the server from the rack (on page 25).
4. Remove the access panel (on page 26).
5. Remove the SPI board (on page 27).
6. Remove the battery.



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



IMPORTANT: To avoid a mismatch between boot modes, Hewlett Packard Enterprise recommends setting system maintenance switch 7 to the same BIOS boot mode the server is deployed in. Otherwise, the storage controller may not recognize the OS installed on the storage media.

For more information, see "System Maintenance Switch (on page 12)."

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 ("[Support and other resources](#)" on page [115](#)).

Warranty and regulatory information

Warranty information

HPE ProLiant and x86 Servers and Options

(<http://www.hpe.com/support/ProLiantServers-Warranties>)

HPE Enterprise Servers (<http://www.hpe.com/support/EnterpriseServers-Warranties>)

HPE Storage Products (<http://www.hpe.com/support/Storage-Warranties>)

HPE Networking Products (<http://www.hpe.com/support/Networking-Warranties>)

Regulatory information

Safety and regulatory compliance

For important safety, environmental, and regulatory information, see *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the Hewlett Packard Enterprise website (<http://www.hpe.com/support/Safety-Compliance-EnterpriseProducts>).

Belarus Kazakhstan Russia marking



Manufacturer and Local Representative Information

Manufacturer information:

Hewlett Packard Enterprise Company, 3000 Hanover Street, Palo Alto, CA 94304 U.S.

Local representative information Russian:

- **Russia:**

ООО «Хьюлетт Паккард Энтерпрайз», Российская Федерация, 125171, г. Москва, Ленинградское шоссе, 16А, стр.3, Телефон/факс: +7 495 797 35 00

- **Belarus:**

ИООО «Хьюлетт-Паккард Бел», Республика Беларусь, 220030, г. Минск, ул. Интернациональная, 36-1, Телефон/факс: +375 17 392 28 20

- **Kazakhstan:**

ТОО «Хьюлетт-Паккард (К)», Республика Казахстан, 050040, г. Алматы, Бостандыкский район, проспект Аль-Фараби, 77/7, Телефон/факс: + 7 727 355 35 52

Local representative information Kazakh:

- **Russia:**

ЖШС "Хьюлетт Паккард Энтерпрайз", Ресей Федерациясы, 125171,
Мәскеу, Ленинград тас жолы, 16А блок 3, Телефон/факс: +7 495 797 35 00

- **Belarus:**

«HEWLETT-PACKARD Bel» ЖШС, Беларусь Республикасы, 220030, Минск қ.,
Интернациональная көшесі, 36/1, Телефон/факс: +375 17 392 28 20

- **Kazakhstan:**

ЖШС «Хьюлетт-Паккард (К)», Қазақстан Республикасы, 050040, Алматы қ.,
Бостандық ауданы, Әл-Фараби даңғылы, 77/7, Телефон/факс: +7 727 355 35 52

Manufacturing date:

The manufacturing date is defined by the serial number.

CCSYWWZZZZ (serial number format for this product)

Valid date formats include:

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

Turkey RoHS material content declaration

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Ukraine RoHS material content declaration

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

Specifications

Environmental specifications

Specification	Value
Temperature range*	
Operating	10°C to 35°C (50°F to 95°F)
Shipping	-40°C to 70°C (-40°F to 158°F)
Maximum wet bulb temperature	28°C (82.4°F)
Relative humidity (noncondensing)**	
Operating	10% to 90%
Nonoperating	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 3,048 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
Height	17.5 cm (6.88 in)
Depth	73.6 cm (29 in)
Width	44.4 cm (17.48 in)
Weight (maximum)	52.87 kg (116.56 lb)
Weight (no drives installed)	32.18 kg (70.94 lb)

Power supply specifications

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

- HPE 1200 W Common Slot Platinum Plus Hot-Plug Power Supply (94% efficiency) (on page 112)
- HPE 1500 W Common Slot -48 VDC Hot-plug Power Supply (on page 113)
- HPE 1500 W Common Slot Platinum Plus Hot-Plug Power Supply (94% efficiency) (on page 114)
- For detailed power supply specifications, see the server QuickSpecs on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/qs>).

HPE 1200 W Common Slot Platinum Plus Hot-Plug Power Supply (94% efficiency)

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

Rated input frequency	50 Hz to 60 Hz
Rated input current	9.2 A at 100 VAC 9.5 A at 110 to 120 VAC 6.6 A at 200 to 240 VAC
Maximum rated input power	1000 W at 120 VAC input 1320 W at 230 VAC input
BTUs per hour	3408 at 120 VAC input 4500 at 230 VAC input
Power supply output	
Power supply output	800 W at 100 VAC input (low line) 900 W at 108 V to 132 VAC input (low line) 1200 W at 200 V to 240 VAC input (high line)
Rated steady-state power	800 W at 100 VAC input 900 W at 120 VAC input 1200 W at 200 V to 240 VAC input
Maximum peak power	800 W at 100 VAC input 900 W at 120 VAC input 1200 W at 200 V to 240 VAC input

HPE 1500 W Common Slot -48 VDC Hot-plug Power Supply

Specification	Value
Input requirements	
Rated input voltage	-40 VDC to -72 VDC
Rated input current	42.0 A at -40 VDC input 33.5 A at -48 VDC input 22.2 A at -72 VDC input
Rated input power (W)	1621 W at -40 VDC input 1607 W at -48 VDC input, nominal input 1598 W at -72 VDC input
Rated input power (BTUs per hour)	5530 at -40 VDC input 5484 at -48 VDC input 5451 at -72 VDC input
Power supply output	
Rated steady-state power (W)	1500 W at -40 VDC to -72 VDC
Maximum peak power (W)	1500 W at -40 VDC to -72 VDC



CAUTION: This equipment is designed to permit the connection of the earthed conductor of the DC supply circuit to the earthing conductor at the equipment. If this connection is made, all of the following must be met:

- This equipment must be connected directly to the DC supply system earthing electrode conductor or to a bonding jumper from an earthing terminal bar or bus to which the DC

supply system earthing electrode conductor is connected.

- This equipment must be located in the same immediate area (such as adjacent cabinets) as any other equipment that has a connection between the earthed conductor of the same DC supply circuit and the earthing conductor, and also the point of earthing of the DC system. The DC system must be earthed elsewhere.
 - The DC supply source is to be located within the same premises as the equipment.
 - Switching or disconnecting devices must not be in the earthed circuit conductor between the DC source and the point of connection of the earthing electrode conductor.
-



CAUTION: To reduce the risk of electric shock or energy hazards:

- This equipment must be installed by trained service personnel, as defined by the NEC and IEC 60950-1, Second Edition, the standard for Safety of Information Technology Equipment.
 - Connect the equipment to a reliably grounded SELV source. An SELV source is a secondary circuit that is designed so normal and single fault conditions do not cause the voltages to exceed a safe level (60 V DC).
 - The branch circuit overcurrent protection must be rated 24 A.
-

HPE 1500 W Common Slot Platinum Plus Hot-Plug Power Supply (94% efficiency)

Specification	Value
Input requirements	
Rated input voltage	200 to 240 VAC
Rated input frequency	50 Hz to 60 Hz
Rated input current	8.3 A at 200 VAC
Maximum rated input power	1652 W at 230 VAC input
BTUs per hour	5637 at 230 VAC input
Power supply output	
Power supply output	1500 W
Rated steady-state power	1500 W at 200 V to 240 VAC input
Maximum peak power	1500 W at 200 V to 240 VAC input

Support and other resources

Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website (<http://www.hpe.com/assistance>).
- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website (<http://www.hpe.com/support/hpesc>).

Information to collect

- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.
- To download product updates, go to either of the following:
 - Hewlett Packard Enterprise Support Center **Get connected with updates** page (<http://www.hpe.com/support/e-updates>)
 - Software Depot website (<http://www.hpe.com/support/softwaredepot>)
- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center **More Information on Access to Support Materials** page (<http://www.hpe.com/support/AccessToSupportMaterials>).



IMPORTANT: Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HP Passport set up with relevant entitlements.

Websites

- Hewlett Packard Enterprise Information Library (<http://www.hpe.com/info/enterprise/docs>)
- Hewlett Packard Enterprise Support Center (<http://www.hpe.com/support/hpesc>)
- Contact Hewlett Packard Enterprise Worldwide (<http://www.hpe.com/assistance>)

- Subscription Service/Support Alerts (<http://www.hpe.com/support/e-updates>)
- Software Depot (<http://www.hpe.com/support/softwaredepot>)
- Customer Self Repair (<http://www.hpe.com/support/selfrepair>)
- Insight Remote Support (<http://www.hpe.com/info/insightremotesupport/docs>)
- Serviceguard Solutions for HP-UX (<http://www.hpe.com/info/hpux-serviceguard-docs>)
- Single Point of Connectivity Knowledge (SPOCK) Storage compatibility matrix (<http://www.hpe.com/storage/spock>)
- Storage white papers and analyst reports (<http://www.hpe.com/storage/whitepapers>)

Customer Self Repair

Hewlett Packard Enterprise 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 Hewlett Packard Enterprise (or Hewlett Packard Enterprise service providers or service partners) identifies that the repair can be accomplished by the use of a CSR part, Hewlett Packard Enterprise 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 Hewlett Packard Enterprise 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 Hewlett Packard Enterprise 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 Hewlett Packard Enterprise parts are not designed for customer self repair. In order to satisfy the customer warranty, Hewlett Packard Enterprise 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 Hewlett Packard Enterprise Support Center and a technician will help you over the telephone. Hewlett Packard Enterprise specifies in the materials shipped with a replacement CSR part whether a defective part must be returned to Hewlett Packard Enterprise. In cases where it is required to return the defective part to Hewlett Packard Enterprise, you must ship the defective part back to Hewlett Packard Enterprise 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 Hewlett Packard Enterprise billing you for the replacement. With a customer self repair, Hewlett Packard Enterprise will pay all shipping and part return costs and determine the courier/carrier to be used.

For more information about the Hewlett Packard Enterprise CSR program, contact your local service provider. For the North American program, go to the Hewlett Packard Enterprise CSR website (<http://www.hpe.com/support/selfrepair>).

Réparation par le client (CSR)

Les produits Hewlett Packard Enterprise 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, Hewlett Packard Enterprise (ou ses partenaires ou mainteneurs agréés) détermine que la réparation peut être effectuée à l'aide d'une pièce CSR, Hewlett Packard Enterprise 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 Hewlett Packard Enterprise 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 Hewlett Packard Enterprise de remplacer ces pièces, l'intervention peut ou non vous être facturée, selon le type de garantie applicable à votre produit.

REMARQUE: Certaines pièces Hewlett Packard Enterprise ne sont pas conçues pour permettre au client d'effectuer lui-même la réparation. Pour que la garantie puisse s'appliquer, Hewlett Packard Enterprise 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 toute assistance, appelez le Centre d'assistance Hewlett Packard Enterprise pour qu'un technicien vous aide au téléphone. Dans les documents envoyés avec la pièce de rechange CSR, Hewlett Packard Enterprise 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, Hewlett Packard Enterprise se réserve le droit de vous facturer les coûts de remplacement. Dans le cas d'une pièce CSR, Hewlett Packard Enterprise 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 Hewlett Packard Enterprise, contactez votre Mainteneur Agréé local. Pour plus d'informations sur ce programme en Amérique du Nord, consultez le site Web Hewlett Packard Enterprise (<http://www.hpe.com/support/selfrepair>).

Riparazione da parte del cliente

Per abbreviare i tempi di riparazione e garantire una maggiore flessibilità nella sostituzione di parti difettose, i prodotti Hewlett Packard Enterprise sono realizzati con numerosi componenti che possono essere riparati direttamente dal cliente (CSR, Customer Self Repair). Se in fase di diagnostica Hewlett Packard Enterprise (o un centro di servizi o di assistenza Hewlett Packard Enterprise) identifica il guasto come riparabile mediante un ricambio CSR, Hewlett Packard Enterprise 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 Hewlett Packard Enterprise, 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 Hewlett Packard Enterprise, potrebbe dover sostenere spese aggiuntive a seconda del tipo di garanzia previsto per il prodotto.

NOTA: alcuni componenti Hewlett Packard Enterprise non sono progettati per la riparazione da parte del cliente. Per rispettare la garanzia, Hewlett Packard Enterprise 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 Hewlett Packard Enterprise. Nel materiale fornito con una parte di ricambio CSR, Hewlett Packard Enterprise specifica se il cliente deve restituire dei componenti. Qualora sia richiesta la resa ad Hewlett Packard Enterprise del componente difettoso, lo si deve spedire ad Hewlett Packard Enterprise 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 Hewlett Packard Enterprise. Nel caso di riparazione da parte del cliente, Hewlett Packard Enterprise sostiene tutte le spese di spedizione e resa e sceglie il corriere/vettore da utilizzare.

Per ulteriori informazioni sul programma CSR di Hewlett Packard Enterprise, contattare il centro di assistenza di zona. Per il programma in Nord America fare riferimento al sito Web (<http://www.hpe.com/support/selfrepair>).

Customer Self Repair

Hewlett Packard Enterprise Produkte enthalten viele CSR-Teile (Customer Self Repair), um Reparaturzeiten zu minimieren und höhere Flexibilität beim Austausch defekter Bauteile zu ermöglichen. Wenn Hewlett Packard Enterprise (oder ein Hewlett Packard Enterprise Servicepartner) bei der Diagnose feststellt, dass das Produkt mithilfe eines CSR-Teils repariert werden kann, sendet Ihnen Hewlett Packard Enterprise 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 Hewlett Packard Enterprise 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 Hewlett Packard Enterprise vornehmen lassen möchten, können bei diesem Service je nach den für Ihr Produkt vorgesehenen Garantiebedingungen zusätzliche Kosten anfallen.

HINWEIS: Einige Hewlett Packard Enterprise Teile sind nicht für Customer Self Repair ausgelegt. Um den Garantieanspruch des Kunden zu erfüllen, muss das Teil von einem Hewlett Packard Enterprise 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 Hewlett Packard Enterprise Support Center anrufen und sich von einem Mitarbeiter per Telefon helfen lassen. Den Materialien von Hewlett Packard Enterprise, die mit einem CSR-Ersatzteil geliefert werden, können Sie entnehmen, ob das defekte Teil an Hewlett Packard Enterprise zurückgeschickt werden muss. Wenn es erforderlich ist, das defekte Teil an Hewlett Packard Enterprise 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 Hewlett Packard Enterprise Ihnen das Ersatzteil in Rechnung stellen. Im Falle von Customer Self Repair kommt Hewlett Packard Enterprise für alle Kosten für die Lieferung und Rücksendung auf und bestimmt den Kurier-/Frachtdienst.

Weitere Informationen über das Hewlett Packard Enterprise Customer Self Repair Programm erhalten Sie von Ihrem Servicepartner vor Ort. Informationen über das CSR-Programm in Nordamerika finden Sie auf der Hewlett Packard Enterprise Website unter (<http://www.hpe.com/support/selfrepair>).

Reparaciones del propio cliente

Los productos de Hewlett Packard Enterprise 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, Hewlett Packard Enterprise (o los proveedores o socios de servicio de Hewlett Packard Enterprise) identifica que una reparación puede llevarse a cabo mediante el uso de un componente CSR, Hewlett Packard Enterprise le enviará dicho componente directamente para que realice su sustitución. Los componentes CSR se clasifican en dos categorías:

- **Obligatorio**—componentes cuya reparación por parte del usuario es obligatoria. Si solicita a Hewlett Packard Enterprise 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 cuya 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 Hewlett Packard Enterprise realice su sustitución, puede o no conllevar costes adicionales, dependiendo del tipo de servicio de garantía correspondiente al producto.

NOTA: Algunos componentes de Hewlett Packard Enterprise no están diseñados para que puedan ser reparados por el usuario. Para que el usuario haga valer su garantía, Hewlett Packard Enterprise 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 Hewlett Packard Enterprise y recibirá ayuda telefónica por parte de un técnico. Con el envío de materiales para la sustitución de componentes CSR, Hewlett Packard Enterprise especificará si los componentes defectuosos deberán devolverse a Hewlett Packard Enterprise. En aquellos casos en los que sea necesario devolver algún componente a Hewlett Packard Enterprise, 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, Hewlett Packard Enterprise podrá cobrarle por el de sustitución. En el caso de todas sustituciones que lleve a cabo el cliente, Hewlett Packard Enterprise 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 Hewlett Packard Enterprise, póngase en contacto con su proveedor de servicios local. Si está interesado en el programa para Norteamérica, visite la página web de Hewlett Packard Enterprise CSR (<http://www.hpe.com/support/selfrepair>).

Customer Self Repair

Veel onderdelen in Hewlett Packard Enterprise 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 Hewlett Packard Enterprise (of een Hewlett Packard Enterprise Service Partner) bij de diagnose vaststelt dat de reparatie kan worden uitgevoerd met een CSR-onderdeel, verzendt Hewlett Packard Enterprise 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 Hewlett Packard Enterprise 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 Hewlett Packard Enterprise verzoekt deze onderdelen voor u te vervangen, kunnen daarvoor extra kosten in rekening worden gebracht, afhankelijk van het type garantieservice voor het product.

OPMERKING: Sommige Hewlett Packard Enterprise onderdelen zijn niet ontwikkeld voor reparatie door de klant. In verband met de garantievooraardelen 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 is gewenst, belt u het Hewlett Packard Enterprise Support Center om via de telefoon ondersteuning van een technicus te ontvangen.

Hewlett Packard Enterprise vermeldt in de documentatie bij het vervangende CSR-onderdeel of het defecte onderdeel aan Hewlett Packard Enterprise moet worden geretourneerd. Als het defecte onderdeel aan Hewlett Packard Enterprise moet worden teruggezonden, moet u het defecte onderdeel binnen een bepaalde periode, gewoonlijk vijf (5) werkdagen, retourneren aan Hewlett Packard Enterprise. Het defecte onderdeel moet met de bijbehorende documentatie worden geretourneerd in het meegeleverde verpakkingsmateriaal. Als u het defecte onderdeel niet terugzendt, kan Hewlett Packard Enterprise u voor het vervangende onderdeel kosten in rekening brengen. Bij reparatie door de klant betaalt Hewlett Packard Enterprise alle verzendkosten voor het vervangende en geretourneerde onderdeel en kiest Hewlett Packard Enterprise zelf welke koerier/transportonderneming hiervoor wordt gebruikt.

Neem contact op met een Service Partner voor meer informatie over het Customer Self Repair programma van Hewlett Packard Enterprise. Informatie over Service Partners vindt u op de Hewlett Packard Enterprise website (<http://www.hpe.com/support/selfrepair>).

Reparo feito pelo cliente

Os produtos da Hewlett Packard Enterprise 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 Hewlett Packard Enterprise (ou fornecedores/parceiros da Hewlett Packard Enterprise) concluir que o reparo pode ser efetuado pelo uso de uma peça CSR, a Hewlett Packard Enterprise enviará a peça diretamente ao cliente. Há duas categorias de peças CSR:

- **Obrigatória**—Peças cujo reparo feito pelo cliente é obrigatório. Se desejar que a Hewlett Packard Enterprise 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 Hewlett Packard Enterprise 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 Hewlett Packard Enterprise não são projetadas para o reparo feito pelo cliente. A fim de cumprir a garantia do cliente, a Hewlett Packard Enterprise 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 Hewlett Packard Enterprise para que um técnico o ajude por telefone. A Hewlett Packard Enterprise especifica nos materiais fornecidos com a peça CSR de reposição se a peça com defeito deve ser devolvida à Hewlett Packard Enterprise. Nos casos em que isso for necessário, é preciso enviar a peça com defeito à Hewlett Packard Enterprise, você deverá enviar a peça com defeito de volta para a Hewlett Packard Enterprise dentro do período de tempo definido, normalmente em 5 (cinco) dias úteis. A peça com defeito deve ser enviada com a documentação correspondente no material de transporte fornecido. Caso não o faça, a Hewlett Packard Enterprise poderá cobrar a reposição. Para as peças de reparo feito pelo cliente, a Hewlett Packard Enterprise 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 Hewlett Packard Enterprise, entre em contato com o fornecedor de serviços local. Para o programa norte-americano, visite o site da Hewlett Packard Enterprise (<http://www.hpe.com/support/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、Hewlett Packard Enterprise製品には多数のカスタマーセルフリペア（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Hewlett Packard Enterprise（Hewlett Packard EnterpriseまたはHewlett Packard Enterprise正規保守代理店）が判断した場合、Hewlett Packard Enterprise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種類があります。

- **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Hewlett Packard Enterprise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Hewlett Packard Enterprise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： Hewlett Packard Enterprise製品の一部の部品は、カスタマーセルフリペアの対象外です。製品の保証を継続するためには、Hewlett Packard EnterpriseまたはHewlett Packard Enterprise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、Hewlett Packard Enterpriseの修理受付窓口に電話していただければ、技術者が電話でアドバイスします。交換用のCSR部品または同梱物には、故障部品をHewlett Packard Enterprise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Hewlett Packard Enterprise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Hewlett Packard Enterpriseに返送してください。故障部品を返送する場合は、届いた時の梱包箱に関連書類とともに入れてください。故障部品を返送しない場合、Hewlett Packard Enterprise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、Hewlett Packard Enterpriseは送料および部品返送費を全額負担し、使用する宅配便会社や運送会社を指定します。

客户自行维修

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

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

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

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

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

客戶自行維修

Hewlett Packard Enterprise 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，Hewlett Packard Enterprise (或 Hewlett Packard Enterprise 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 Hewlett Packard Enterprise 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 Hewlett Packard Enterprise 更換這些零件，Hewlett Packard Enterprise 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 Hewlett Packard Enterprise 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 Hewlett Packard Enterprise 零件沒有消費者可自行維修的設計。為符合客戶保固，Hewlett Packard Enterprise 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 Hewlett Packard Enterprise 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，Hewlett Packard Enterprise 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 Hewlett Packard Enterprise，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 Hewlett Packard Enterprise。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，Hewlett Packard Enterprise 可能要向您收取替換費用。針對客戶自行維修情形，Hewlett Packard Enterprise 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 Hewlett Packard Enterprise 的 CSR 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 Hewlett Packard Enterprise 的 CSR 網站 [selfrepair](http://www.hpe.com/support/selfrepair) (<http://www.hpe.com/support/selfrepair>)。

고객 셀프 수리

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

- 필수 - 고객 셀프 수리가 의무 사항인 필수 부품. 사용자가 Hewlett Packard Enterprise에 이 부품의 교체를 요청할 경우 이 서비스에 대한 출장비 및 작업비가 청구됩니다.
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CSR 부품은 재고 상태와 지리적 조건이 허용하는 경우 다음 영업일 납품이 가능하도록 배송이 이루어집니다. 지리적 조건이 허용하는 경우 추가 비용이 청구되는 조건으로 당일 또는 4시간 배송이 가능할 수도 있습니다. 도움이 필요하시면 Hewlett Packard Enterprise Support Center로 전화하십시오. 전문 기술자가 전화로 도움을 줄 것입니다. Hewlett Packard Enterprise는 결함이 발생한 부품을 Hewlett Packard Enterprise로 반환해야 하는지 여부를 CSR 교체 부품과 함께 배송된 자료에 지정합니다. 결함이 발생한 부품을 Hewlett Packard Enterprise로 반환해야 하는 경우에는 지정된 기간 내(통상 영업일 기준 5일)에 Hewlett Packard Enterprise로 반환해야 합니다. 이때 결함이 발생한 부품은 제공된 포장 재료에 넣어 관련 설명서와 함께 반환해야 합니다. 결함이 발생한 부품을 반환하지 않는 경우 Hewlett Packard Enterprise가 교체 부품에 대해 비용을 청구할 수 있습니다. 고객 셀프 수리의 경우, Hewlett Packard Enterprise는 모든 운송 및 부품 반환 비용을 부담하며 이용할 운송업체 및 택배 서비스를 결정합니다.

Hewlett Packard Enterprise CSR 프로그램에 대한 자세한 내용은 가까운 서비스 제공업체에 문의하십시오. 북미 지역의 프로그램에 대해서는 Hewlett Packard Enterprise CSR 웹사이트(<http://www.hpe.com/support/selfrepair>)를 참조하십시오.

Remote support

Remote support is available with supported devices as part of your warranty or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which will initiate a fast and accurate resolution based on your product's service level. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

For more information and device support details, go to the Insight Remote Support website (<http://www.hpe.com/info/insightremotesupport/docs>).

Documentation feedback

Hewlett Packard Enterprise is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback ([**mailto:docsfeedback@hpe.com**](mailto:docsfeedback@hpe.com)). When submitting your feedback, include the document title, part number, edition, and publication date located on the front cover of the document. For online help content, include the product name, product version, help edition, and publication date located on the legal notices page.

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

DDDC

Double Device Data Correction

ESD

electrostatic discharge

FBWC

flash-backed write cache

HPE SSA

HPE Smart Storage Administrator

IEC

International Electrotechnical Commission

iLO 4

Integrated Lights-Out 4

IML

Integrated Management Log

KVM

keyboard, video, and mouse

NVRAM

nonvolatile memory

ORCA

Option ROM Configuration for Arrays

PCIe

Peripheral Component Interconnect Express

PCI-X

peripheral component interconnect extended

PDU

power distribution unit

PID

port ID

POST

Power-On Self Test

QPI

QuickPath Interconnect

RAS

Reliability, Availability, Serviceability

RBSU

ROM-Based Setup Utility

SAS

serial attached SCSI

SD

Secure Digital

SDDC

Single Device Data Correction

SFF

small form factor

SIM

Systems Insight Manager

SMI

Scalable memory interfaces

SPI

system peripheral interface

SPP

Service Pack for ProLiant

TMRA

recommended ambient operating temperature

TPM

Trusted Platform Module

UEFI

Unified Extensible Firmware Interface

UID

unit identification

UPS

uninterruptible power system

USB

universal serial bus

VCA

Version Control Agent

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