



**Hewlett Packard  
Enterprise**

# **HPE ProLiant DL380 Gen10 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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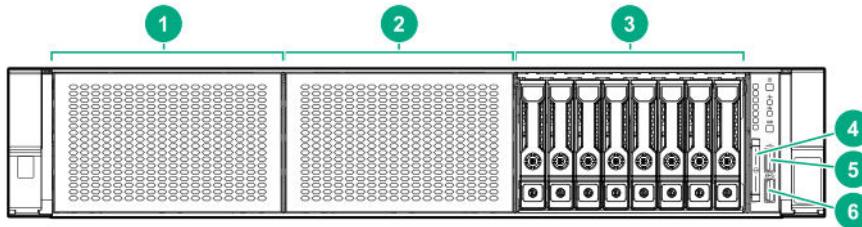
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# Component identification

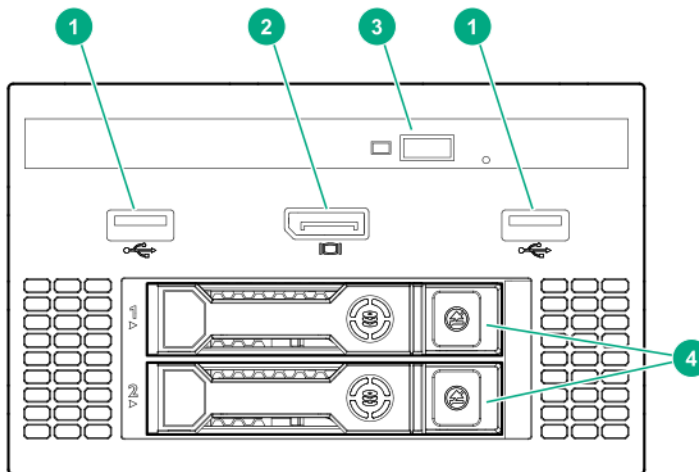
## Front panel components

### SFF front panel components



Item	Description
1	Box 1 (optional drives or <b>universal media bay</b> )
2	Box 2 (optional drives)
3	Box 3 Drives 1-8
4	Serial label pull tab or optional <b>Systems Insight Display</b>
5	iLO service port
6	USB 3.0 port

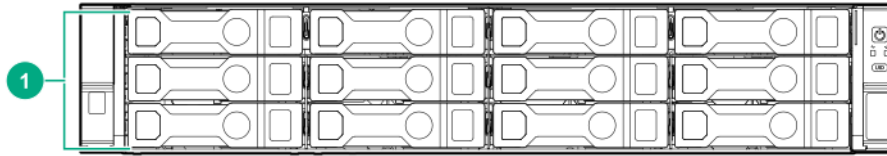
### Universal media bay components



Item	Description
1	USB 2.0 port
2	Video display port
3	Optical disk drive (optional)
4	Drives (optional)



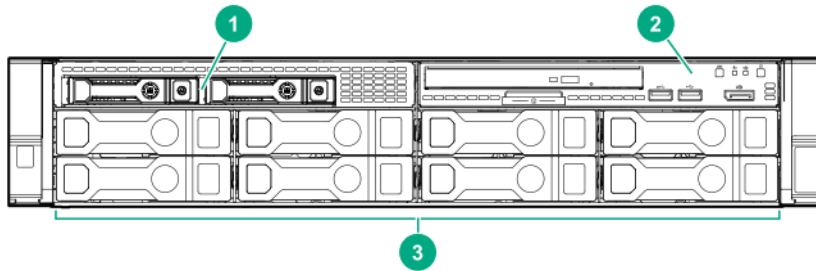
## 12-drive LFF front panel components



Item	Description
------	-------------

1	Drive bays
---	------------

## 8-drive LFF model front panel components



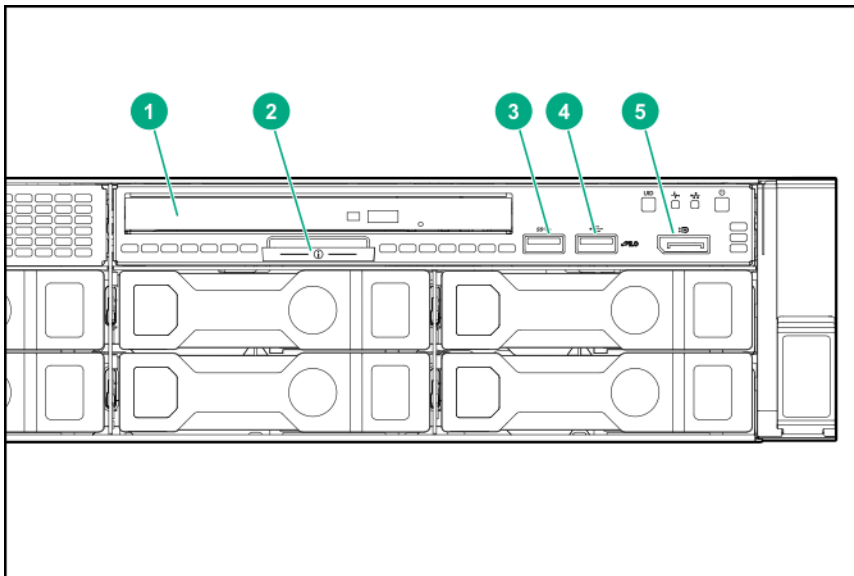
Item	Description
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1	Drives (optional)
---	-------------------

2	<b>LFF power switch module</b>
---	--------------------------------

3	Drive bays
---	------------

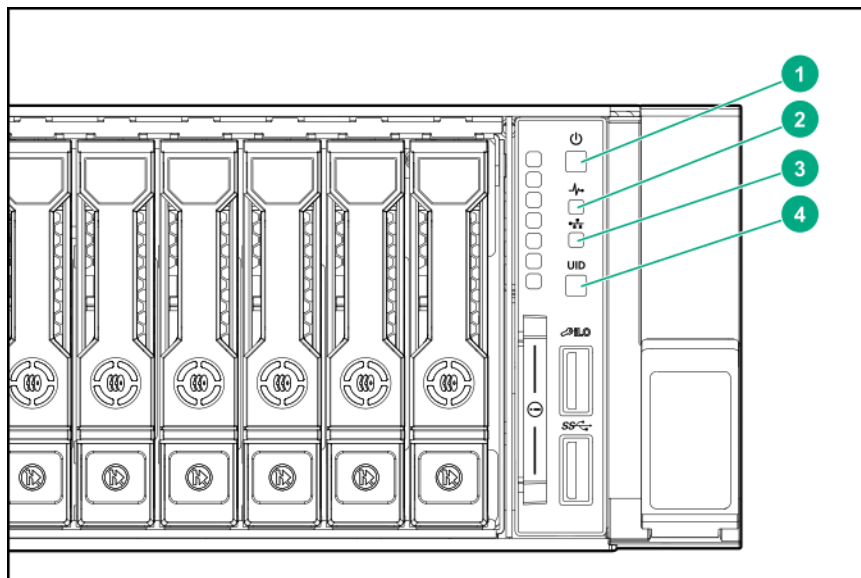
## LFF power switch module components



Item	Description
1	Optical disk drive
2	Serial label pull tab
3	USB 3.0 port
4	iLO service port
5	Video display port

## Front panel LEDs and buttons

### SFF front panel LEDs and button



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 green (1 Hz/cycle per sec) = iLO is rebooting Flashing amber = System degraded Flashing red (1 Hz/cycle per sec) = System critical**

*Table Continued*

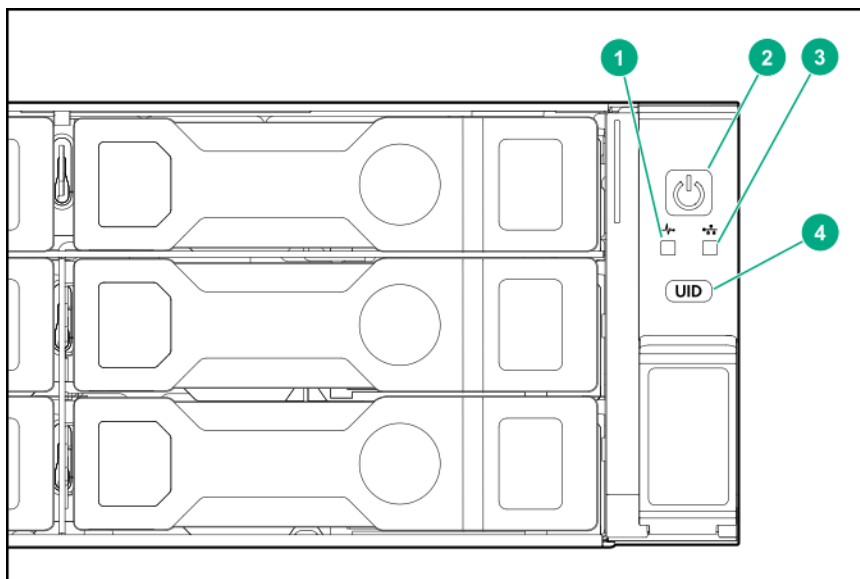
Item	Description	Status
3	NIC status LED*	Solid green = Link to network Flashing green (1 Hz/cycle per sec) = Network active Off = No network activity
4	UID button/LED*	Solid blue = Activated Flashing blue: <ul style="list-style-type: none"> <li>• 1 Hz/cycle per sec = Remote management or firmware upgrade in progress</li> <li>• 4 Hz/cycle per sec = iLO manual reboot sequence initiated</li> <li>• 8 Hz/cycle per sec = iLO manual reboot sequence in progress</li> </ul> Off = Deactivated

\*When all four LEDs described in this table flash simultaneously, a power fault has occurred. For more information, see "**Power fault LEDs.**"

\*\*If the health LED indicates a degraded or critical state, review the system IML or use iLO to review the system health status.

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

#### LFF 12-drive model front panel LEDs and button



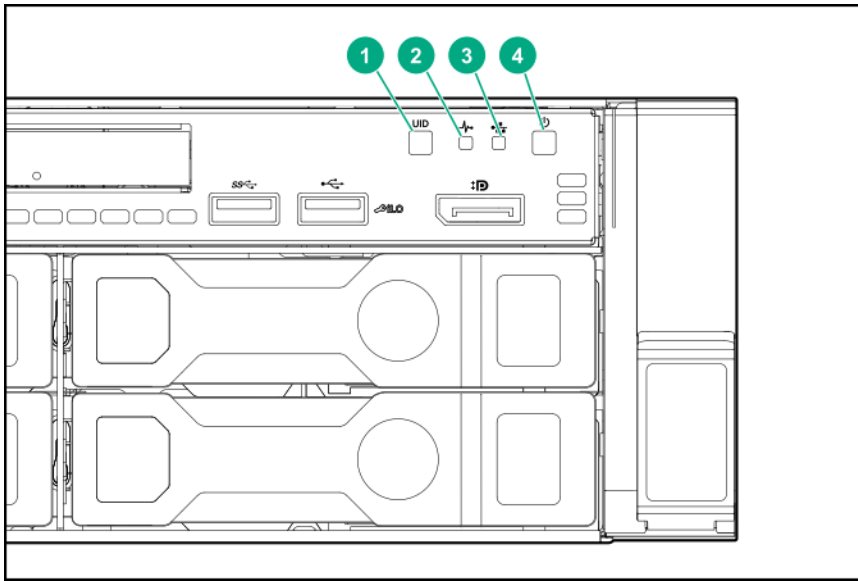
Item	Description	Status
1	Health LED*	Solid green = Normal Flashing green (1 Hz/cycle per sec) = iLO is rebooting Flashing amber = System degraded Flashing red (1 Hz/cycle per sec) = System critical**
2	Power On/Standby button and system power LED*	Solid green = System on Flashing green (1 Hz/cycle per sec) = Performing power on sequence Solid amber = System in standby Off = No power present†
3	NIC status LED*	Solid green = Link to network Flashing green (1 Hz/cycle per sec) = Network active Off = No network activity
4	UID button/LED*	Solid blue = Activated Flashing blue: <ul style="list-style-type: none"> <li>• 1 Hz/cycle per sec = Remote management or firmware upgrade in progress</li> <li>• 4 Hz/cycle per sec = iLO manual reboot sequence initiated</li> <li>• 8 Hz/cycle per sec = iLO manual reboot sequence in progress</li> </ul> Off = Deactivated

\*When all four LEDs described in this table flash simultaneously, a power fault has occurred. For more information, see "**Power fault LEDs.**"

\*\*If the health LED indicates a degraded or critical state, review the system IML or use iLO to review the system health status.

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

## LFF power switch module LEDs and button



Item	Description	Status
1	UID button/LED*	<p>Solid blue = Activated</p> <p>Flashing blue:</p> <ul style="list-style-type: none"> <li>• 1 Hz/cycle per sec = Remote management or firmware upgrade in progress</li> <li>• 4 Hz/cycle per sec = iLO manual reboot sequence initiated</li> <li>• 8 Hz/cycle per sec = iLO manual reboot sequence in progress</li> </ul> <p>Off = Deactivated</p>
2	Health LED*	<p>Solid green = Normal</p> <p>Flashing green (1 Hz/cycle per sec) = iLO is rebooting</p> <p>Flashing amber = System degraded</p> <p>Flashing red (1 Hz/cycle per sec) = System critical**</p>
3	NIC status LED*	<p>Solid green = Link to network</p> <p>Flashing green (1 Hz/cycle per sec) = Network active</p> <p>Off = No network activity</p>
4	Power On/Standby button and system power LED*	<p>Solid green = System on</p> <p>Flashing green (1 Hz/cycle per sec) = Performing power on sequence</p> <p>Solid amber = System in standby</p> <p>Off = No power present†</p>

\*When all four LEDs described in this table flash simultaneously, a power fault has occurred. For more information, see "[Power fault LEDs](#)."

\*\*If the health LED indicates a degraded or critical state, review the system IML or use iLO to review the system health status.

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

## UID button functionality

The UID button can be used to display the HPE ProLiant Pre-boot Health Summary when the server will not power on. For more information, see the latest *HPE iLO User Guide* on the [Hewlett Packard Enterprise website](#).

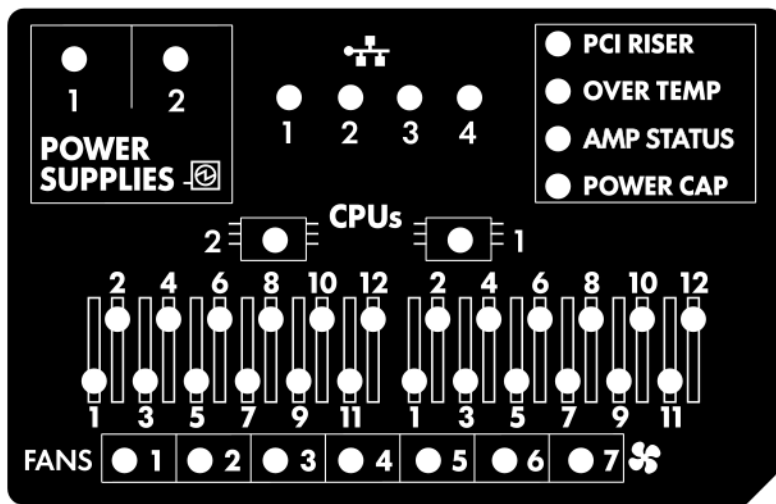
## Front panel LED power fault codes

The following table provides a list of power fault codes, and the subsystems that are affected. Not all power faults are used by all servers.

Subsystem	LED behavior
System board	1 flash
Processor	2 flashes
Memory	3 flashes
Riser board PCIe slots	4 flashes
FlexibleLOM	5 flashes
Removable HPE Smart Array SR Gen10 controller	6 flashes
System board PCIe slots	7 flashes
Power backplane or storage backplane	8 flashes
Power supply	9 flashes

## Systems Insight Display LEDs

The Systems Insight Display LEDs represent the system board layout. The display enables diagnosis with the access panel installed.



Description	Status
Processor LEDs	Off = Normal Amber = Failed processor
DIMM LEDs	Off = Normal Amber = Failed DIMM or configuration issue
Fan LEDs	Off = Normal Amber = Failed fan or missing fan
NIC LEDs	Off = No link to network Solid green = Network link Flashing green = Network link with activity If power is off, the front panel LED is not active. For status, see <b>Rear panel LEDs</b> on page 18.
Power supply LEDs	Off = Normal Solid amber = Power subsystem degraded, power supply failure, or input power lost.
PCI riser LED	Off = Normal Amber = Incorrectly installed PCI riser cage
Over temp LED	Off = Normal Amber = High system temperature detected

*Table Continued*

Description	Status
Amp Status LED	Off = AMP modes disabled Solid green = AMP mode enabled Solid amber = Failover Flashing amber = Invalid configuration
Power cap LED	Off = System is in standby, or no cap is set. Solid green = Power cap applied

When the health LED on the front panel illuminates either amber or red, the server is experiencing a health event. For more information on the combination of these LEDs, see **Systems Insight Display combined LED descriptions** on page 16).

## Systems Insight Display combined LED descriptions

The combined illumination of the following LEDs indicates a system condition:

- Systems Insight Display LEDs
- System power LED
- Health LED

Systems Insight Display LED and color	Health LED	System power LED	Status
Processor (amber)	Red	Amber	One or more of the following conditions may exist: <ul style="list-style-type: none"> <li>• Processor in socket X has failed.</li> <li>• Processor X is not installed in the socket.</li> <li>• Processor X is unsupported.</li> <li>• ROM detects a failed processor during POST.</li> </ul>
Processor (amber)	Amber	Green	Processor in socket X is in a pre-failure condition.
DIMM (amber)	Red	Green	One or more DIMMs have failed.
DIMM (amber)	Amber	Green	DIMM in slot X is in a pre-failure condition.
Over temp (amber)	Amber	Green	The Health Driver has detected a cautionary temperature level.
Over temp (amber)	Red	Amber	The server has detected a hardware critical temperature level.

*Table Continued*



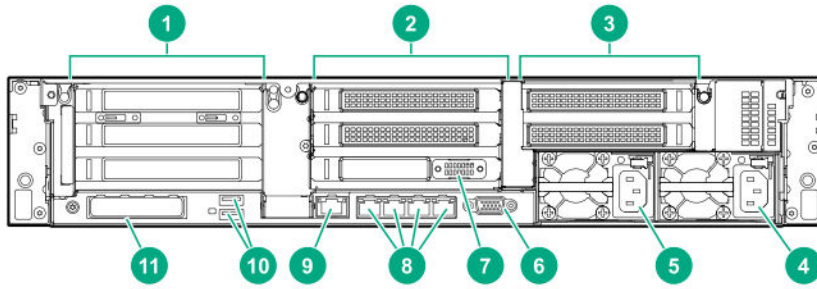
Systems Insight Display LED and color	Health LED	System power LED	Status
PCI riser (amber)	Red	Green	The PCI riser cage is not seated properly.
Fan (amber)	Amber	Green	One fan has failed or has been removed.
Fan (amber)	Red	Green	Two or more fans have failed or been removed.
Power supply (amber)	Red	Amber	One or more of the following conditions may exist: <ul style="list-style-type: none"> <li>• Only one power supply is installed and that power supply is in standby.</li> <li>• Power supply fault</li> <li>• System board fault</li> </ul>
Power supply (amber)	Amber	Green	One or more of the following conditions may exist: <ul style="list-style-type: none"> <li>• Redundant power supply is installed and only one power supply is functional.</li> <li>• AC power cord is not plugged into redundant power supply.</li> <li>• Redundant power supply fault</li> <li>• Power supply mismatch at POST or power supply mismatch through hot-plug addition</li> </ul>
Power cap (off)	—	Amber	Standby
Power cap (green)	—	Flashing green	Waiting for power
Power cap (green)	—	Green	Power is available.
Power cap (flashing amber)	—	Amber	Power is not available.



**IMPORTANT:**

If more than one DIMM slot LED is illuminated, further troubleshooting is required. Test each bank of DIMMs by removing all other DIMMs. Isolate the failed DIMM by replacing each DIMM in a bank with a known working DIMM.

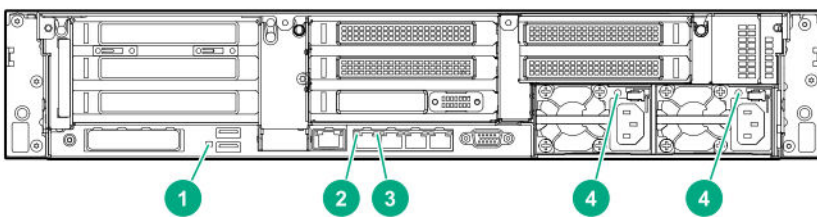
# Rear panel components



Item	Description
1	Primary riser slots 1-3 (Optional drive cage)
2	Optional riser slots 4-6 (Optional drive cage)
3	Optional riser slots 7-8 (Optional drive cage)
4	Power supply 1
5	Power supply 2
6	Video port
7	Serial port (optional)*
8	1Gb RJ-45 ports 1-4
9	iLO management port
10	USB 3.0 ports
11	FlexibleLOM slot

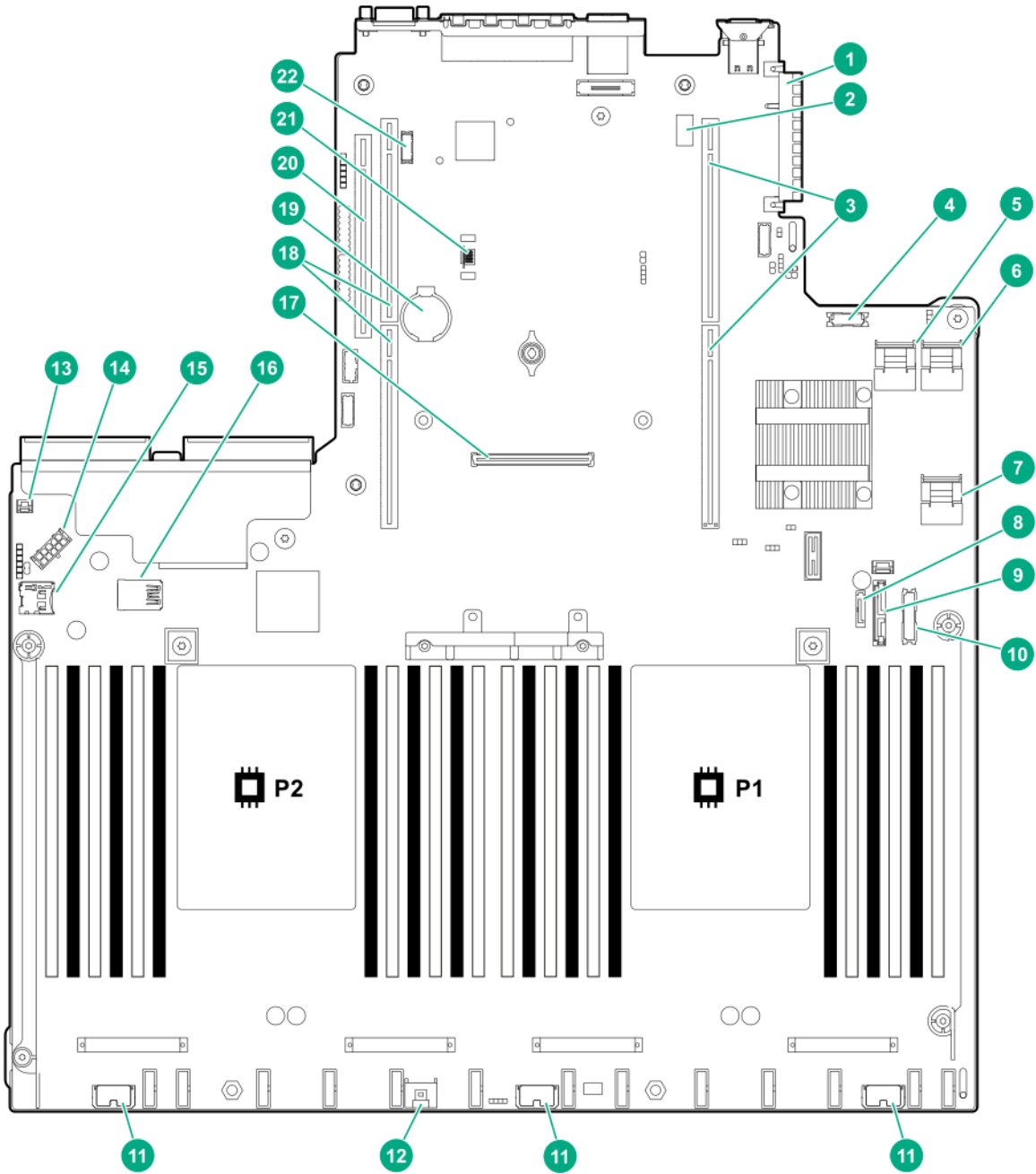
\*When a tertiary riser cage is installed as shown, the serial port can installed in riser slot 6.

# Rear panel LEDs



<b>Item</b>	<b>Description</b>	<b>Status</b>
1	UID LED	Off = Deactivated Solid blue = Activated Flashing blue = System being managed remotely
2	Link LED	Off = No network link Green = Network link
3	Activity LED	Off = No network activity Solid green = Link to network Flashing green = Network activity
4	Power supply LEDs	Off = System is off or power supply has failed. Solid green = Normal

# System board components



Item	Description
1	FlexibleLOM connector
2	System maintenance switch
3	Primary PCIe riser connector
4	Front display port/USB 2.0 connector

*Table Continued*

Item	Description
5	x4 SATA port 1
6	x4 SATA port 2
7	x2 SATA port 3
8	x1 SATA port 4
9	Optical disk drive/SATA port 5
10	Front power/USB 3.0 connector
11	Drive backplane power connectors
12	Smart Storage Battery connector
13	Chassis intrusion detection connector
14	Drive backplane power connector
15	Micro SD card slot
16	Dual internal USB 3.0 ports
17	Type-a Smart Array connector
18	Secondary PCIe riser connector*
19	System battery
20	Tertiary PCIe riser connector*
21	TPM connector
22	Serial port connector (optional)

\* Requires a second processor

## System maintenance switch descriptions

Position	Default	Function
S1 <sup>1</sup>	Off	Off = iLO security is enabled. On = iLO security is disabled.
S2	Off	Off = System configuration can be changed. On = System configuration is locked.
S3	Off	Reserved
S4	Off	Reserved
S5 <sup>1</sup>	Off	Off = Power-on password is enabled. On = Power-on password is disabled.
S6 <sup>1, 2, 3</sup>	Off	Off = No function On = Restore default manufacturing settings

*Table Continued*

Position	Default	Function
S7	Off	Off = Set default boot mode to UEFI. On = Set default boot mode to legacy.
S8	—	Reserved
S9	—	Reserved
S10	—	Reserved
S11	—	Reserved
S12	—	Reserved

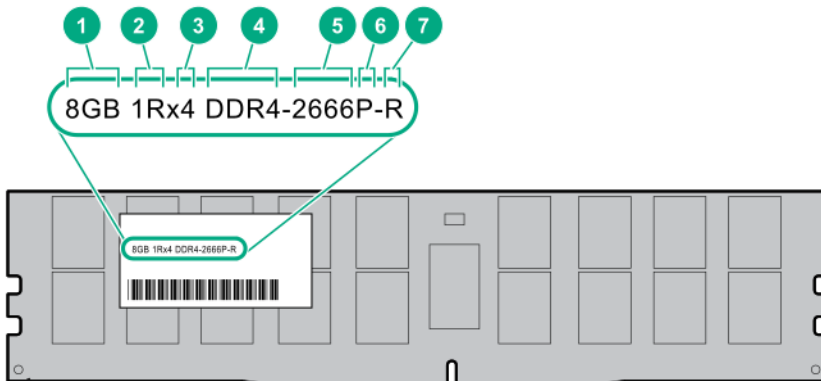
<sup>1</sup> To access the redundant ROM, set S1, S5, and S6 to On.

<sup>2</sup> When the system maintenance switch position 6 is set to the On position, the system is prepared to restore all configuration settings to their manufacturing defaults.

<sup>3</sup> When the system maintenance switch position 6 is set to the On position and Secure Boot is enabled, some configurations cannot be restored. For more information, see **Secure Boot** on page 160.

## DIMM label identification

To determine DIMM characteristics, see the label attached to the DIMM. The information in this section helps you to use the label to locate specific information about the DIMM.

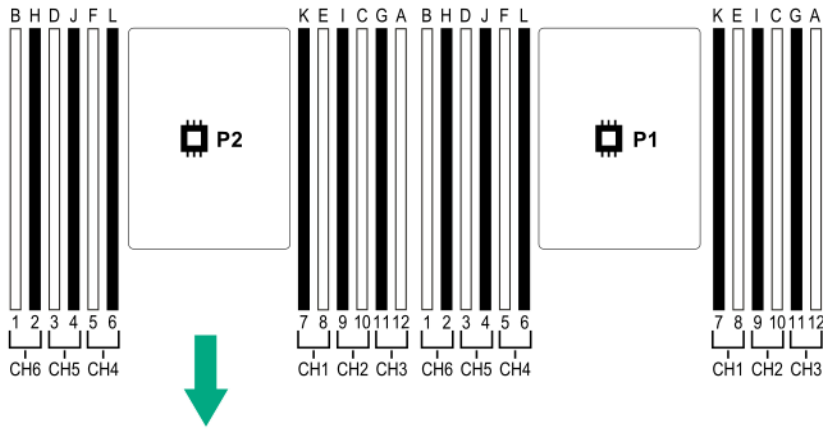


Item	Description	Definition
1	Capacity	8 GB 16 GB 32 GB 64 GB 128 GB
2	Rank	1R = Single rank 2R = Dual rank 4R = Quad rank 8R = Octal rank
3	Data width on DRAM	x4 = 4-bit x8 = 8-bit x16 = 16-bit
4	Memory generation	PC4 = DDR4
5	Maximum memory speed	2133 MT/s 2400 MT/s 2666 MT/s
6	CAS latency	P = CAS 15-15-15 T = CAS 17-17-17 U = CAS 20-18-18 V = CAS 19-19-19 (for RDIMM, LRDIMM) V = CAS 22-19-19 (for 3DS TSV LRDIMM)
7	DIMM type	R = RDIMM (registered) L = LRDIMM (load reduced) E = Unbuffered ECC (UDIMM)

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>).

## DIMM slot locations

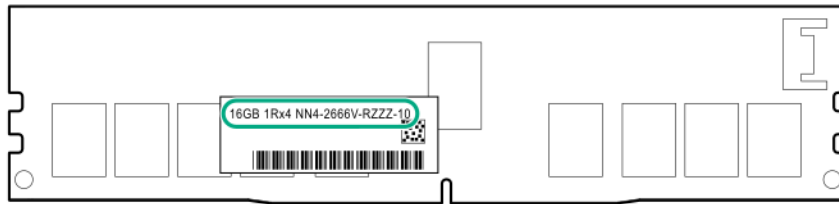
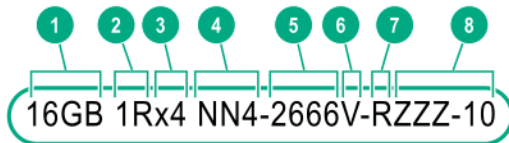
DIMM slots are numbered sequentially (1 through 12) for each processor. The supported AMP modes use the letter assignments for population guidelines.



## NVDIMM identification

The NVDIMM boards are blue instead of green. This change to the color makes it easier to distinguish the NVDIMMs from the DIMMs when installed.

To determine NVDIMM characteristics, see the full product description as shown in the following example:



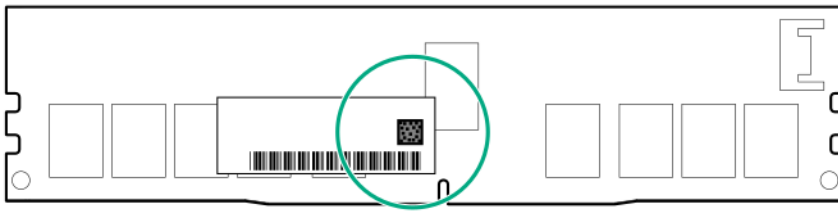
Item	Description	Definition
1	Capacity	16 GiB
2	Rank	1R (Single rank)
3	Data width per DRAM chip	x4 (4 bit)
4	Memory type	NN4=DDR4 NVDIMM-N
5	Maximum memory speed	2667 MT/s
6	Speed grade	V (latency 19-19-19)
7	DIMM type	RDIMM (registered)
8	Other	—

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

## NVDIMM 2D Data Matrix barcode

The 2D Data Matrix barcode is on the right side of the NVDIMM label and can be scanned by a cell phone or other device.



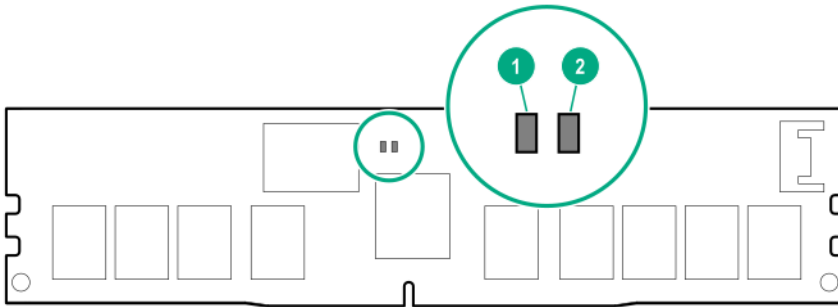


When scanned, the following information from the label can be copied to your cell phone or device:

- (P) is the module part number.
- (L) is the technical details shown on the label.
- (S) is the module serial number.

Example: (P)HMN82GR7AFR4N-VK (L)16GB 1Rx4 NN4-2666V-RZZZ-10(S)80AD-01-1742-11AED5C2

## NVDIMM LED identification



Item	LED description	LED color
1	Power LED	Green
2	Function LED	Blue

## NVDIMM-N LED combinations

State	Definition	NVDIMM-N Power LED (green)	NVDIMM-N Function LED (blue)
0	AC power is on (12 V rail) but the NVM controller is not working.	On	Off
1	AC power is on (12 V rail) and the NVM controller is read.	On	Off
2	AC power is off or the battery is off (12 V rail off).	On	Off

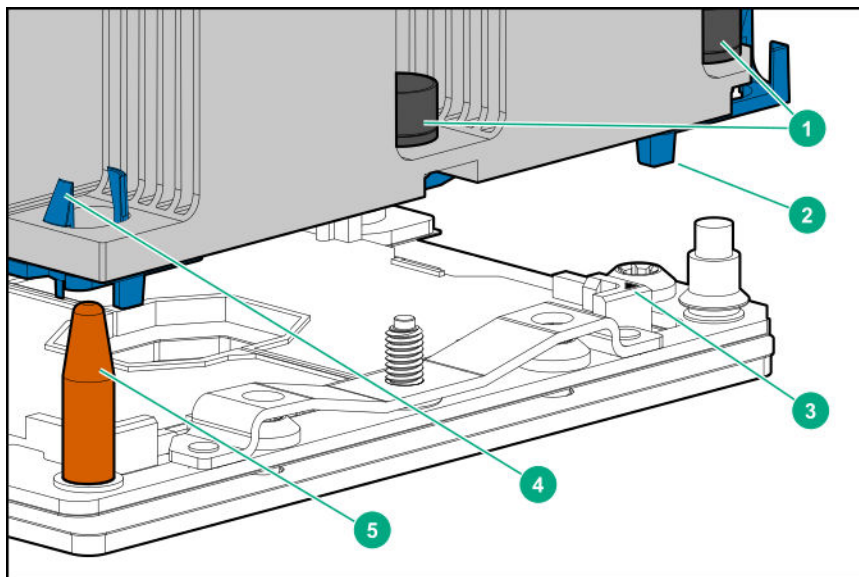
## NVDIMM Function LED patterns

For the purpose of this table, the NVDIMM-N LED operates as follows:

- Solid indicates that the LED remains in the on state.
- Flashing indicates that the LED is on for 2 seconds and off for 1 second.
- Fast-flashing indicates that the LED is on for 300 ms and off for 300 ms.

State	Definition	NVDIMM-N Function LED
0	The restore operation is in progress.	Flashing
1	The restore operation is successful.	Solid or On
2	Erase is in progress.	Flashing
3	The erase operation is successful.	Solid or On
4	The NVDIMM-N is armed, and the NVDIMM-N is in normal operation.	Solid or On
5	The save operation is in progress.	Flashing
6	The NVDIMM-N finished saving and battery is still turned on (12 V still powered).	Solid or On
7	The NVDIMM-N has an internal error or a firmware update is in progress. For more information about an NVDIMM-N internal error, see the IML.	Fast-flashing

## Processor, heatsink, and socket components

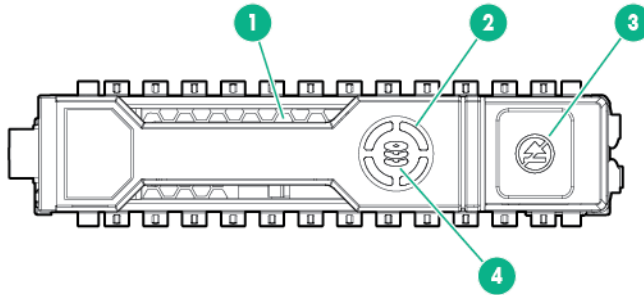


Item	Description
1	Heatsink nuts
2	Processor carrier
3	Pin 1 indicator <sup>1</sup>
4	Heatsink latch
5	Alignment post

<sup>1</sup> Symbol also on the processor and frame.

## Drives

### SAS/SATA drive components and LEDs



Item	Description	Status
1	Locate	<ul style="list-style-type: none"><li>• Solid blue = The drive is being identified by a host application.</li><li>• Flashing blue = The drive carrier firmware is being updated or requires an update.</li></ul>
2	Activity ring LED	<ul style="list-style-type: none"><li>• Rotating green = Drive activity.</li><li>• Off = No drive activity.</li></ul>

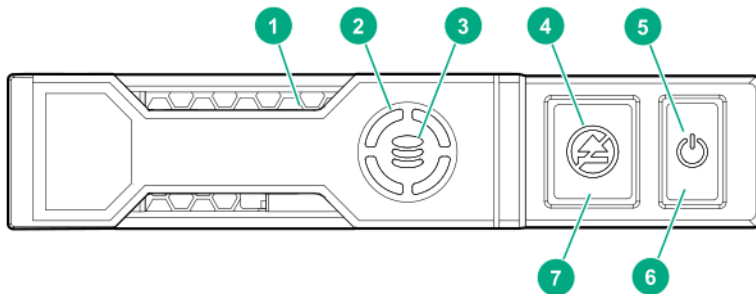
*Table Continued*

Item	Description	Status
3	Do not remove LED	<ul style="list-style-type: none"> <li>• Solid white = Do not remove the drive. Removing the drive causes one or more of the logical drives to fail.</li> <li>• Off = Removing the drive does not cause a logical drive to fail.</li> </ul>
4	Drive status LED	<ul style="list-style-type: none"> <li>• Solid green = The drive is a member of one or more logical drives.</li> <li>• Flashing green = The drive is rebuilding or performing a RAID migration, strip size migration, capacity expansion, or logical drive extension, or is erasing.</li> <li>• Flashing amber/green = The drive is a member of one or more logical drives and predicts the drive will fail.</li> <li>• Flashing amber = The drive is not configured and predicts the drive will fail.</li> <li>• Solid amber = The drive has failed.</li> <li>• Off = The drive is not configured by a RAID controller.</li> </ul>

## NVMe SSD components

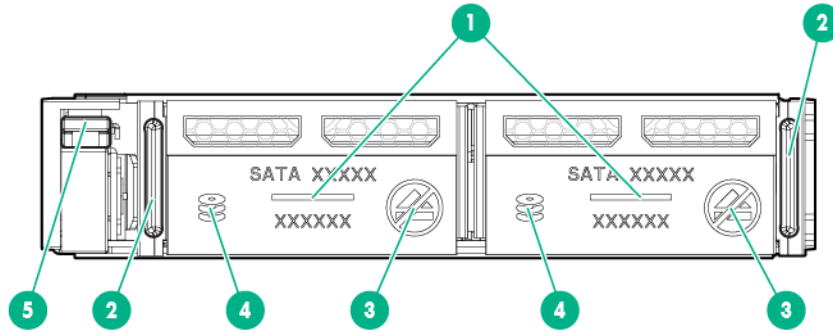
The NVMe SSD is a PCIe bus device. A device attached to a PCIe bus cannot be removed without allowing the device and bus to complete and cease the signal/traffic flow.

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



<b>Item</b>	<b>Description</b>	<b>Status</b>
1	Locate LED	<p>Solid blue = The drive is being identified by a host application.</p> <p>Flashing blue = The drive carrier firmware is being updated or requires an update.</p>
2	Activity ring LED	<p>Rotating green = Drive activity</p> <p>Off = No drive activity</p>
3	Drive status LED	<p>Solid green = The drive is a member of one or more logical drives.</p> <p>Flashing green = The drive is rebuilding or performing a RAID migration, stripe size migration, capacity expansion, or logical drive extension, or is erasing.</p> <p>Flashing amber/green = The drive is a member of one or more logical drives and predicts the drive will fail.</p> <p>Flashing amber = The drive is not configured and predicts the drive will fail.</p> <p>Solid amber = The drive has failed.</p> <p>Off = The drive is not configured by a RAID controller.</p>
4	Do Not Remove LED	<p>Solid white = Do not remove the drive. Drive must be ejected from the PCIe bus prior to removal.</p> <p>Flashing white = Ejection request pending</p> <p>Off = Drive has been ejected</p>
5	Power LED	<p>Solid green = Do not remove the drive. Drive must be ejected from the PCIe bus prior to removal.</p> <p>Flashing green = Ejection request pending</p> <p>Off = Drive has been ejected</p>
6	Power button	<p>Press to request PCIe ejection. Removal request can be denied by the:</p> <ul style="list-style-type: none"> <li>• RAID controller (one or more of the logical drives could fail)</li> <li>• Operating system</li> </ul>
7	Do not remove button	Press to open the release lever.

## uFF drive components and LEDs

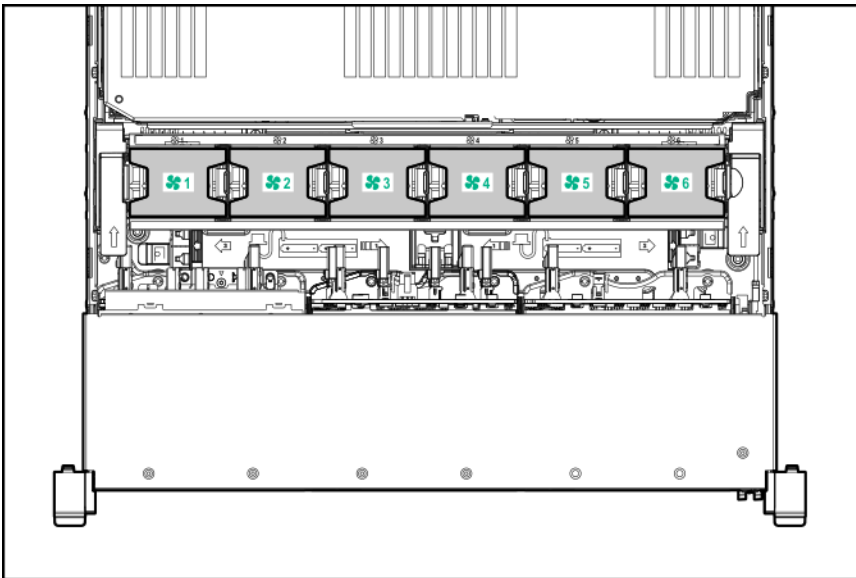


Item	Description	Status
1	Locate	<ul style="list-style-type: none"> <li>Off—Normal</li> <li>Solid blue—The drive is being identified by a host application</li> <li>Flashing blue—The drive firmware is being updated or requires an update</li> </ul>
2	uFF drive ejection latch	Removes the uFF drive when released
3	Do not remove LED	<ul style="list-style-type: none"> <li>Off—OK to remove the drive. Removing the drive does not cause a logical drive to fail.</li> <li>Solid white—Do not remove the drive. Removing the drive causes one or more of the logical drives to fail.</li> </ul>

*Table Continued*

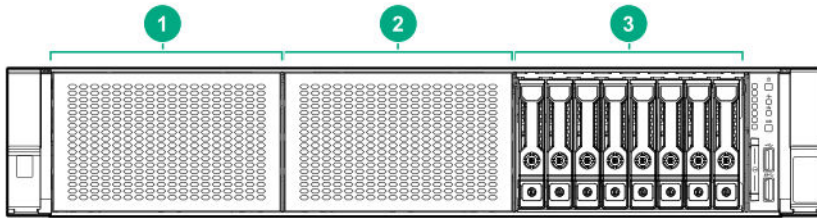
Item	Description	Status
4	Drive status LED	<ul style="list-style-type: none"> <li>• Off—The drive is not configured by a RAID controller</li> <li>• Solid green—The drive is a member of one or more logical drives</li> <li>• Flashing green (4 Hz)—The drive is operating normally and has activity</li> <li>• Flashing green (1 Hz)—The drive is rebuilding or performing a RAID migration, stripe size migration, capacity expansion, logical drive extension, or is erasing</li> <li>• Flashing amber/green (1 Hz)—The drive is a member of one or more logical drives that predicts the drive will fail</li> <li>• Solid amber—The drive has failed</li> <li>• Flashing amber (1 Hz)—The drive is not configured and predicts the drive will fail</li> </ul>
5	Adapter ejection release latch and handle	Removes the SFF flash adapter when released

## Fan bay numbering

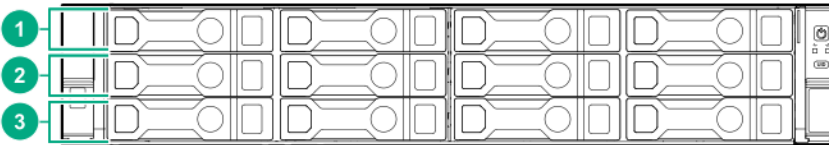


# Drive box identification

## Front boxes

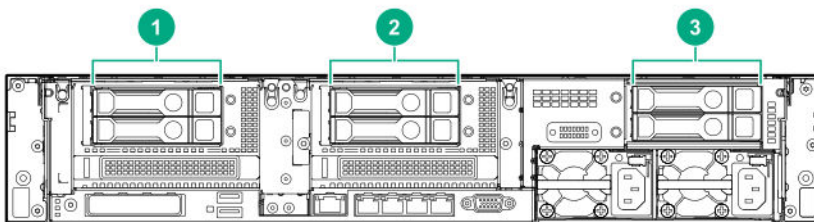


Item	Description
1	Box 1
2	Box 2
3	Box 3



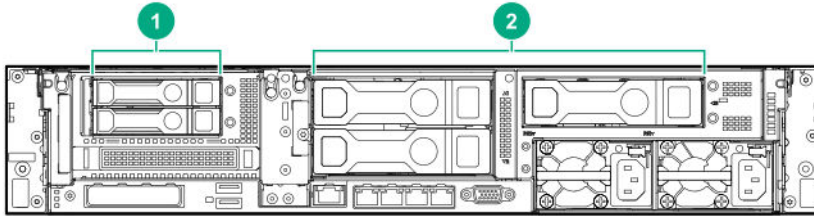
Item	Description
1	Box 1
2	Box 2
3	Box 3

## Rear boxes



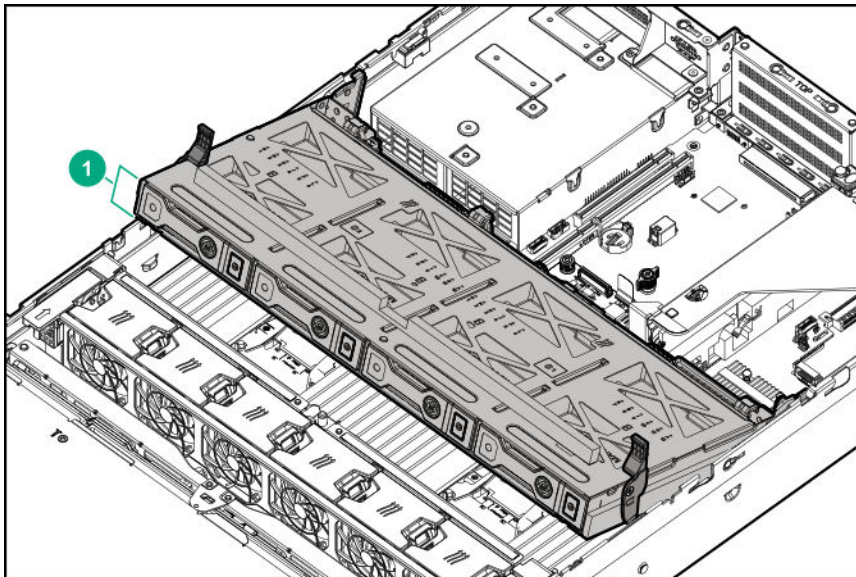
Item	Description
1	Box 4
2	Box 5
3	Box 6





Item	Description
1	Box 4
2	Box 6

### Midplane box (LFF only)



Item	Description
1	Box 7

## Drive bay numbering

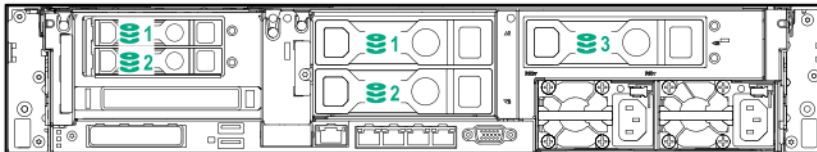
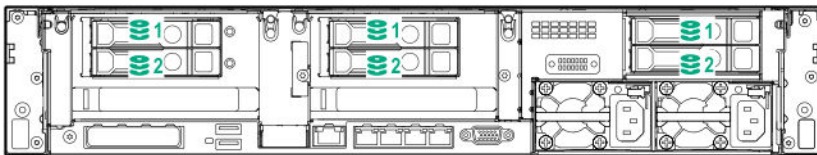
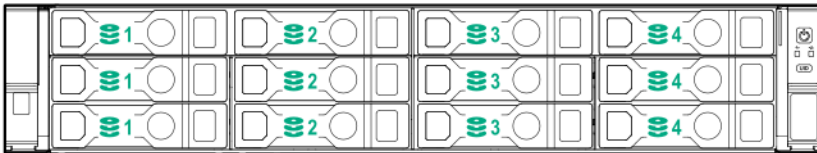
Drive bay numbering depends on how the drive backplanes are connected:

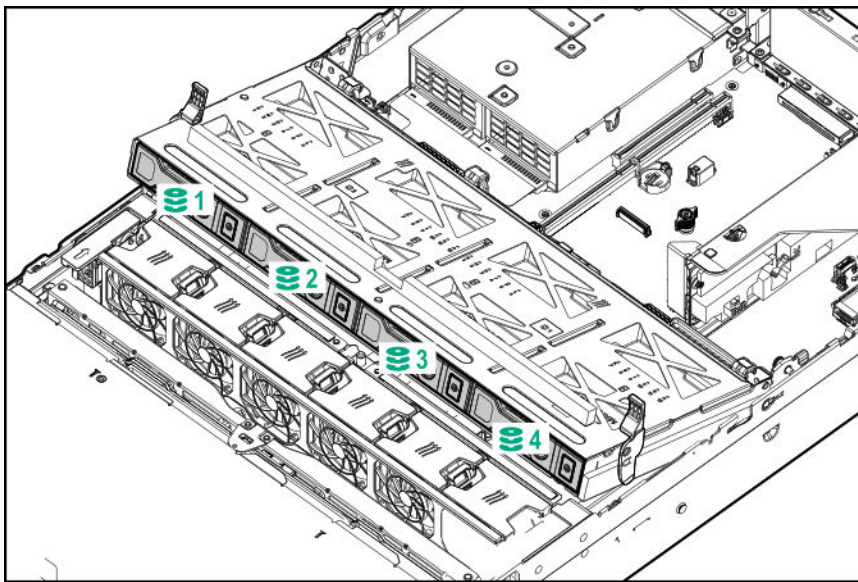
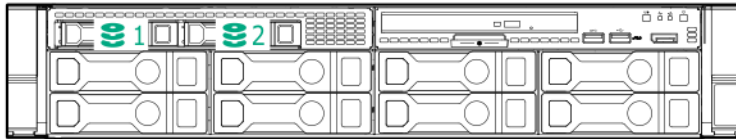
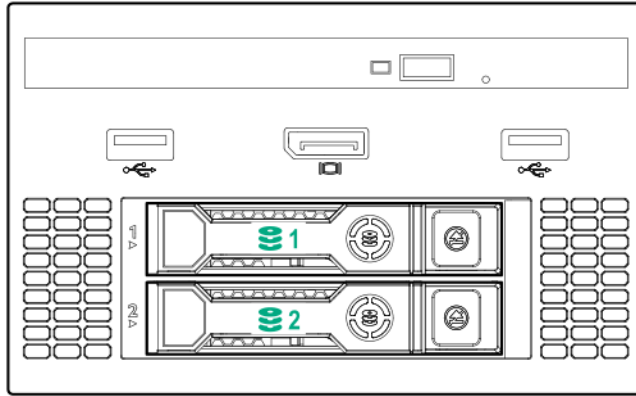
- To a controller
  - Embedded controllers use the onboard SATA ports.
  - Type-a controllers install to the type-a smart array connector.
  - Type-p controllers install to a PCIe riser.
- To a SAS expander
 

Installs in the primary or secondary PCIe riser

## Drive bay numbering: Smart Array controller

When the drive backplane is connected directly to a storage controller, then each drive box starts at 1. The following images are examples of common configurations.





## Drive bay numbering: SAS expander

Drive numbering through a SAS Expander is continuous.

- SAS expander port 1 always connects to port 1 of the controller.
- SAS expander port 2 always connects to port 2 of the controller.
- SAS expander port 3 = drive numbers 1-4.
- SAS expander port 4 = drive numbers 5-8.
- SAS expander port 5 = drive numbers 9-12.
- SAS expander port 6 = drive numbers 13-16.

- SAS expander port 7 = drive numbers 17-20.
- SAS expander port 8 = drive numbers 21-24.
- SAS expander port 9 = drive numbers 25-28.

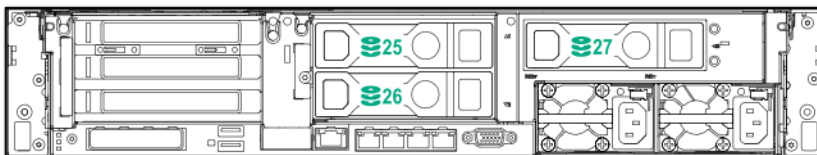
Common configuration examples:



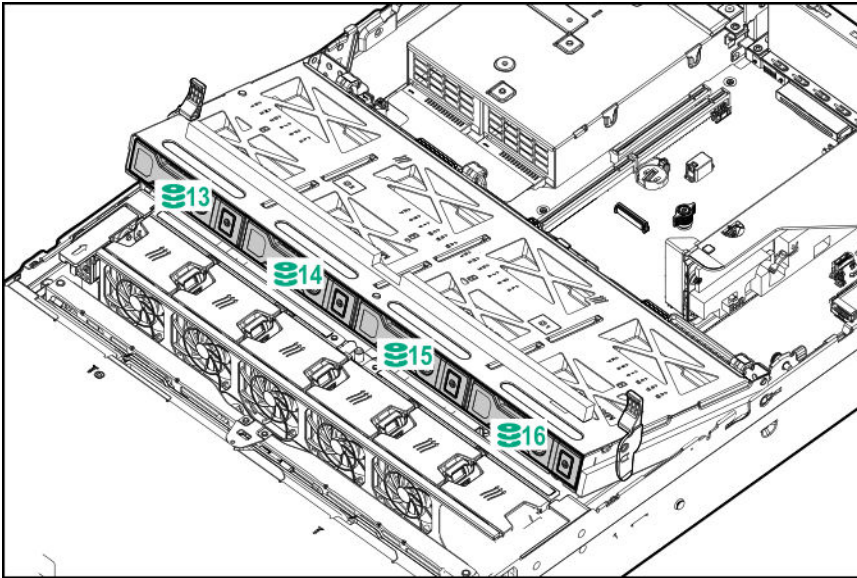
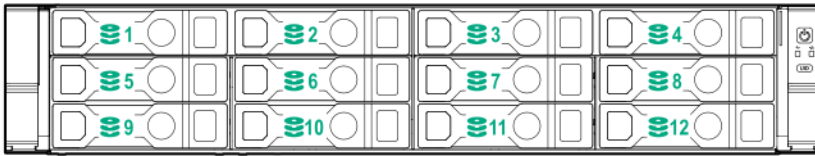
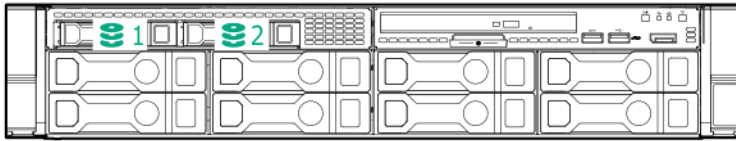
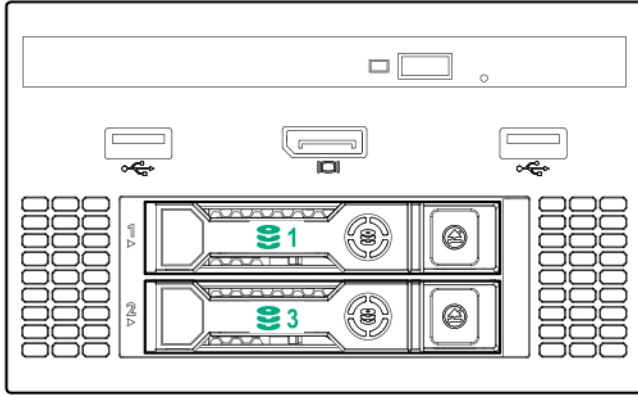
When any stacked 2SFF drive cage is connected to the SAS expander, the drive numbering skips the second number to allow **uFF drive bay numbering** on page 38. For example, when a rear 2SFF drive cage is connected to SAS expander port 9, then the drive numbers are 25 and 27.



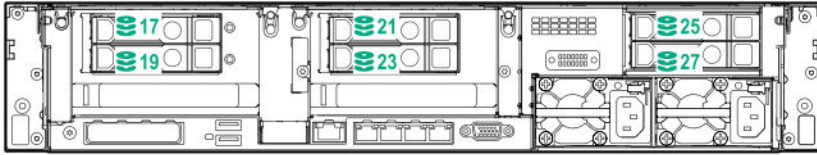
When the front 24SFF bays are populated, any installed rear 2SFF drives are always 25 and 27.



If a 2SFF drive cage is connected to SAS expander port 3, then the drive numbers are 1 and 3.

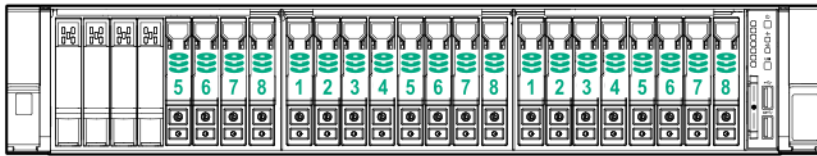


Front 12LFF + Midplane 4LFF + All rear 2SFF:



## Drive bay numbering: NVMe drives

If the server is populated with NVMe drives and NVMe risers:

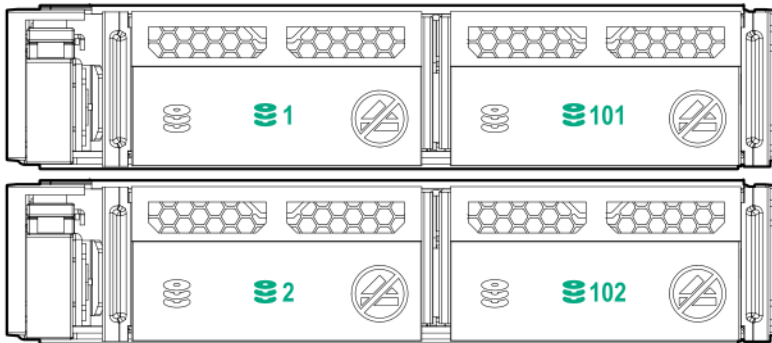


## uFF drive bay numbering

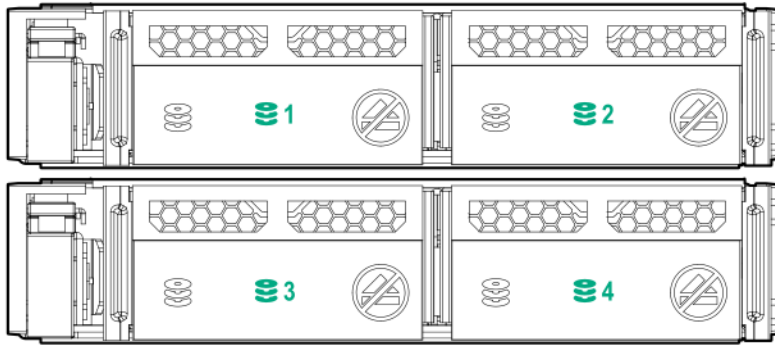
There are two uFF drives in each drive carrier.

If the drives are connected to a controller:

- The left bay = The default bay number of the server
- The right bay = The default bay number of the server + 100



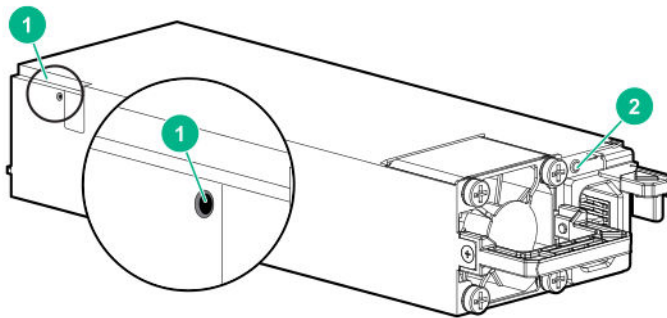
If the drives are connected to a SAS expander:



For example:

- If the drives are connected to port 3 of the SAS expander, then the uFF drives are 1-4.
- If the drives are connected to port 9 of the SAS expander, then the uFF drives are 25-28.

## HPE Flex Slot Power Supply with Integrated Battery Backup Unit components and LED



1. Battery check button
2. Power LED

For more information about the HPE Flex Slot Power Supply with Integrated Battery Backup Unit, see the document that ships with the component.

The label on the component indicates that the flex slot power supply has an integrated battery back up module.

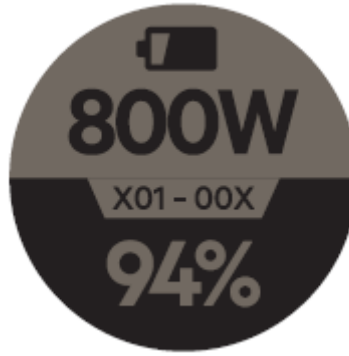


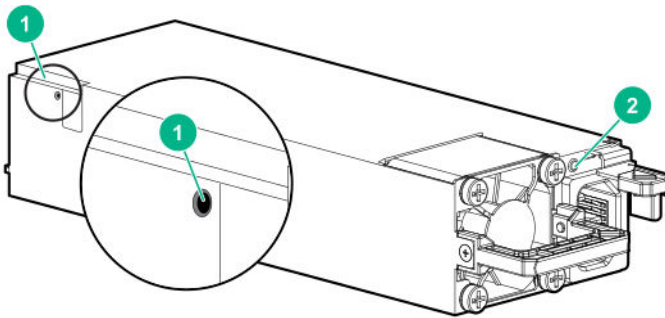
Figure 1: HPE Flex Slot Power Supply with Integrated Battery Backup Unit label

## Checking the battery backup charge level

### Procedure

1. Using a ball tip pen, press and release the battery check button.

After releasing the button, you may have to wait up to seven seconds before the LED starts flashing.



2. Note the number of LED flashes and reference the following table.

Flashes	Battery State RSOC <sup>1</sup>
0	Battery bad/failed
1	RSOC ≤ 29%
2	30% ≤ RSOC ≤ 62%
3	63% ≤ RSOC ≤ 94%
4	95% ≤ RSOC

<sup>1</sup> Relative State of Charge

The battery will fully charge within one hour of being installed into the server.



# Operations

## Power up the server

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

- Press the Power On/Standby button.
- Use the virtual power button through iLO.

## Power down the server

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

---

 **IMPORTANT:**

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

---

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

- Press and release the Power On/Standby button.  
This method initiates a controlled shutdown of applications and the OS before the server enters standby mode.
- Press and hold the Power On/Standby button for more than 4 seconds to force the server to enter standby mode.  
This method forces the server to enter standby mode without properly exiting applications and the OS. If an application stops responding, you can use this method to force a shutdown.
- Use a virtual power button selection through iLO.  
This method initiates a controlled remote shutdown of applications and the OS before the server enters standby mode.

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

## Extend the server from the rack

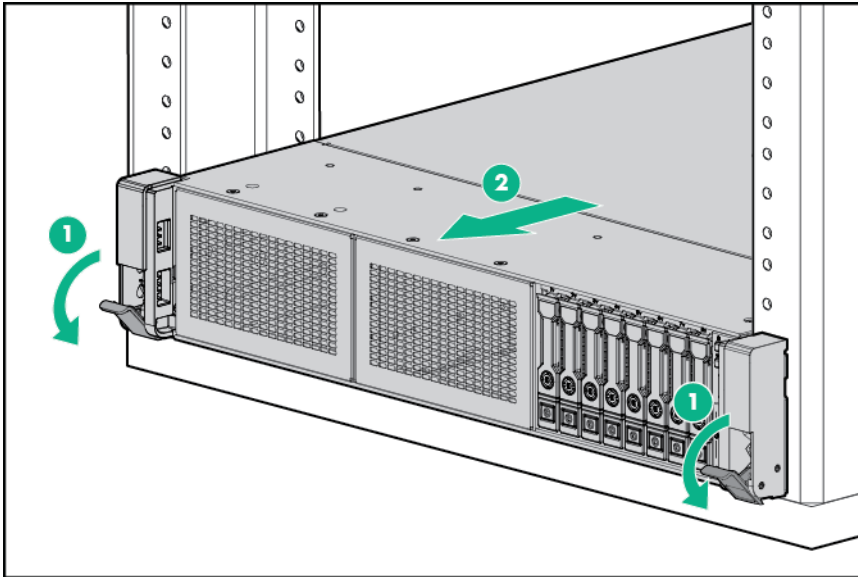
---

 **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.

---

1. Pull down the quick release levers on each side of the server.
2. Extend the server from the rack.



3. After performing the installation or maintenance procedure, slide the server back into the rack, and then press the server firmly into the rack to secure it in place.



**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.

## Extending the server from the rack

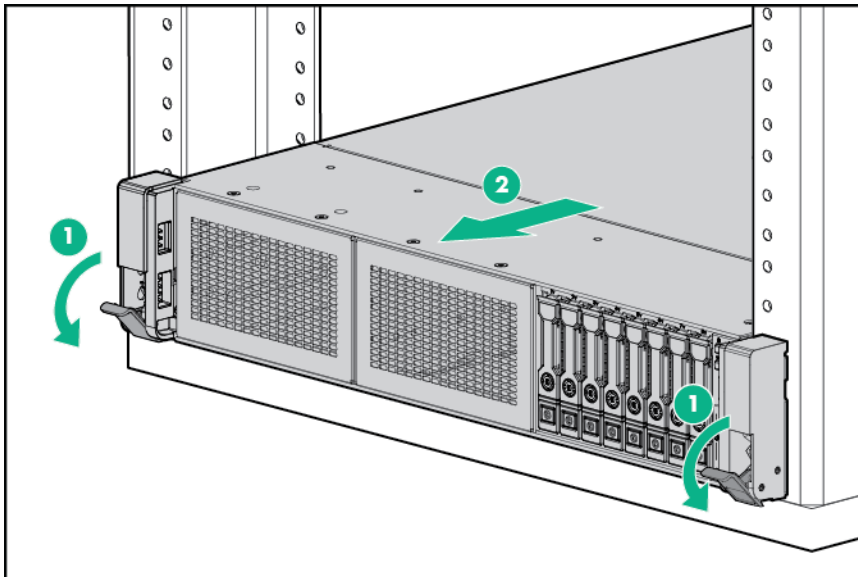


**WARNING:**

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

### Procedure

Pull down the quick release levers on each side of the server, and then extend the server from the rack.



## Removing the server from the rack

To remove the server from a Hewlett Packard Enterprise, Compaq-branded, Telco, or third-party rack:

### Procedure

1. **Power down the server.**
2. **Extend the server from the rack.**
3. Disconnect the cabling and remove the server from the rack.  
For more information, see the documentation that ships with the rack mounting option.
4. Place the server on a sturdy, level surface.

## Installing the server into the rack

### Procedure

1. Observe the following alert:



#### **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.

---

2. Install the server and cable management arm into the rack. For more information, see the installation instructions that ship with the rack rail system.
  3. Connect peripheral devices to the server. For information on identifying connectors, see "**Rear panel components.**"
- 

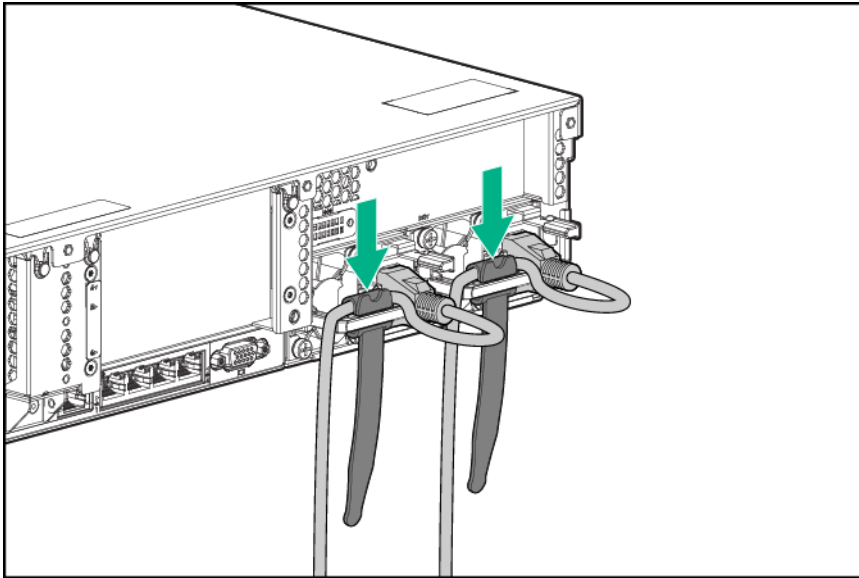


#### **WARNING:**

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

---

4. Connect the power cord to the rear of the server.
5. Install the power cord anchors.

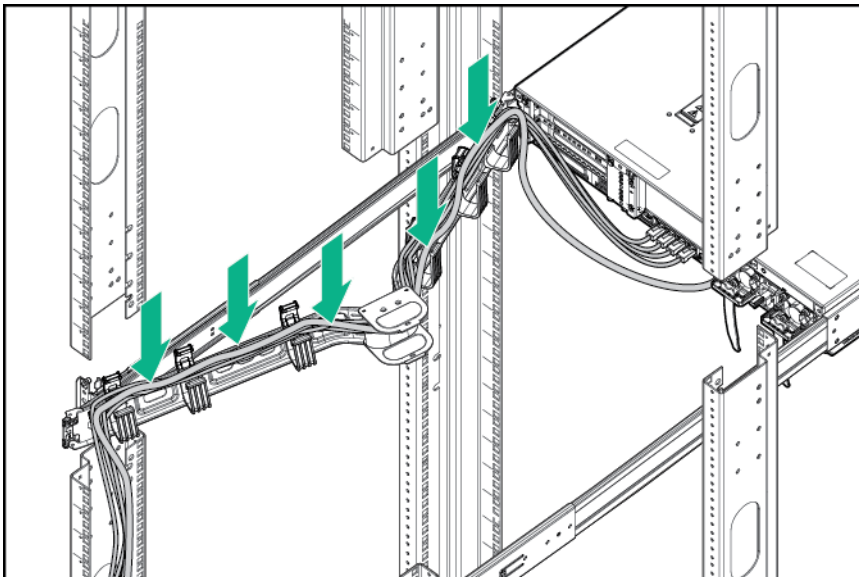


6. Secure the cables to the cable management arm.



**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.



7. Connect the power cord to the AC power source.

**WARNING:**

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

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
  - Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
  - Unplug the power cord from the power supply to disconnect power to the equipment.
  - Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the server.
- 

## 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:

**Procedure**

1. **Power down the server.**
2. **Extend the server from the rack.**
3. Open or unlock the locking latch, slide the access panel to the rear of the chassis, and remove the access panel.

## Installing the access panel

**Procedure**

1. Place the access panel on top of the server with the latch open.  
Allow the panel to extend past the rear of the server approximately 1.25 cm (0.5 in).
2. Push down on the latch.  
The access panel slides to a closed position.
3. Tighten the security screw on the latch, if needed.

# Removing the fan cage

**⚠ CAUTION:**

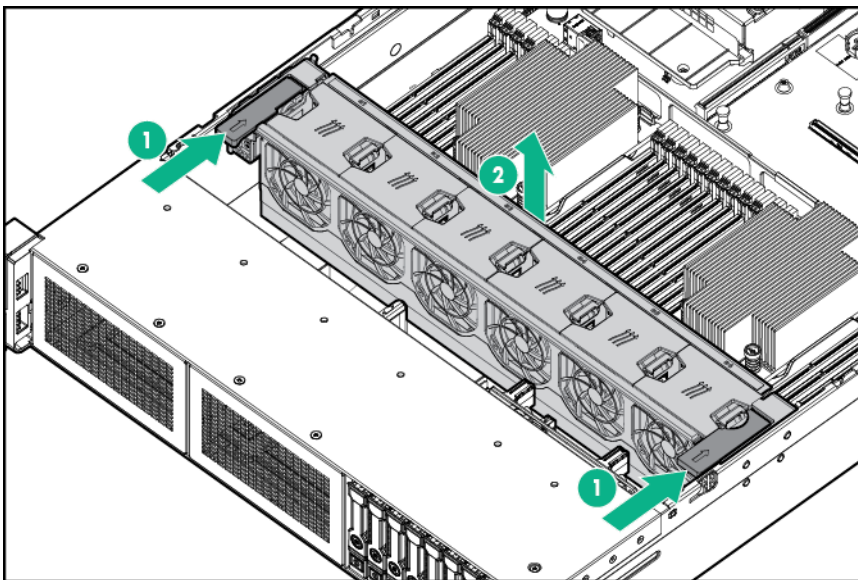
Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

**⚠ IMPORTANT:**

For optimum cooling, install fans in all primary fan locations.

## Procedure

1. **Power down the server.**
2. Do one of the following:
  - Disconnect each power cord from the power source.
  - Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. Remove the fan cage.



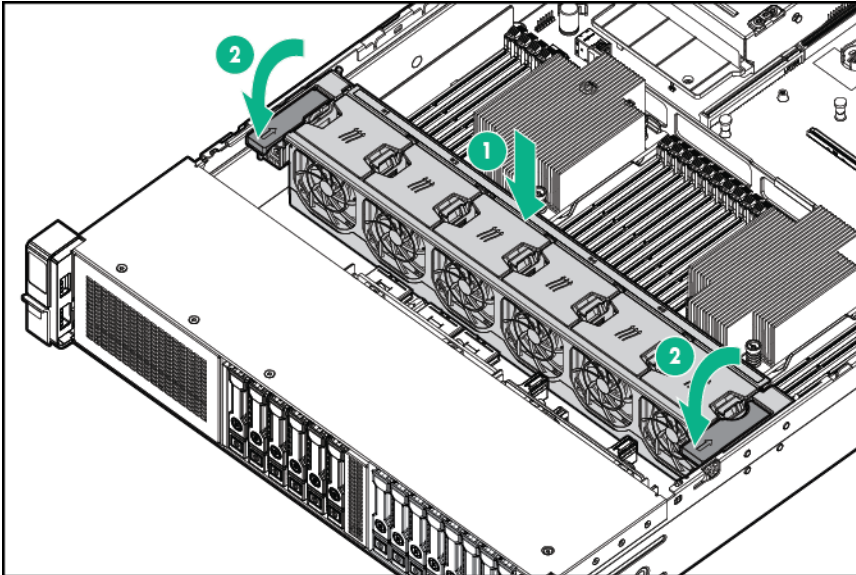
# Installing the fan cage

**⚠ 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.

**❗ IMPORTANT:**

For optimum cooling, install fans in all primary fan locations.



# Removing the air baffle or midplane drive cage

**⚠ CAUTION:**

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

**⚠ CAUTION:**

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

## Procedure

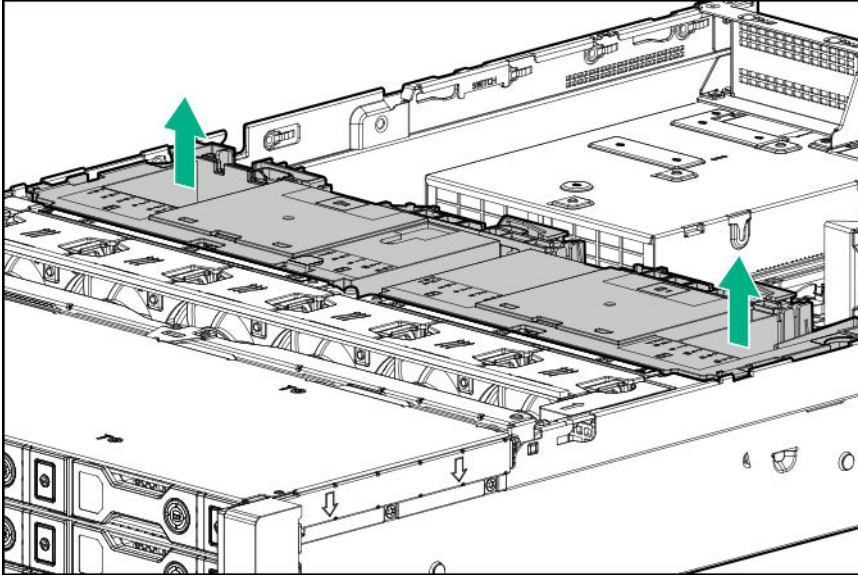
1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:

- **Extend the server from the rack.**
- **Remove the server from the rack.**

**4. Remove the access panel.**

**5. Do one of the following:**

- Remove the air baffle.



- Remove the 4LFF midplane drive cage:

**a.** Disconnect all cables.

**b.** Remove all drives.

Be sure to note the location of each drive.

**c.** Remove the drive cage.

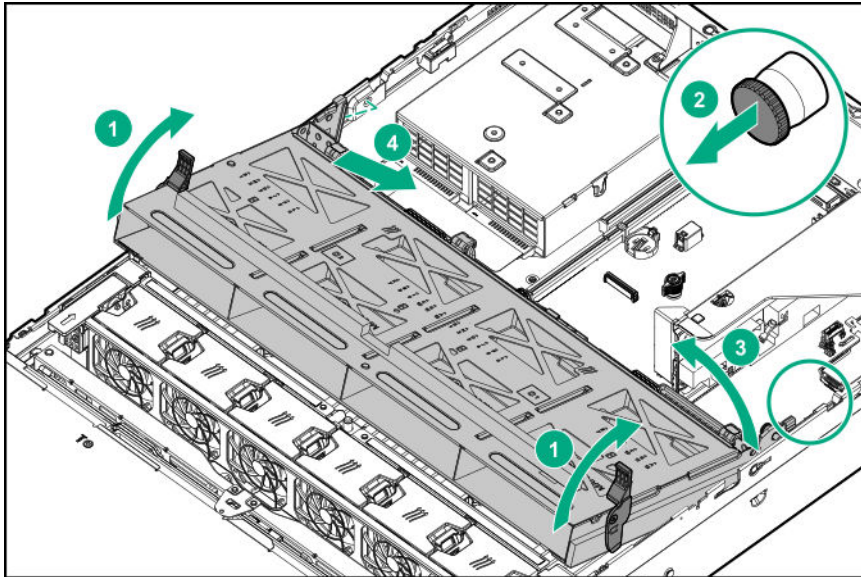


**CAUTION:**

Do not drop the drive cage on the system board. Dropping the drive cage on the system board might damage the system or components. Remove all drives and use two hands when installing or removing the drive cage.

---





## Installing the air baffle

### Procedure

1. Observe the following alerts.

---

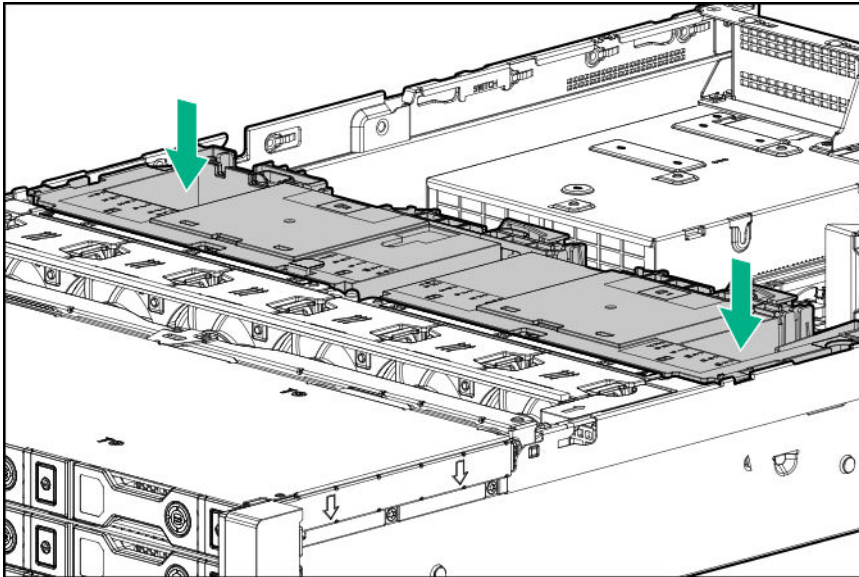
**⚠ CAUTION:**  
For proper cooling, do not operate the server without the access panel, baffles, expansion slot covers, or blanks installed. If the server supports hot-plug components, minimize the amount of time the access panel is open.

---

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

---

2. Install the air baffle.

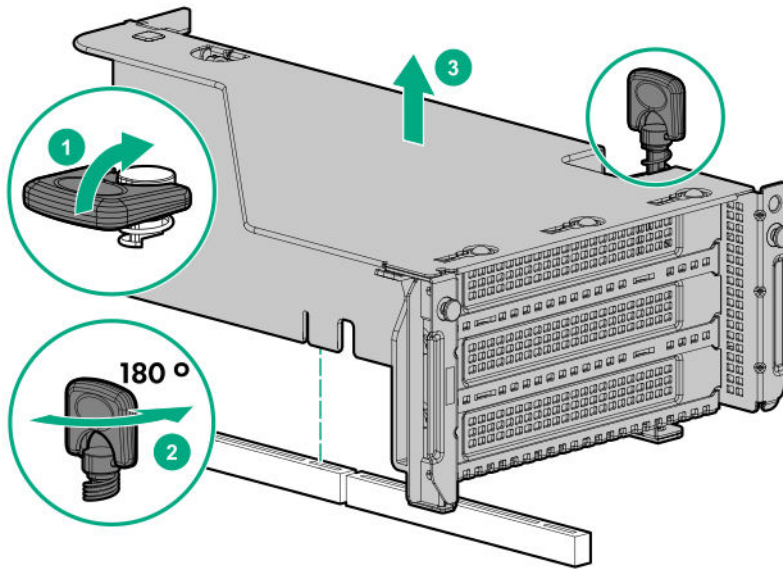


## Removing a riser cage

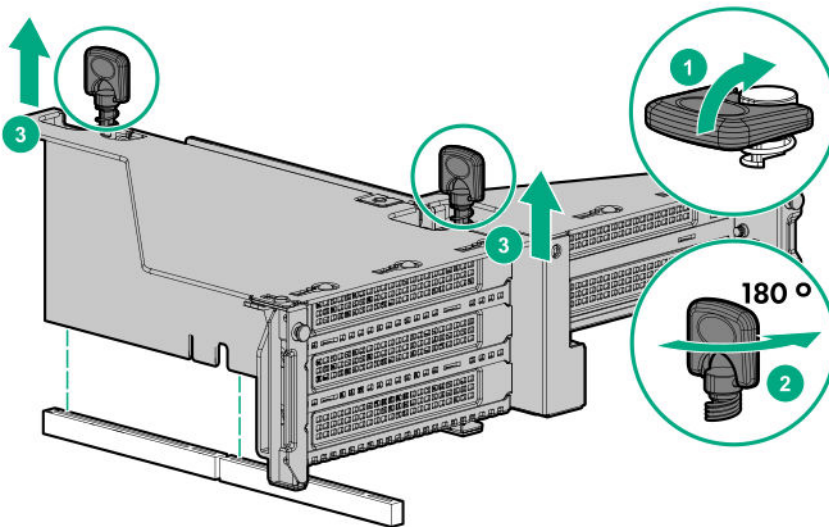
- ⚠ CAUTION:**  
To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. Remove the riser cage.  
Primary and secondary riser cages



Tertiary riser cage



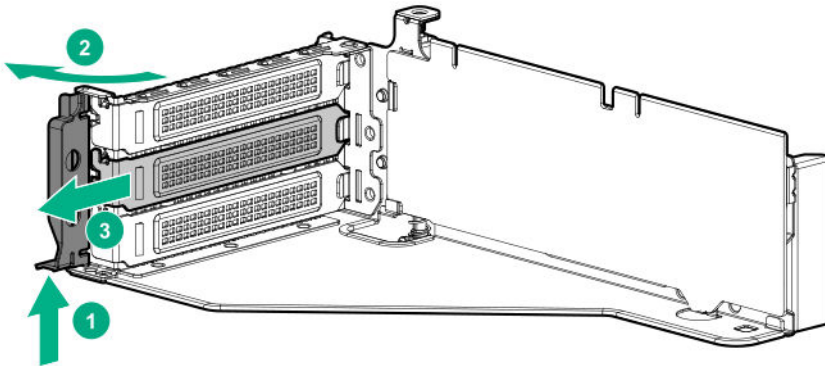
## Removing a riser slot blank

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

### Procedure

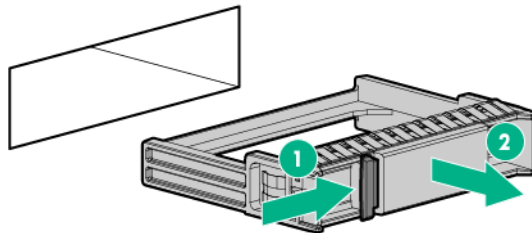
1. **Power down the server.**
2. Remove all power:

- a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
- **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the riser cage.**
6. Remove the blank.



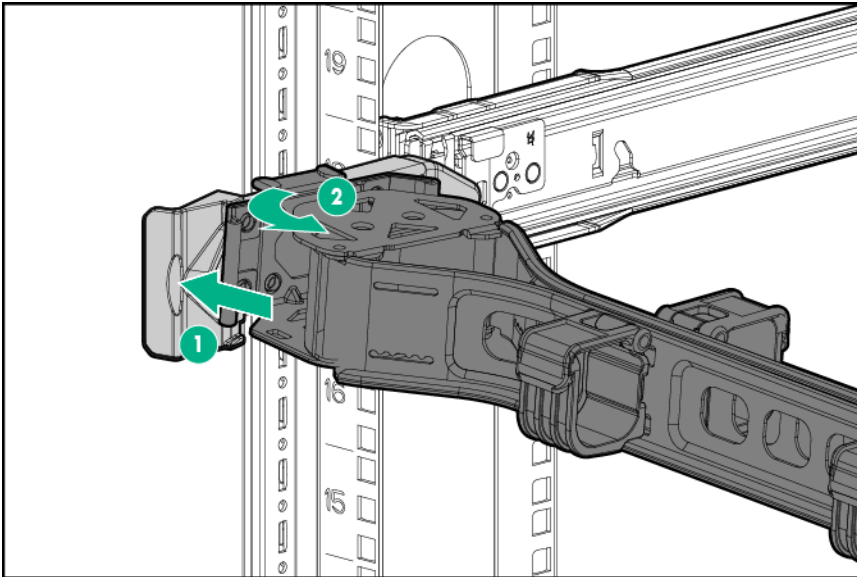
## Removing the hard drive blank

Remove the component as indicated.



## Releasing the cable management arm

Release the cable management arm and then swing the arm away from the rack.

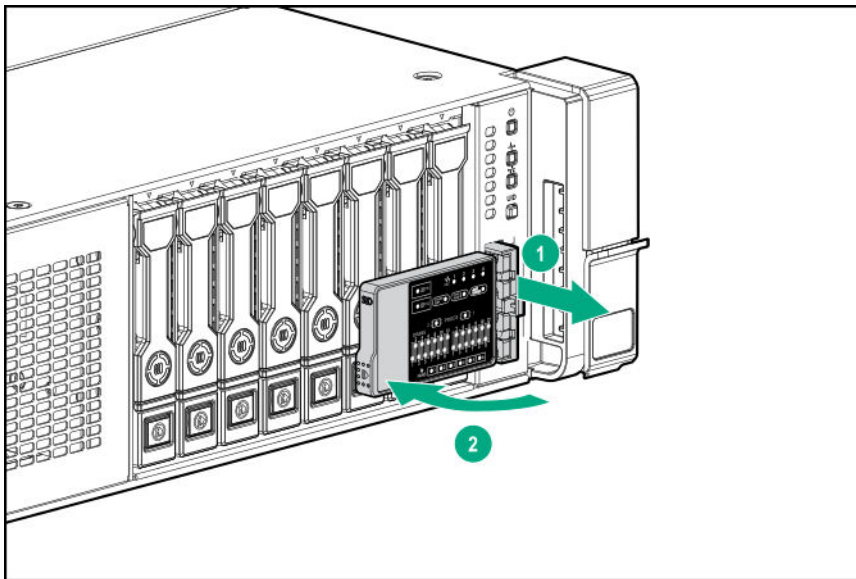


## Accessing the Systems Insight Display

The Systems Insight Display is only supported on SFF models. To access a Systems Insight Display, use the following procedure.

### Procedure

1. Press and release the panel.
2. After the display fully ejects, rotate the display to view the LEDs.



# Setup

## HPE support 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](#).

## Setup overview

### Procedure

1. Review the operational requirements for the server ([Operational requirements](#) on page 55).
2. Read the following safety notices, warnings, and cautions:
  - Server warnings and cautions ([Server warnings and cautions](#) on page 57)
  - Rack warnings ([Rack warnings](#) on page 57)
  - Electrostatic discharge ([Electrostatic discharge](#) on page 58)
3. Verify the contents in the server box ([Server box contents](#) on page 59).
4. Install hardware options ([Hardware options installation](#) on page 60).
5. Install the server into a rack ([Installing the server into the rack](#) on page 43).
6. Configure the server ([Configuring the server](#) on page 59).

7. Install or deploy an operating system ([Installing or deploying an operating system](#) on page 59).
8. Register your server ([Registering the server](#) on page 59).

## Operational requirements

### 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 DL380 Gen10 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.

---

## 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.



## Server warnings and cautions

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### **WARNING:**

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

- Observe local occupational health and safety requirements and guidelines for manual material handling.
  - Get help to lift and stabilize the product during installation or removal, especially when the product is not fastened to the rails. Hewlett Packard Enterprise recommends that a minimum of two people are required for all rack server installations. If the server is installed higher than chest level, a third person may be required to help align the server.
  - Use caution when installing the server in or removing the server from the rack; it is unstable when not fastened to the rails.
- 
- 



### **WARNING:**

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

---

---



### **WARNING:**

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

---

---



### **CAUTION:**

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

---

---



### **CAUTION:**

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

---

---

## Rack warnings

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### **WARNING:**

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

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

**WARNING:**

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

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

**WARNING:**

To reduce the risk of personal injury or damage to the equipment, adequately stabilize the rack before extending a component outside the rack. Extend only one component at a time. A rack may become unstable if more than one component is extended.

**WARNING:**

When installing a server in a telco rack, be sure that the rack frame is adequately secured at the top and bottom to the building structure.

---

## Electrostatic discharge

Be aware of the precautions you must follow when setting up the system or handling components. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the system or component.

To prevent electrostatic damage:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:
  - Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm  $\pm$ 10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
  - Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
  - Use conductive field service tools.
  - Use a portable field service kit with a folding static-dissipating work mat.

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

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

## Server box contents

The server shipping box contains the following contents:

- A server
- A power cord
- Rack-mounting hardware
- Documentation

## 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](#)."

## Configuring the server

When the server is powered on, the POST screen is displayed. Use the following options to configure the server:

- System utilities (**F9**)  
Use this option to configure UEFI, RBSU, or other boot settings.
- Intelligent Provisioning (**F10**)  
Use this option to configure drives, access Smart Storage Administrator, or begin installing or deploying an operating system.
- Boot order (**F11**)  
Use this option to select a boot device.
- Network boot (**F12**)  
Use this option to PXE boot the server from the network.

## Installing or deploying an operating system

Before installing an operating system, observe the following:

- Be sure to read the HPE UEFI requirements for ProLiant servers on the [Hewlett Packard Enterprise website](#). If UEFI requirements are not met, you might experience boot failures or other errors when installing the operating system.
- Update firmware before using the server for the first time, unless software or components require an older version. For more information, see "[Keeping the system current](#)" on page 162."
- For the latest information on supported operating systems, see the [Hewlett Packard Enterprise website](#).
- The server does not ship with OS media. All system software and firmware is preloaded on the server.

## Registering the server

To experience quicker service and more efficient support, register the product at the [Hewlett Packard Enterprise Product Registration website](#).

# Hardware options installation

## 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>).

## 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.

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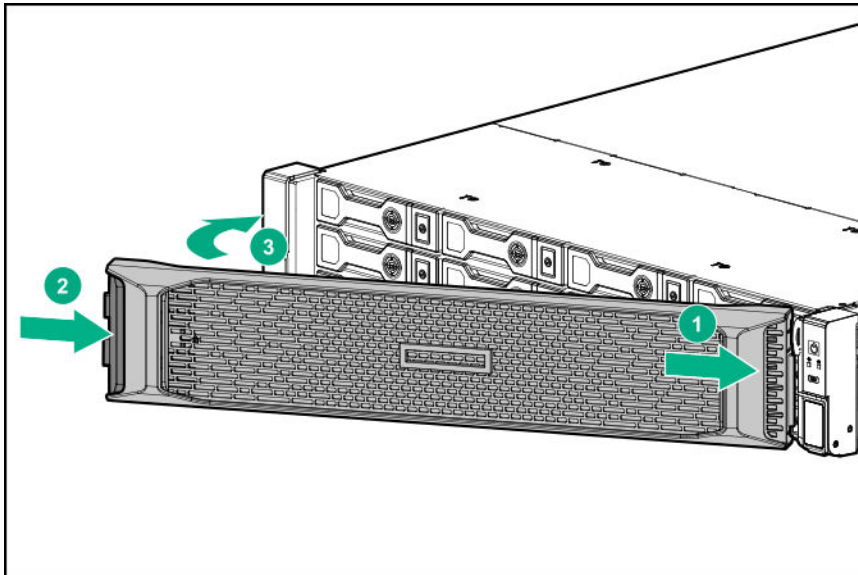
**⚠ WARNING:**  
To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

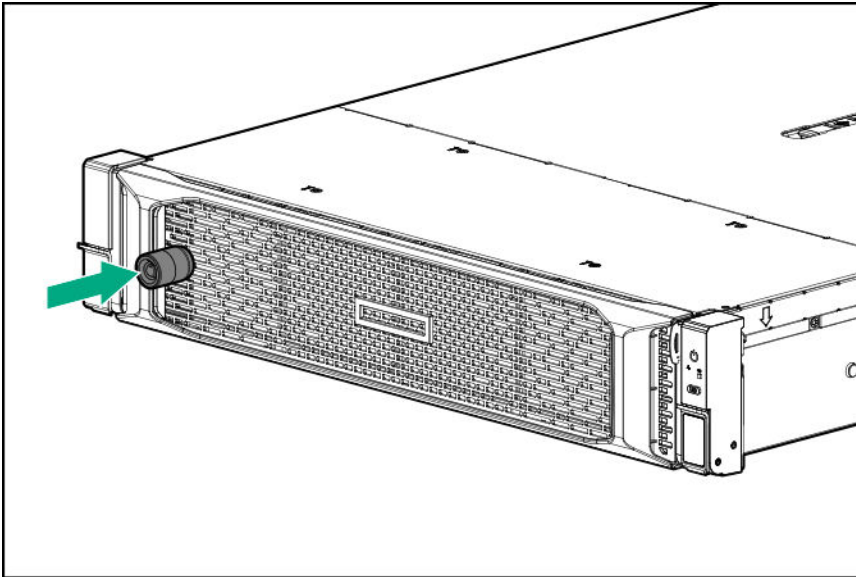
---

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

---

## Installing the bezel and bezel lock





## Power supply options

### Hot-plug power supply calculations

For hot-plug power supply specifications and calculators to determine electrical and heat loading for the server, see the Hewlett Packard Enterprise Power Advisor website (<http://www.hpe.com/info/poweradvisor/online>).

### Installing a redundant hot-plug power supply

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**⚠ CAUTION:**

All power supplies installed in the server must have the same output power capacity. Verify that all power supplies have the same part number and label color. The system becomes unstable and might shut down if it detects different power supplies.

---

**⚠ 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.

---

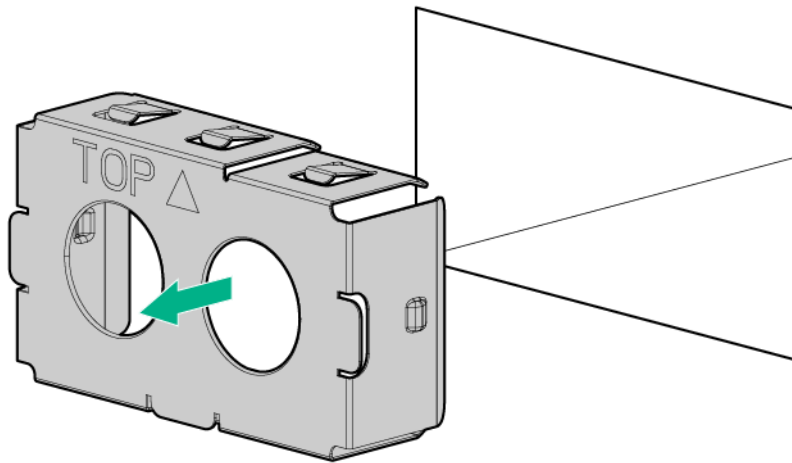
#### Procedure

1. **Release the cable management arm to access the rear panel.**
  2. Remove the blank.
- 

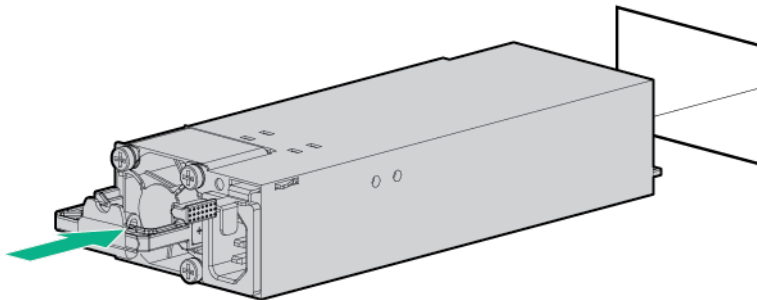
**⚠ WARNING:**

To reduce the risk of personal injury from hot surfaces, allow the power supply or power supply blank to cool before touching it.

---



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



4. Connect the power cord to the power supply.
5. Route the power cord.  
Use the cable management arm and best practices when routing cords and cables.
6. Connect the power cord to the power source.
7. Observe the power supply LED.

## Drive options

### Drive guidelines

Depending on the configuration, the server supports SAS, SATA, and NVMe drives.

Observe the following general guidelines:

- The system automatically sets all drive numbers.
- If only one hard drive is used, install it in the bay with the lowest drive number.  
For drive numbering, see "[Drive bay numbering](#)".
- The NVMe SSD is a PCIe bus device. Devices attached to a PCIe bus cannot be removed without allowing the device and bus to complete and cease the signal/traffic flow.

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 that 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.

- Drives with the same capacity provide the greatest storage space efficiency when grouped into the same drive array.

## Supported drive carriers

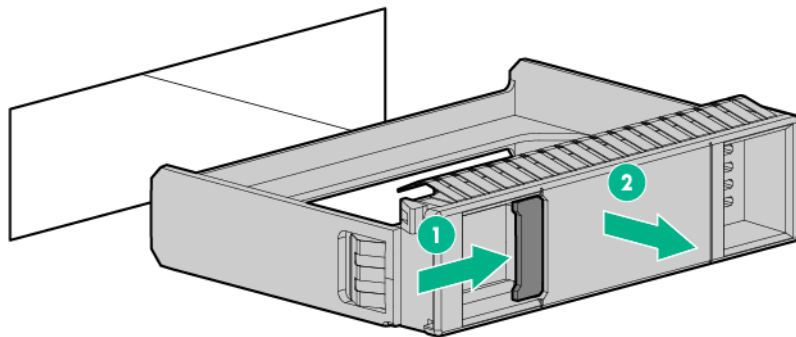
Depending on the drive cage, the server supports the following drive carriers:

- SFF Smart Carrier (SC)
- SFF Smart Carrier NVMe (SCN)
- SFF Smart Carrier M.2 (SCM)
- LFF Smart Carrier (SC)
- LFF to SFF Smart Carrier Converter

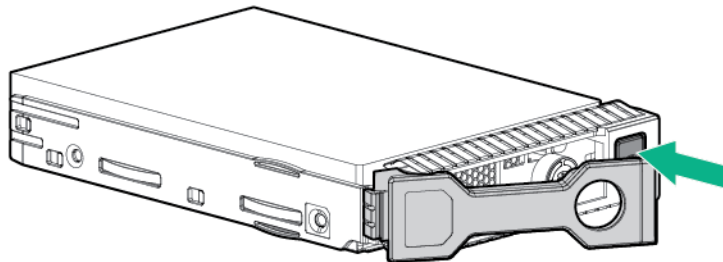
## Installing a hot-plug SAS or SATA drive

### Procedure

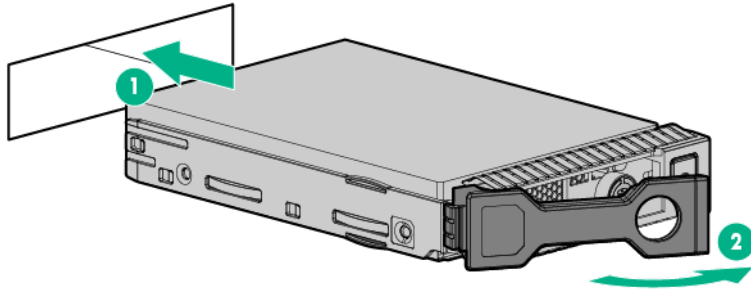
1. Remove the drive blank.



2. Prepare the drive.



3. Install the drive.



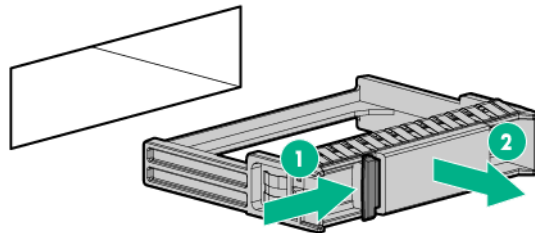
4. Observe the LED status of the drive.

## Installing an NVMe drive

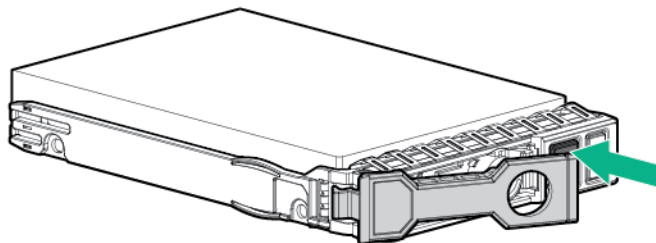
- CAUTION:**  
To prevent improper cooling and thermal damage, do not operate the server unless all drive and device bays are populated with either a component or a blank.

### Procedure

1. Remove the drive blank.

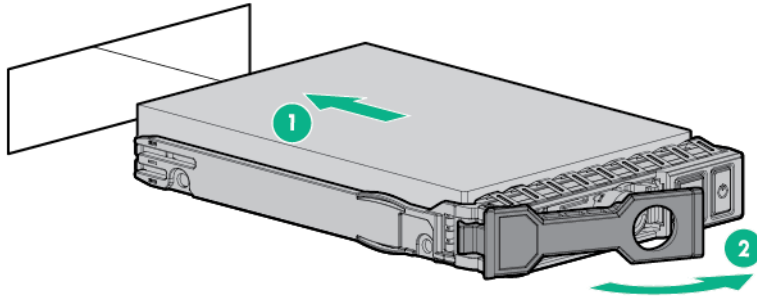


2. Prepare the drive.



3. Install the drive.





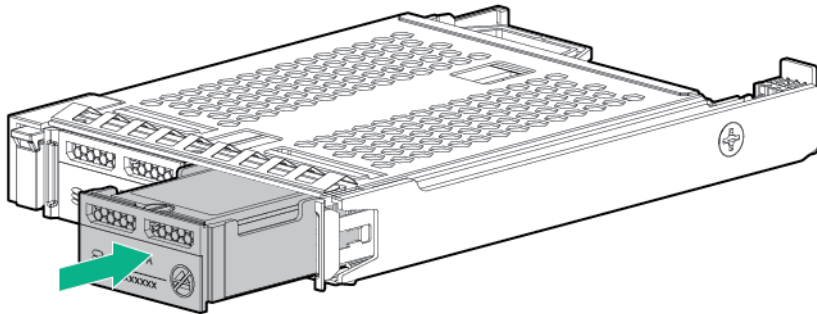
4. Observe the LED status of the drive.

## Installing a uFF drive and SCM drive carrier

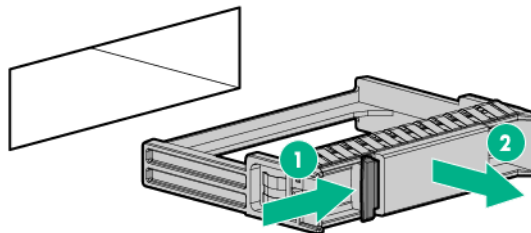
- !** **IMPORTANT:**  
Not all drive bays support the drive carrier. To find supported bays, see the server QuickSpecs.

### Procedure

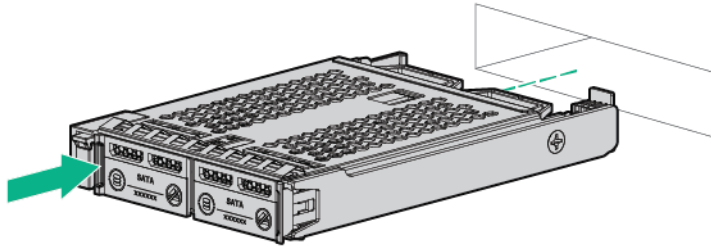
1. If needed, install the uFF drive into the drive carrier.



2. Remove the drive blank.



3. Install the drives.  
Push firmly near the ejection handle until the latching spring engages with the drive bay.



4. Power on the server.

To configure the drive, use **HPE Smart Storage Administrator**.

## Installing an M.2 drive

This procedure is for replacing M.2 drives located on an expansion card, riser, or the system board only. Do not use this procedure to replace uFF drives.

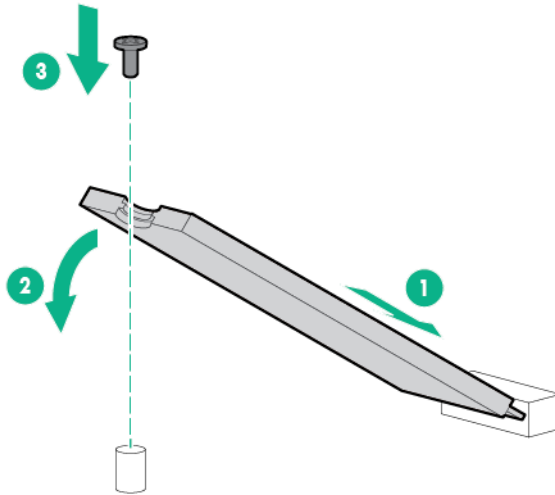
### Prerequisites

Before installing this option, be sure that you have the following:

- The components included with the hardware option kit
- T-10 Torx screwdriver

### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the riser cage.**
6. Install the drive.



The installation is complete.

## Fan options

**⚠ CAUTION:**  
To avoid damage to server components, fan blanks must be installed in fan bays 1 and 2 in a single-processor configuration.

**⚠ CAUTION:**  
To avoid damage to the equipment, do not operate the server for extended periods of time if the server does not have the optimal number of fans installed. Although the server might boot, Hewlett Packard Enterprise does not recommend operating the server without the required fans installed and operating.

Valid fan configurations are listed in the following table.

Configuration	Fan bay 1	Fan bay 2	Fan bay 3	Fan bay 4	Fan bay 5	Fan bay 6
1 processor	Fan blank	Fan blank	Fan	Fan	Fan	Fan
1 processor 24-SFF or 12-LFF configuration with high-performance fans	Fan	Fan	Fan	Fan	Fan	Fan
2 processors	Fan	Fan	Fan	Fan	Fan	Fan

For a single-processor configuration, excluding 24-SFF and 12-LFF configurations, four fans and two blanks are required in specific fan bays for redundancy. A fan failure or missing fan causes a loss of redundancy. A second fan failure or missing fan causes an orderly shutdown of the server.

For a dual-processor configuration or single-processor 24-SFF or 12-LFF configurations, six fans are required for redundancy. A fan failure or missing fan causes a loss of redundancy. A second fan failure or missing fan causes an orderly shutdown of the server.

High-performance fans might be necessary in 24-SFF and 12-LFF configurations for the following installations:

- Optional GPU riser installations
- ASHRAE compliant configurations

For more information, see the [Hewlett Packard Enterprise website](#).

The server supports variable fan speeds. The fans operate at minimum speed until a temperature change requires a fan speed increase to cool the server. The server shuts down during the following temperature-related scenarios:

- At POST and in the OS, iLO performs an orderly shutdown if a cautionary temperature level is detected. If the server hardware detects a critical temperature level before an orderly shutdown occurs, the server performs an immediate shutdown.
- When the Thermal Shutdown feature is disabled in the BIOS/Platform Configuration (RBSU), iLO does not perform an orderly shutdown when a cautionary temperature level is detected. Disabling this feature does not disable the server hardware from performing an immediate shutdown when a critical temperature level is detected.



**CAUTION:**

A thermal event can damage server components when the Thermal Shutdown feature is disabled in the BIOS/Platform Configuration (RBSU).

---

## Installing high-performance fans

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**CAUTION:**

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

---



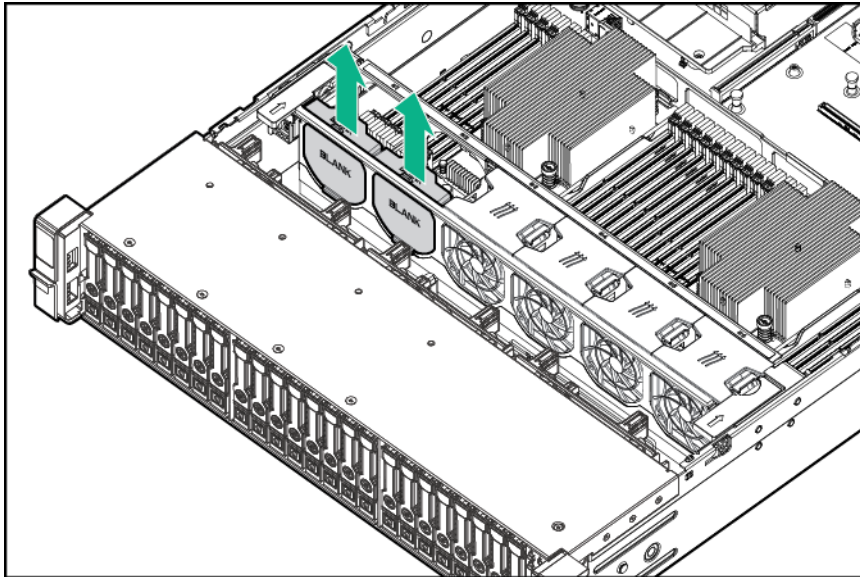
**CAUTION:**

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.

---

### Procedure

1. **Extend the server from the rack.**
2. **Remove the access panel.**
3. If installed, remove all fan blanks.



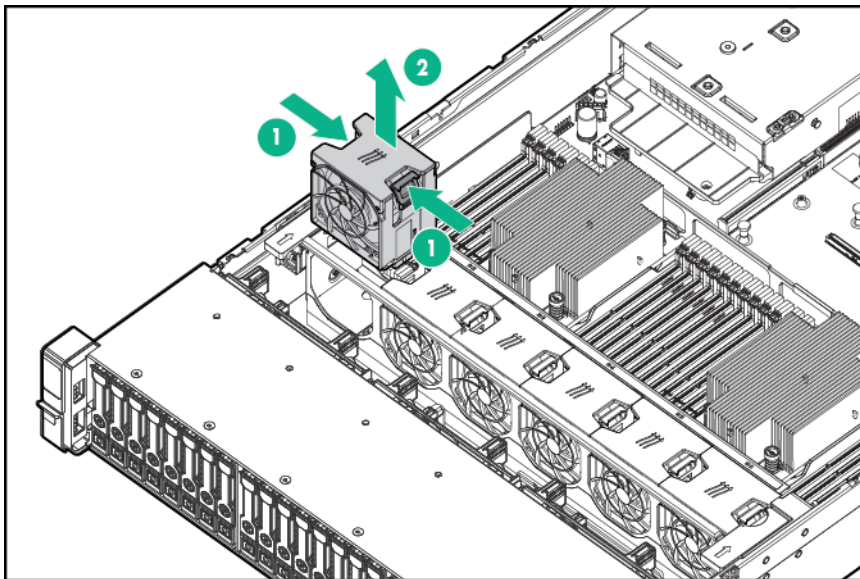
4. **Remove the air baffle.**

5. Remove all standard fans.

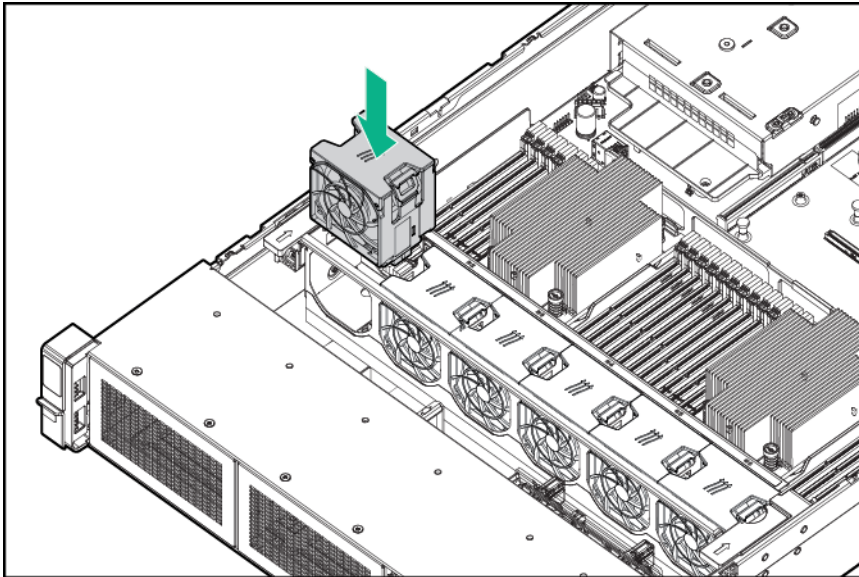


**IMPORTANT:**

Do not mix standard fans and high-performance fans in the same server.



6. Install high-performance fans in all fan bays.



7. **Install the air baffle.**
8. **Install the access panel.**
9. **Install the server into the rack.**

## Memory options

---



### **IMPORTANT:**

This server does not support mixing LRDIMMs and RDIMMs. Attempting to mix any combination of these DIMMs can cause the server to halt during BIOS initialization. All memory installed in the server must be of the same type.

---

## DIMM and NVDIMM population information

For specific DIMM and NVDIMM population information, see the DIMM population guidelines on the Hewlett Packard Enterprise website (<http://www.hpe.com/docs/memory-population-rules>).

## HPE SmartMemory speed information

For more information about memory speed information, see the Hewlett Packard Enterprise website (<https://www.hpe.com/docs/memory-speed-table>).

## Installing a DIMM

The server supports up to 24 DIMMs.

### **Prerequisites**

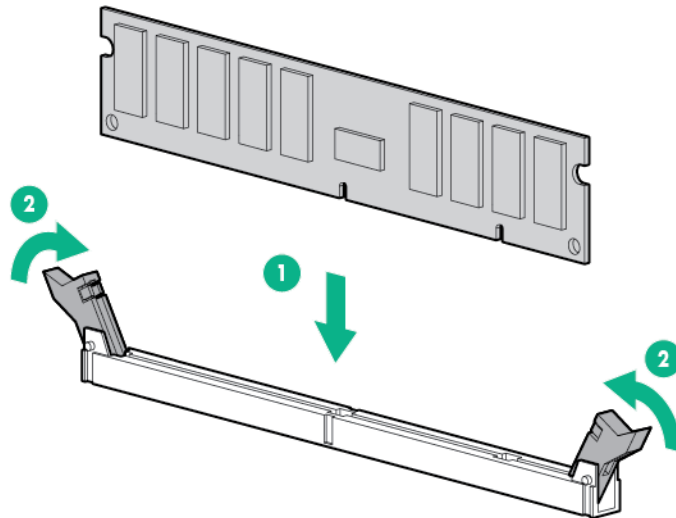
Before installing this option, be sure you have the following:

The components included with the hardware option kit

For more information on specific options, see the server QuickSpecs on the **Hewlett Packard Enterprise website**.

## Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - a. **Extend the server from the rack.**
  - b. **Remove the server from the rack.**
4. **Remove the access panel.**
5. Open the DIMM slot latches.
6. Install the DIMM.



7. **Install the access panel.**
8. Install the server in the rack.
9. Connect each power cord to the server.
10. Connect each power cord to the power source.
11. **Power up the server.**

Use the BIOS/Platform Configuration (RBSU) in the UEFI System Utilities to configure the memory mode.

For more information about LEDs and troubleshooting failed DIMMs, see "**Systems Insight Display combined LED descriptions.**"

## HPE 16GB NVDIMM option

HPE NVDIMMs are flash-backed NVDIMMs used as fast storage and are designed to eliminate smaller storage bottlenecks. The HPE 16GB NVDIMM for HPE ProLiant Gen10 servers is ideal for smaller database storage bottlenecks, write caching tiers, and any workload constrained by storage bottlenecks.

The HPE 16GB NVDIMM is supported on select ProLiant Gen10 servers and can support up to 12 NVDIMMs in 2 socket servers (up to 192GB) and up to 24 NVDIMMs in 4 socket servers (up to 384GB). The HPE Smart Storage Battery provides backup power to the memory slots allowing data to be moved from the DRAM portion of the NVDIMM to the Flash portion for persistence during a power down event.

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

## Server requirements for NVDIMM support

Before installing an HPE 16GB NVDIMM in a server, make sure that the following components and software are available:

- A supported HPE server using Intel Xeon Scalable Processors: For more information, see the NVDIMM QuickSpecs on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/qs>).
- An HPE Smart Storage Battery
- A minimum of one regular DIMM: The system cannot have only NVDIMM-Ns installed.
- A supported operating system with persistent memory/NVDIMM drivers. For the latest software information, see the Hewlett Packard Enterprise website (<http://persistentmemory.hpe.com>).
- For minimum firmware versions, see the HPE 16GB NVDIMM User Guide on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/nvdimm-docs>).

To determine NVDIMM support for your server, see the server QuickSpecs on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/qs>).

## Installing an NVDIMM

---

### CAUTION:

To avoid damage to the hard drives, memory, and other system components, the air baffle, drive blanks, and access panel must be installed when the server is powered up.

---

### CAUTION:

To avoid damage to the hard drives, memory, and other system components, be sure to install the correct DIMM baffles for your server model.

---

### CAUTION:

DIMMs are keyed for proper alignment. Align notches in the DIMM with the corresponding notches in the DIMM slot before inserting the DIMM. Do not force the DIMM into the slot. When installed properly, not all DIMMs will face in the same direction.

---

### CAUTION:

Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning this procedure.

---

### CAUTION:

Failure to properly handle DIMMs can damage the DIMM components and the system board connector. For more information, see the DIMM handling guidelines in the troubleshooting guide for your product on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/enterprise-docs>).

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**⚠ CAUTION:**

Unlike traditional storage devices, NVDIMMs are fully integrated in with the ProLiant server. Data loss can occur when system components, such as the processor or HPE Smart Storage Battery, fails. HPE Smart Storage battery is a critical component required to perform the backup functionality of NVDIMMs. It is important to act when HPE Smart Storage Battery related failures occur. Always follow best practices for ensuring data protection.

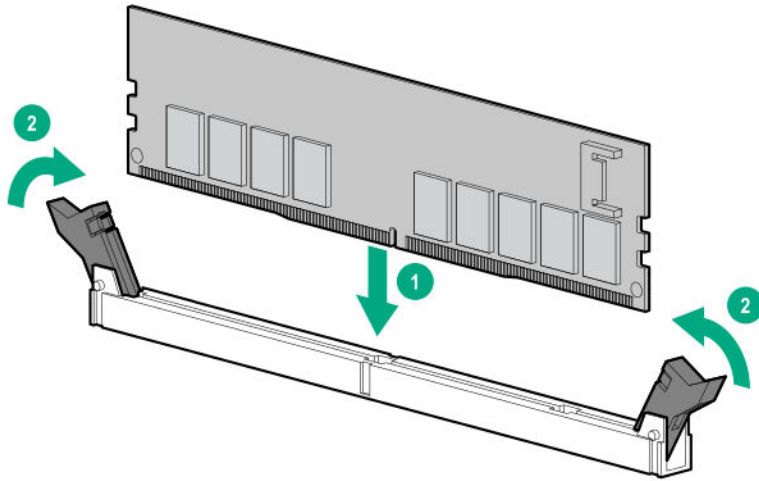
---

**Prerequisites**

Before installing an NVDIMM, be sure the server meets the **Server requirements for NVDIMM support** on page 72.

**Procedure**

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - a. **Extend the server from the rack.**
  - b. **Remove the server from the rack.**
4. **Remove the access panel.**
5. If the Smart Storage battery is not installed, do one of the following:
  - **Remove the air baffle.**
  - **If installed on LFF models, remove the midplane drive cage.**
6. Locate any NVDIMMs already installed in the server.
7. Verify that all LEDs on any installed NVDIMMs are off.
8. Install the NVDIMM.



9. If it is not already installed, **install the Smart Storage battery.**
10. **Install the access panel.**
11. Slide or install the server into the rack.
12. Connect each power cord to the server.
13. **Power up the server.**
14. If required, sanitize the NVDIMM-Ns. For more information, see **NVDIMM sanitization** on page 74.

## Configuring the server for NVDIMMs

After installing NVDIMMs, configure the server for NVDIMMs. For information on configuring settings for NVDIMMs, see the *HPE 16GB NVDIMM User Guide* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/nvdimm-docs>).

The server can be configured for NVDIMMs using either of the following:

- UEFI System Utilities—Use System Utilities through the Remote Console to configure the server for NVDIMM memory options by pressing the **F9** key during POST. For more information about UEFI System Utilities, see the Hewlett Packard Enterprise website (<http://www.hpe.com/info/uefi/docs>).
- iLO RESTful API for HPE iLO 5—For more information about configuring the system for NVDIMMs, see <https://hewlettpackard.github.io/ilo-rest-api-docs/ilo5/>.

## NVDIMM sanitization

Media sanitization is defined by NIST SP800-88 Guidelines for Media Sanitization (Rev 1, Dec 2014) as "a general term referring to the actions taken to render data written on media unrecoverable by both ordinary and extraordinary means."

The specification defines the following levels:

- Clear: Overwrite user-addressable storage space using standard write commands; might not sanitize data in areas not currently user-addressable (such as bad blocks and overprovisioned areas)
- Purge: Overwrite or erase all storage space that might have been used to store data using dedicated device sanitize commands, such that data retrieval is "infeasible using state-of-the-art laboratory techniques"
- Destroy: Ensure that data retrieval is "infeasible using state-of-the-art laboratory techniques" and render the media unable to store data (such as disintegrate, pulverize, melt, incinerate, or shred)

The NVDIMM-N Sanitize options are intended to meet the Purge level.

For more information on sanitization for NVDIMMs, see the following sections in the *HPE 16GB NVDIMM User Guide* on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/nvdimm-docs>):

- NVDIMM sanitization policies
- NVDIMM sanitization guidelines
- Setting the NVDIMM-N Sanitize/Erase on the Next Reboot Policy

NIST SP800-88 *Guidelines for Media Sanitization* (Rev 1, Dec 2014) is available for download from the NIST website (<http://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-88r1.pdf>).

## NVDIMM relocation guidelines

### Requirements for relocating NVDIMMs or a set of NVDIMMs when the data must be preserved

- The destination server hardware must match the original server hardware configuration.
- All System Utilities settings in the destination server must match the original System Utilities settings in the original server.
- If NVDIMM-Ns are used with NVDIMM Interleaving ON mode in the original server, do the following:
  - Install the NVDIMMs in the same DIMM slots in the destination server.
  - Install the entire NVDIMM set (all the NVDIMM-Ns on the processor) on the destination server.

This guideline would apply when replacing a system board due to system failure.

If any of the requirements cannot be met during NVDIMM relocation, do the following:

- Manually back up the NVDIMM-N data before relocating NVDIMM-Ns to another server.
- Relocate the NVDIMM-Ns to another server.
- Sanitize all NVDIMM-Ns on the new server before using them.

### Requirements for relocating NVDIMMs or a set of NVDIMMs when the data does not have to be preserved

If data on the NVDIMM-N or set of NVDIMM-Ns does not have to be preserved, then

- Move the NVDIMM-Ns to the new location and sanitize all NVDIMM-Ns after installing them to the new location. For more information, see [NVDIMM sanitization](#) on page 74.
- Observe all DIMM and NVDIMM population guidelines. For more information, see [DIMM and NVDIMM population information](#) on page 70.
- Observe the process for removing an NVDIMM.
- Observe the process for installing an NVDIMM.
- Review and configure the system settings for NVDIMMs. For more information, see [Configuring the server for NVDIMMs](#) on page 74.

## HPE Scalable Persistent Memory (CTO only)

HPE Scalable Persistent Memory is an integrated storage solution that runs at memory speeds with terabyte capacity unlocking new levels of performance for your business workloads. It provides a complete hardware and software solution utilizing the following components:

- DRAM for application performance
- A tier of flash for persistence
- A backup power source to move data from DRAM to flash

HPE Scalable Persistent Memory is ideal for enabling in-memory compute with persistence and any workload that could benefit from low-latency DRAM-level performance. This option is available as HPE Factory Configure To Order (CTO) SKUs only.

For configuration details for HPE Scalable Persistent Memory, see the *HPE Scalable Persistent Memory User Guide* at <http://www.hpe.com/info/nvdimm-docs>.

For more information about HPE Scalable Persistent Memory, see <http://www.hpe.com/info/persistentmemory>.

## Controller options

The server supports the following storage controllers:

- Embedded controllers  
Enabled through System Utilities and configured through HPE Smart Storage Administrator (Intelligent Provisioning)
- Type-a controllers  
Type-a controllers install in the type-a smart array connector.
- Type-p controllers  
Type-p controllers install in a PCIe expansion slot

## Installing a storage controller

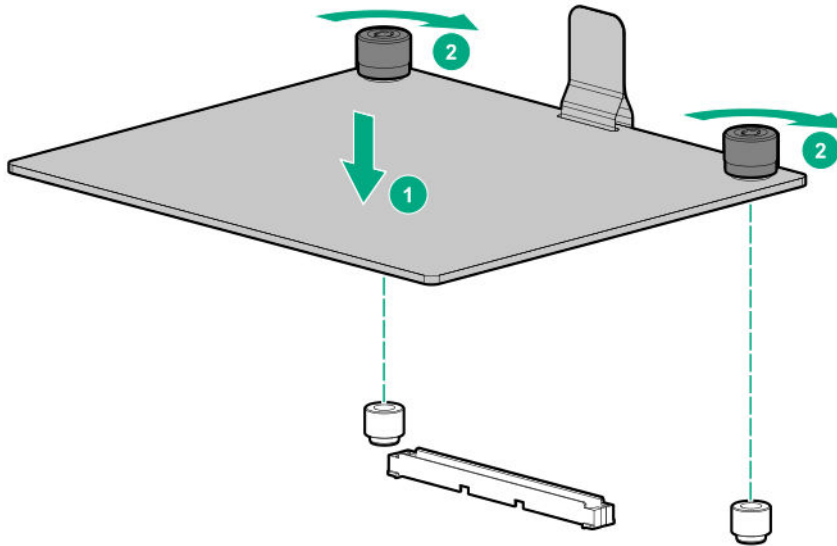
### Prerequisites

Before installing this option, be sure that you have the following:

The components included with the hardware option kit

## Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. Do one of the following:
  - **Remove the air baffle.**
  - **If installed, remove the 4LFF midplane drive cage.**
6. Do one of the following:
  - For Type-a Smart Array controllers, install the controller into the Smart Array connector.



- For Type-p Smart Array controllers, **install the controller into an expansion slot.**

## 7. **Cable the controller.**

The installation is complete.

# Installing a Universal Media Bay

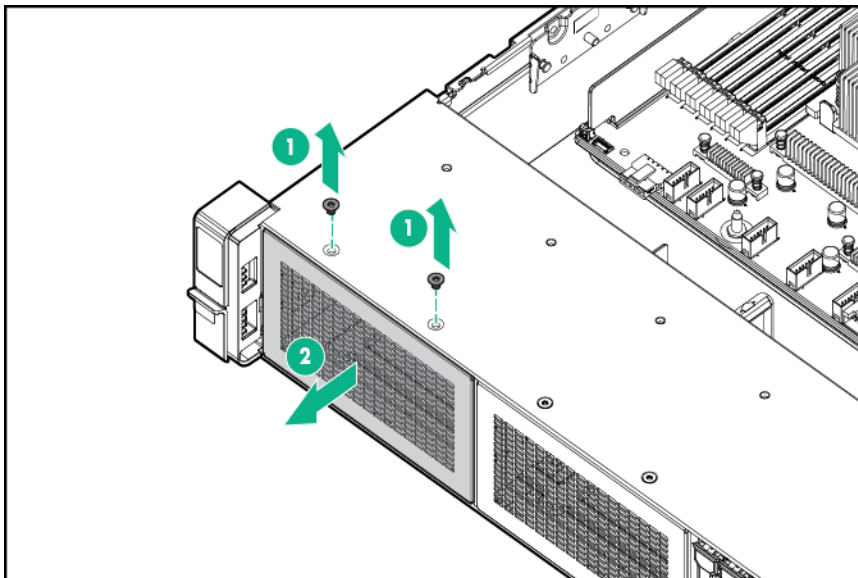
## Prerequisites

Before installing this option, be sure that you have the following:

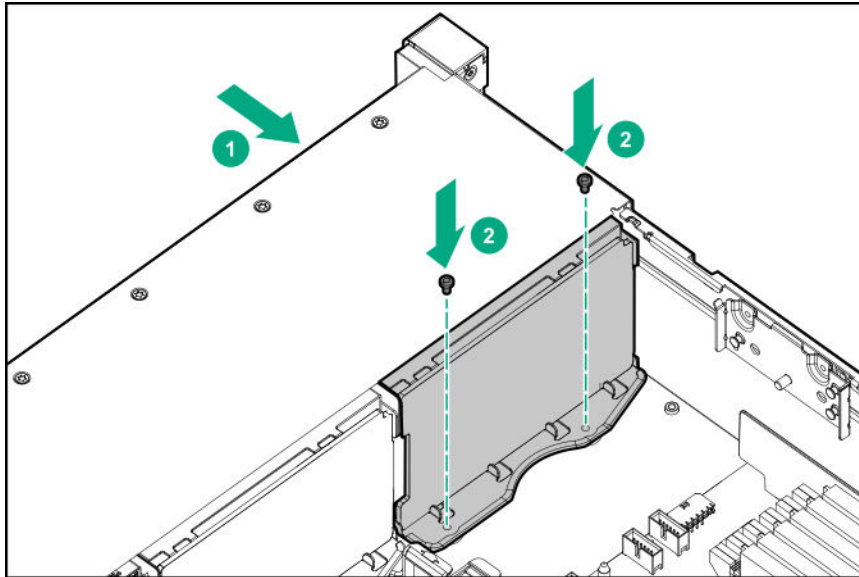
- The components included with the hardware option kit
- T-10 Torx screwdriver

## Procedure

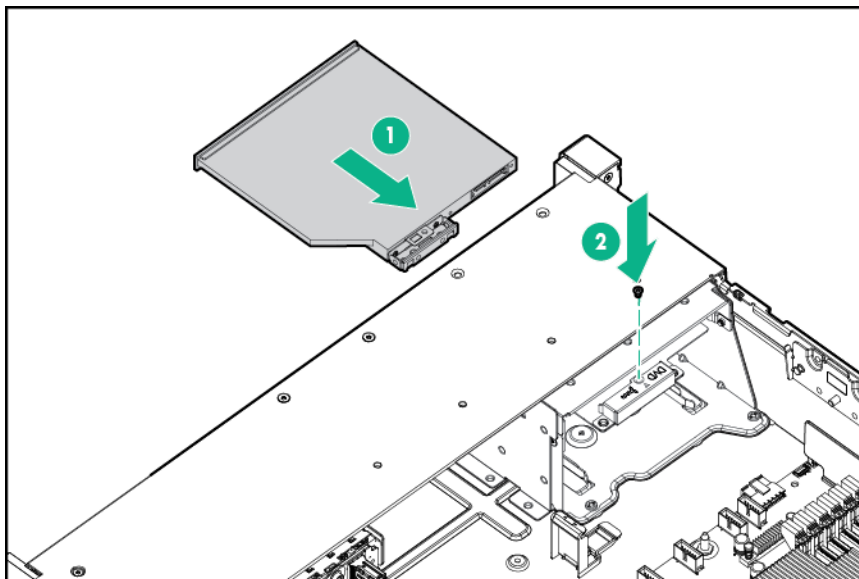
1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. **Remove the fan cage.**
7. Remove the bay blank.



8. Route the USB and video cables through the opening.
9. If installing a two-bay SFF front drive cage, **install the drive cage.**
10. Install the universal media bay.



11. (Optional) Install the optical disk drive.



12. **Connect the cables.**

13. Install the fan cage.

14. **Install the air baffle.**

15. **Install the access panel.**

16. Slide the server into the rack.

17. Connect each power cord to the server.

18. Connect each power cord to the power source.

19. **Power up the server.**

The installation is complete.

# Drive cage options

## Installing a front 8NVMe SSD Express Bay drive cage

Observe the following:

- The drive cage can be installed in any box. This procedure covers installing the drive cage in box 1.
- When installing in box 1, the NVMe riser must be installed in the tertiary PCIe slot.
- When installing in box 2, the NVMe riser must be installed in the secondary PCIe slot.
- When installing in box 3, the NVMe riser must be installed in the primary PCIe slot.

### Prerequisites

An associated NVMe riser and high-performance fans are required when installing this option.

### Procedure

1. Observe the following alerts.



#### **WARNING:**

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

---



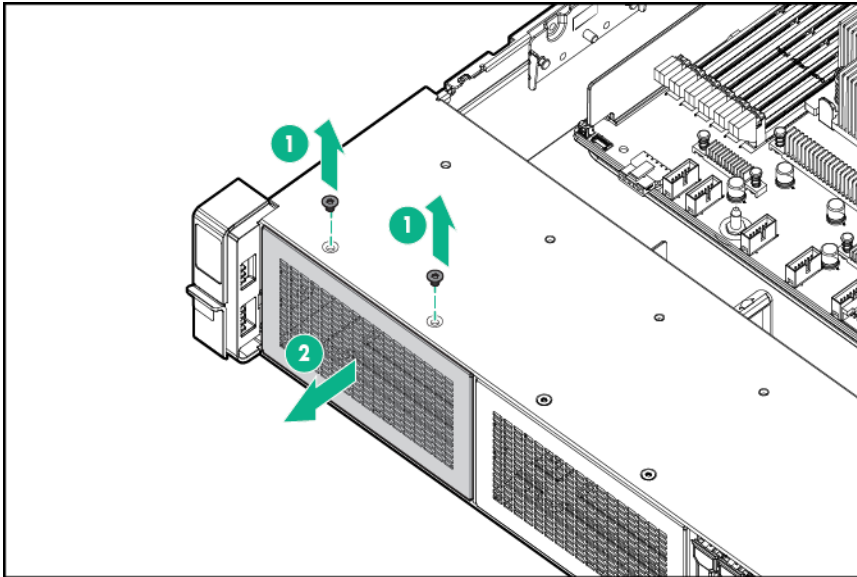
#### **CAUTION:**

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

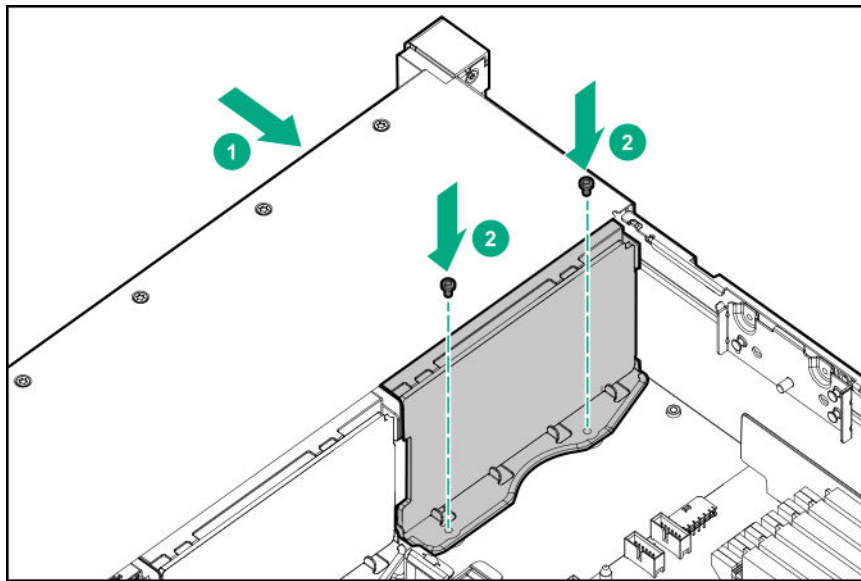
---

2. **Power down the server.**
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. **Remove the fan cage.**
7. Remove the blank.





8. Install the drive cage:
  - a. **Remove all drives and drive blanks.**
  - b. Install the drive cage.



9. **Install the associated NVMe riser.**
10. **Connect the power cable to the drive backplane power connector.**
11. **Connect the data cables from the drive backplane to the NVMe riser.**
12. **Install drives** or drive blanks.

The installation is complete.

## Installing a front 6SFF SAS/SATA + 2NVMe Premium drive cage

The drive cage can be installed in any box. This procedure covers installing the drive cage in box 1.

## Prerequisites

A storage controller and high-performance fans are required when installing this drive cage.

## Procedure

1. Observe the following alerts.



### **WARNING:**

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

---

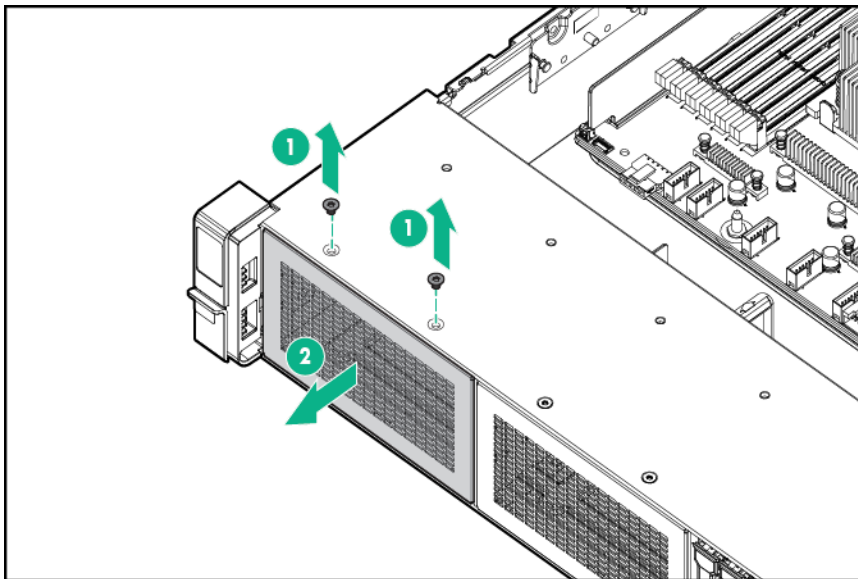


### **CAUTION:**

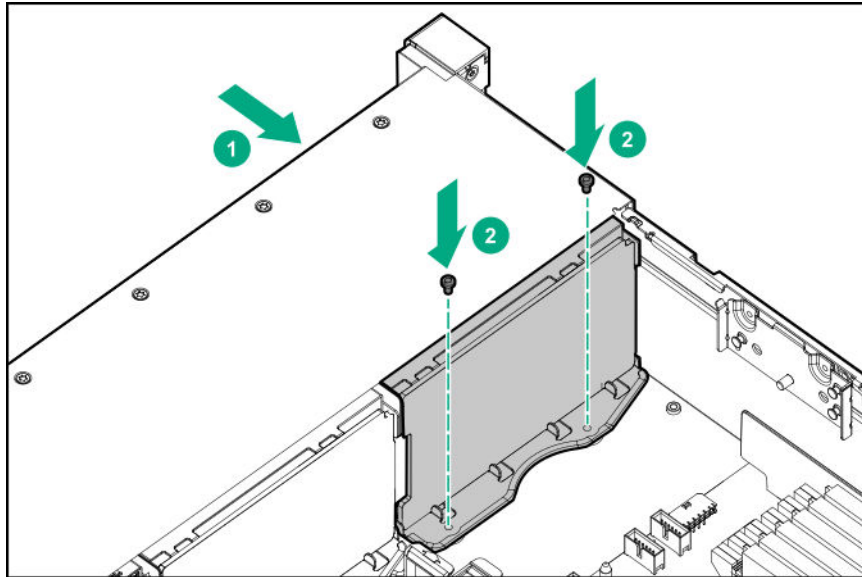
To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause ESD.

---

2. **Power down the server .**
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack .**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. **Remove the fan cage.**
7. Remove the blank.



8. Install the drive cage:
  - a. If drive blanks are installed in the drive cage assembly, **remove the drive blanks.** Retain the drive blanks for use in empty drive bays.
  - b. Install the drive cage.



9. **Connect the power cable.**
10. **Install a storage controller.**
11. **Connect the data cables from the drive backplane to the controller.**
12. **Install drives** or drive blanks.

The installation is complete.

## **Installing airflow labels**

When an Express Bay drive cage is installed, airflow labels might be required:

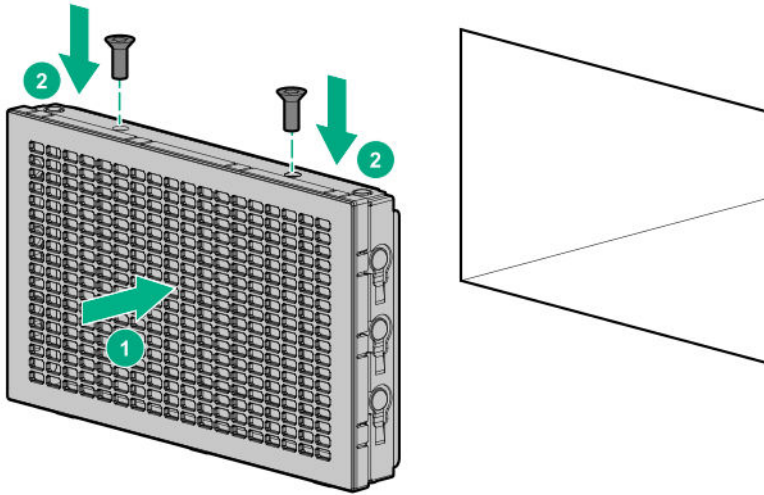
### **Prerequisites**

Before installing this option, be sure that you have the following:

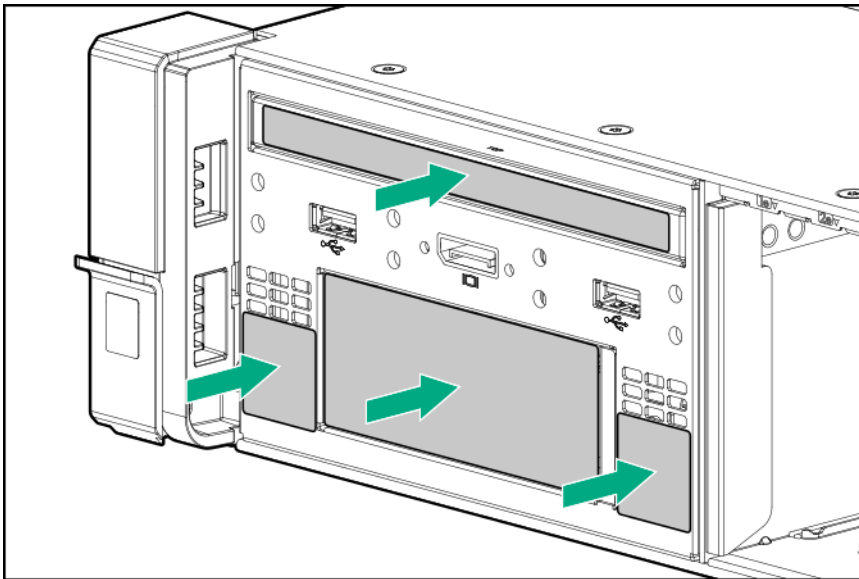
The components included with the hardware option kit

### **Procedure**

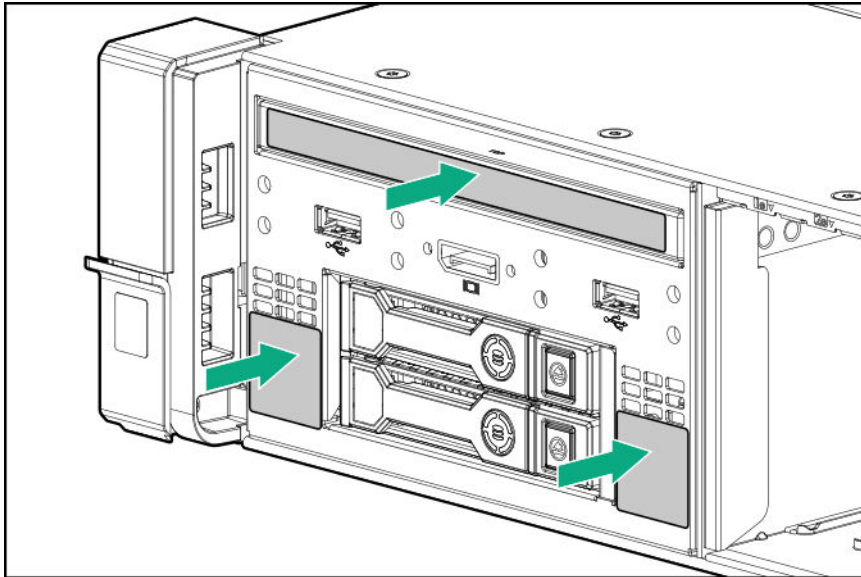
- If an eight-bay SFF drive cage is installed in box 1, then airflow labels are not required.
- If a blank is installed in box 1, replace it with the blank that comes with the kit.



- If a Universal Media Bay is installed in box 1, do one of the following:
  - If the 2SFF drive cage is not installed, then install airflow labels as shown.



- If a 2SFF drive cage is installed, then install the airflow labels as shown.



## Installing a front 8SFF SAS/SATA drive cage in box 1

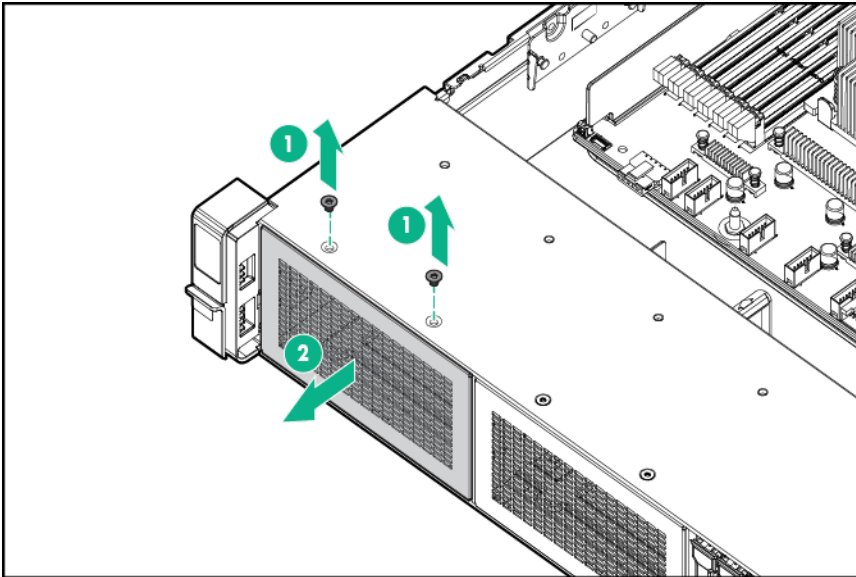
### Prerequisites

Before installing this option, be sure that you have the following:

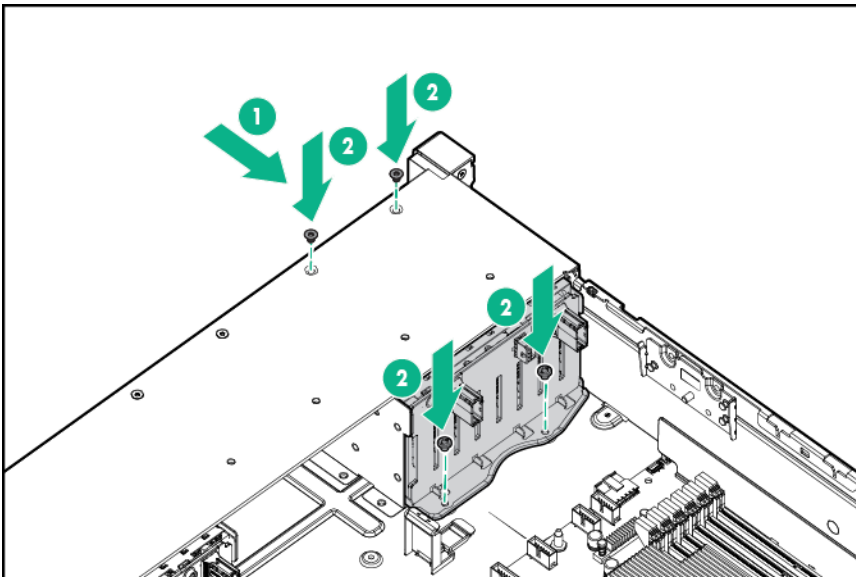
- T-10 Torx screwdriver
- The components included with the hardware option kit

### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. **Remove the fan cage.**
7. Remove the bay blank.



8. Install the 8SFF front drive cage option.



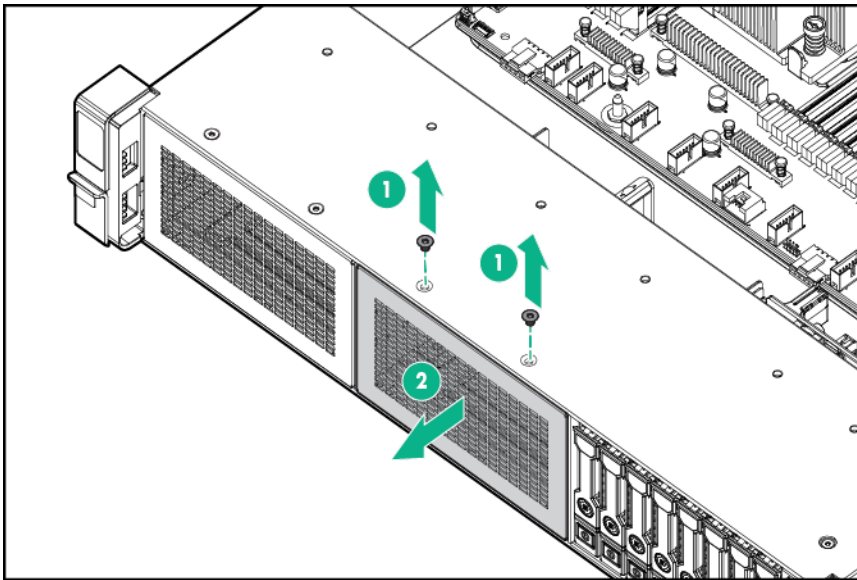
9. **Connect the power and data cables.**
10. **Install the fan cage.**
11. **Install the air baffle.**
12. **Install the access panel.**
13. Slide the server into the rack.
14. Connect each power cord to the server.
15. Connect each power cord to the power source.
16. **Power up the server.**

The installation is complete.

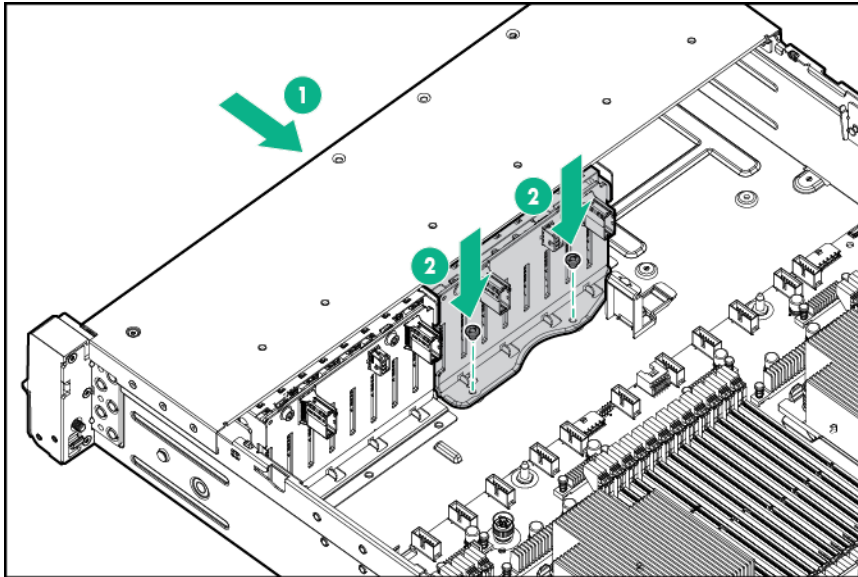
## Installing a front 8SFF SAS/SATA drive cage in box 2

### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. **Remove the fan cage.**
7. Remove the bay blank.



8. Install the 8SFF front drive cage option.



9. **Connect the power and data cables.**
10. **Install the fan cage.**
11. **Install the access panel.**
12. Slide the server into the rack.
13. Connect each power cord to the server.
14. Connect each power cord to the power source.
15. **Power up the server.**

The installation is complete.

## Installing a front 2SFF NVMe/SAS/SATA Premium drive cage

### Prerequisites

Before installing this option, be sure that you have the following:

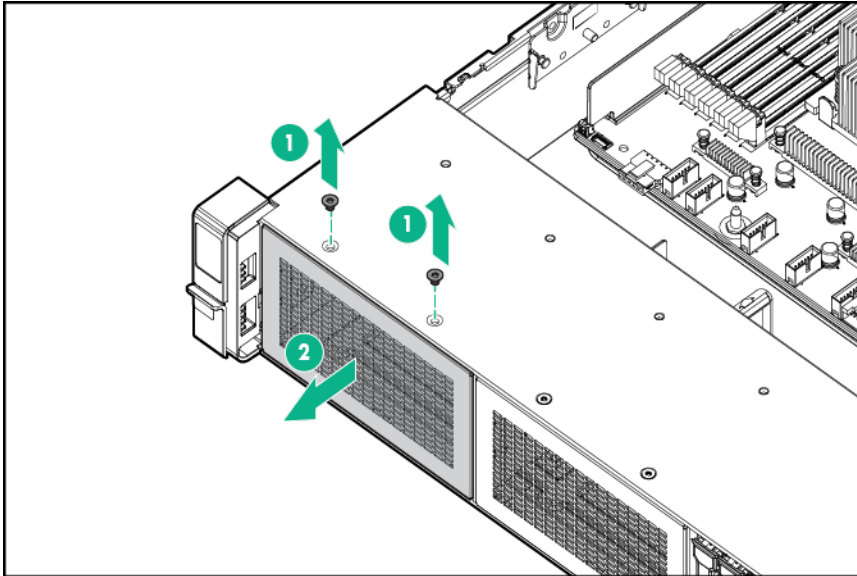
- T-10 Torx screwdriver
- The components included with the hardware option kit
- This installation requires a universal media bay.

### Procedure

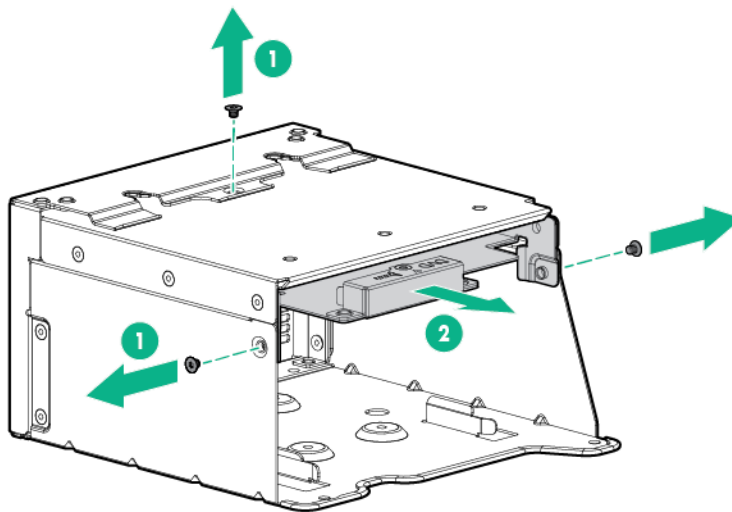
1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:



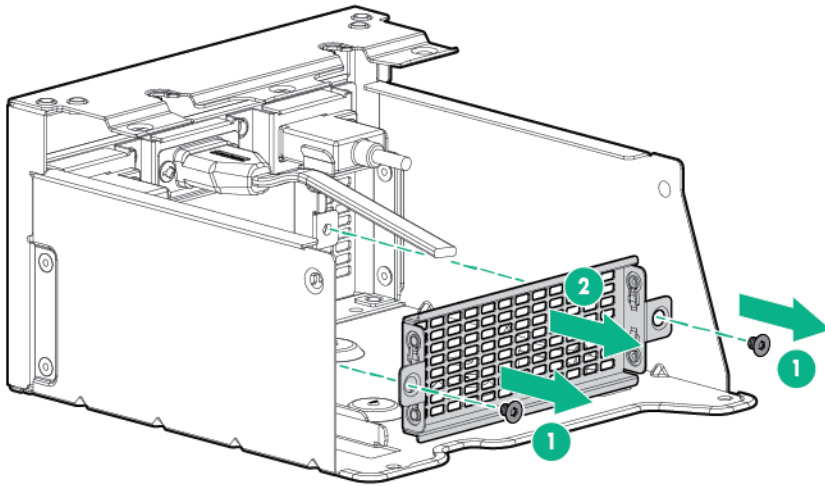
- **Extend the server from the rack.**
  - **Remove the server from the rack.**
- Remove the access panel.**
  - Remove the front bay blank.



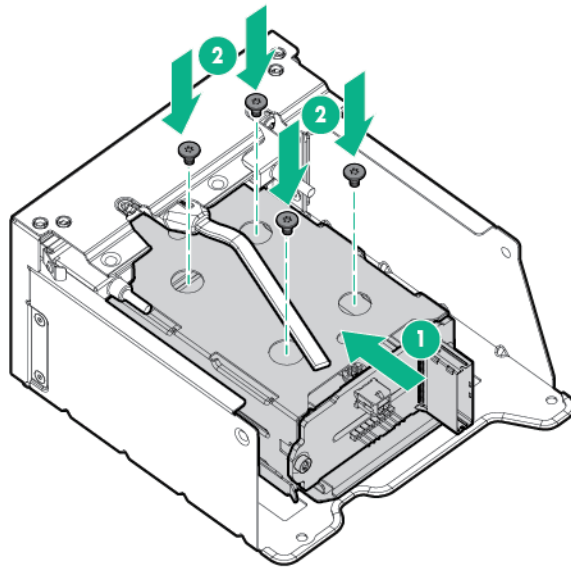
- Remove the optical disk drive tray from the universal media bay.



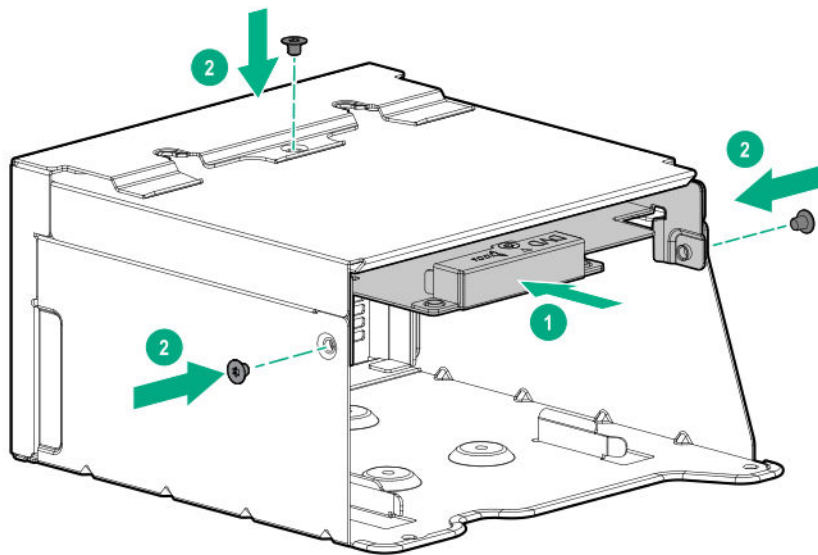
- Remove the SFF drive blank from the universal media bay.



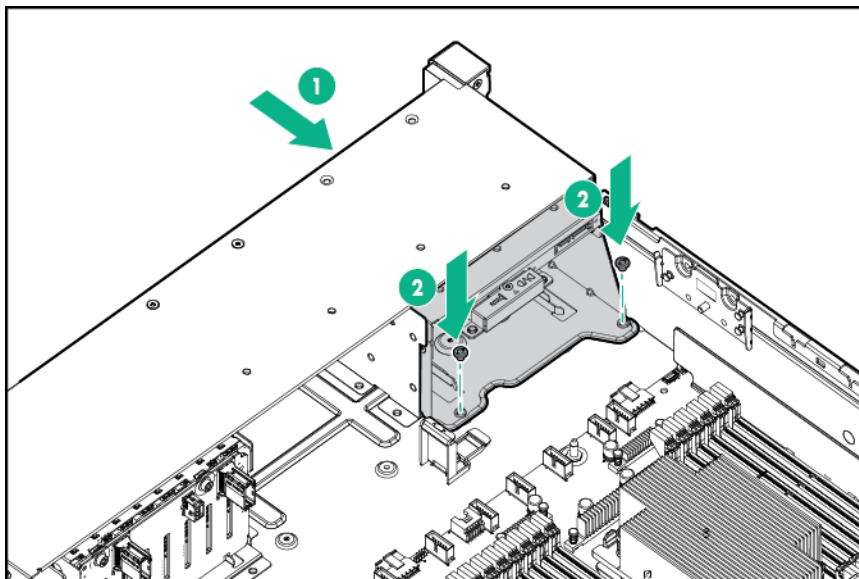
8. Install the drive cage into the universal media bay.



9. Install the optical disk drive tray.



10. Install the universal media bay.



11. **Connect the power and data cables.**

12. **Install the access panel.**

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.**

The installation is complete.

## Installing a midplane 4LFF SAS/SATA drive cage

Observe the following:

- A 1U heatsink is required for each processor when installing this option.
- If you have a TPM, install it prior to this option.
- If you have a type-a controller, install it prior to this option.

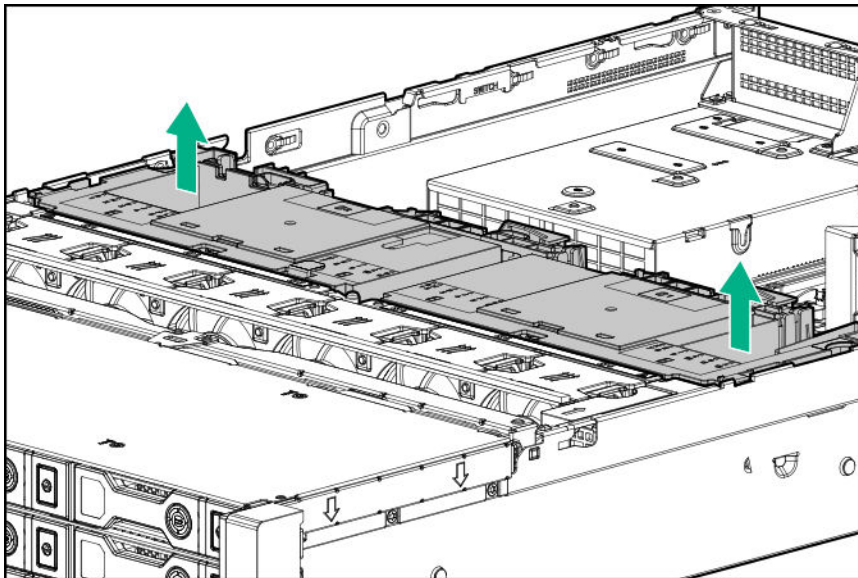
### Prerequisites

Before installing this option, be sure that you have the following:

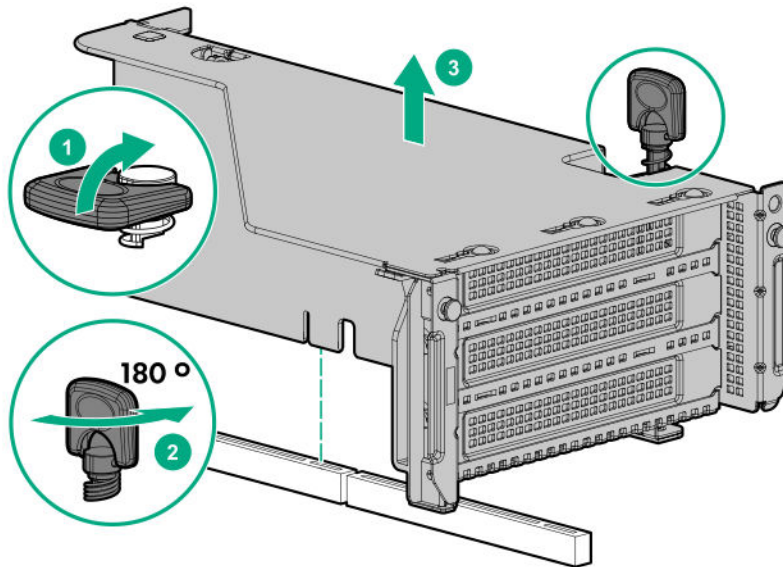
The components included with the hardware option kit

### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**  
The air baffle is no longer needed. The drive cage acts as an air baffle for the server.



6. Remove all riser cages.



7. Connect the power cable to the drive backplane power connector on the system board.
8. If connecting the data cable to the system board or a controller, connect the data cable.
9. Prepare the drive cage for installation by lifting the latches on the drive cage.
10. Install the drive cage:

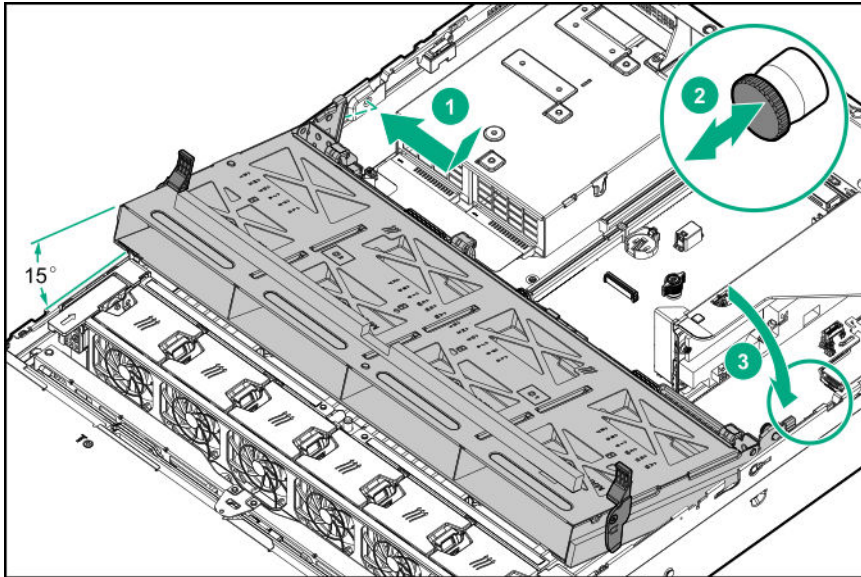


**CAUTION:**

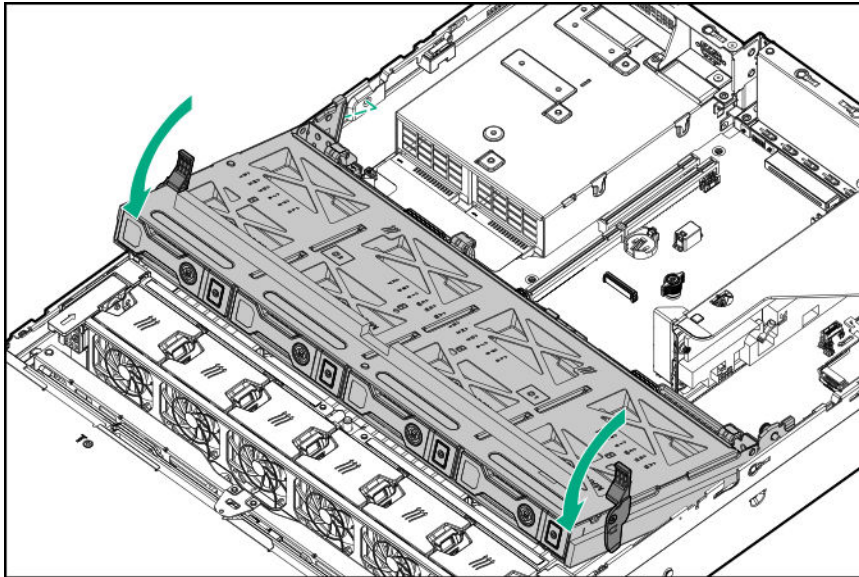
Do not drop the drive cage on the system board. Dropping the drive cage on the system board might damage the system or components. Remove all drives and use two hands when installing or removing the drive cage.

---

- a. Locate the alignment pins on the rear of the drive cage.
- b. Align the pin on the rear left of the drive cage to the server and then insert the pin.
- c. Gently lower the opposite side of the drive cage.
- d. Pull the plunger pin on the rear right of the drive cage and then lower the drive cage until the plunger pin engages.



11. Install drives or drive blanks.
12. Push down on the latches to lower the drive cage into place.



13. Connect the power and data cables to the drive backplane.

The installation is complete.

## Installing a rear 2SFF SAS/SATA drive cage in the primary or secondary riser

### Prerequisites

Before installing this option, be sure that you have the following:

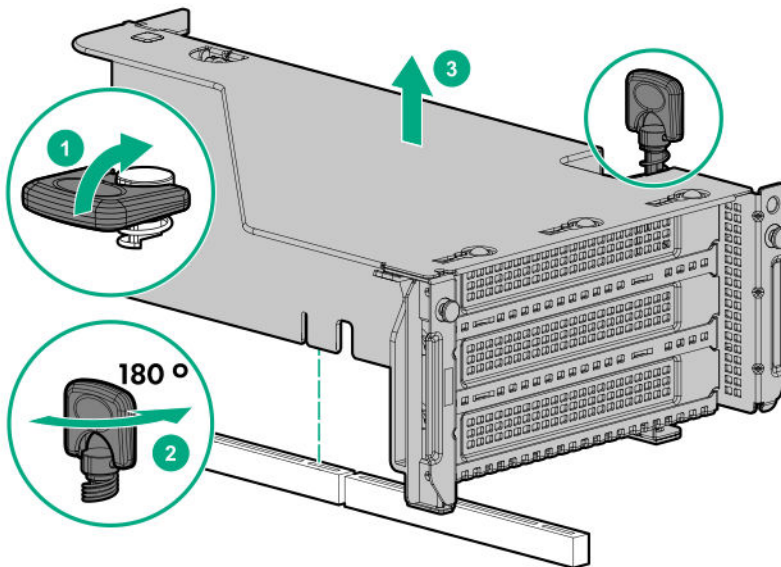
- T-10 Torx screwdriver
- The components included with the hardware option kit

- The front drive bays are fully populated with 12 LFF or 24 SFF drives.
- High performance fans are installed in all fan bays.

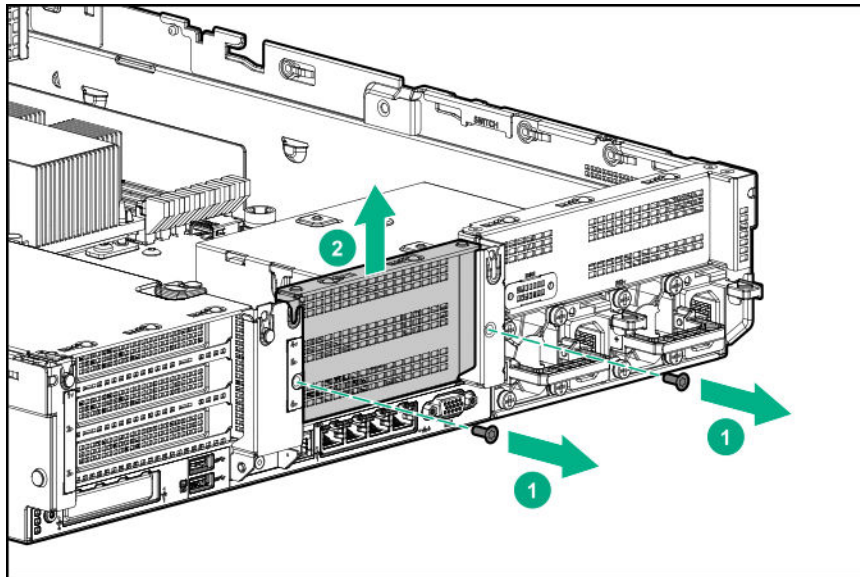
### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. Do one of the following:

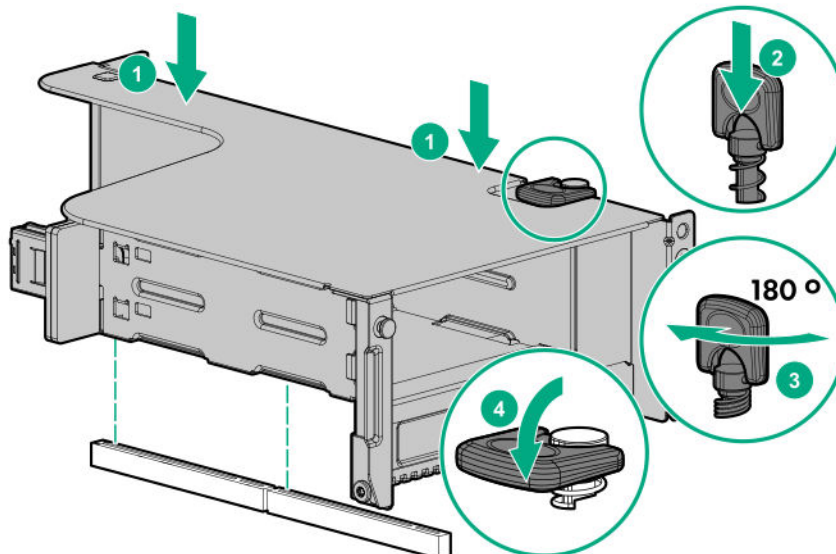
For primary bays, remove the riser cage.



For secondary bays, remove the rear wall blank.



6. **Install a SAS expander or other expansion card, if needed.**
7. Install the drive cage.



8. **Cable the drive backplane.**
9. **Install drives or drive blanks.**
10. **Install the access panel.**
11. Slide the server into the rack.
12. Connect each power cord to the server.
13. Connect each power cord to the power source.
14. **Power up the server.**

The installation is complete.



# Installing a rear 2SFF SAS/SATA drive cage over the power supplies

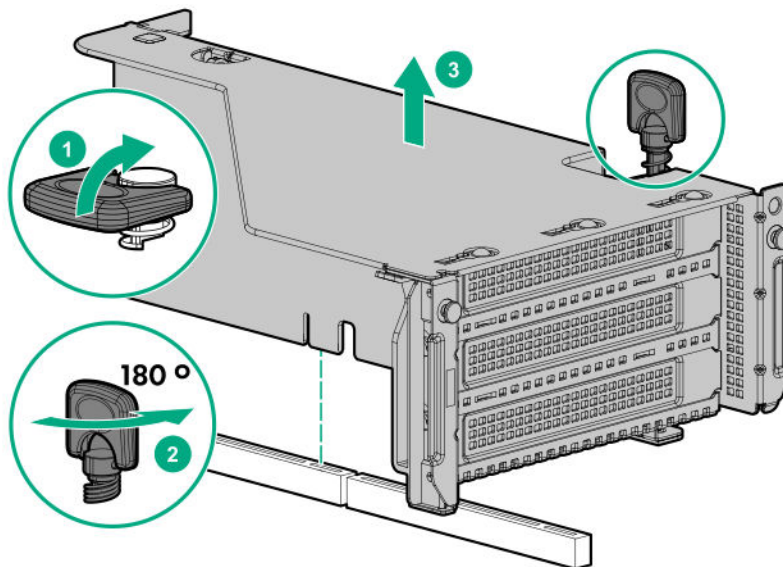
## Prerequisites

Before installing this option, be sure that you have the following:

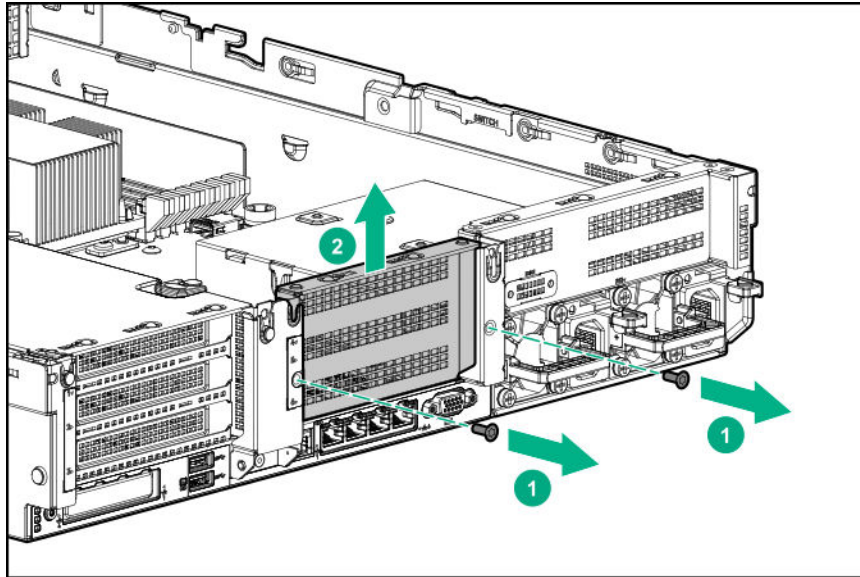
- T-10 Torx screwdriver
- The components included with the hardware option kit
- The front bays are fully populated with 12 LFF or 24 SFF drives
- High performance fans are installed in all fan bays

## Procedure

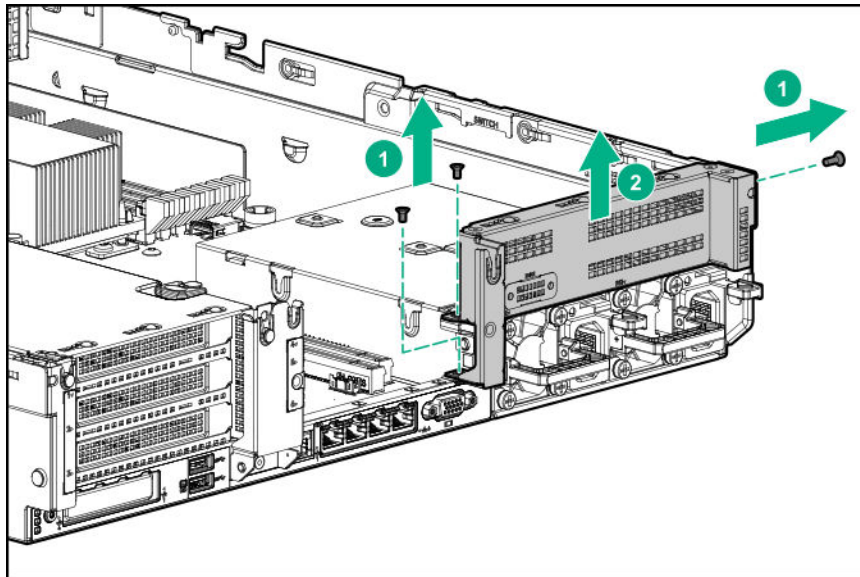
1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack .**
4. **Remove the access panel.**
5. Do one of the following:  
If installed, remove the secondary riser cage.



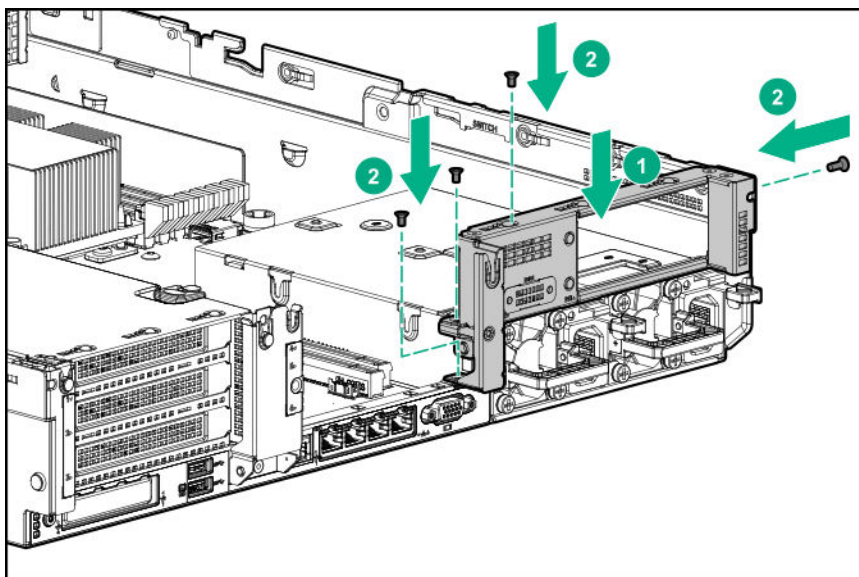
Remove the secondary wall blank.



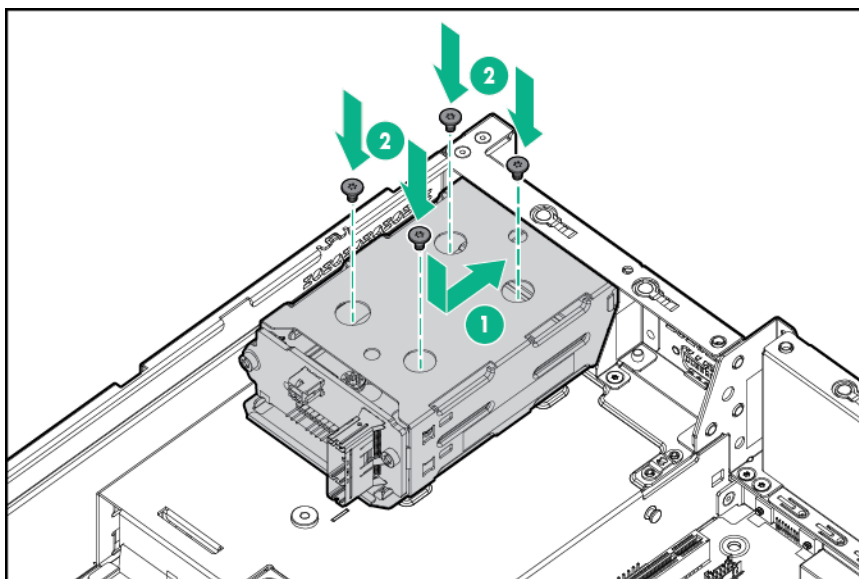
6. Remove the tertiary wall blank.



7. Install the drive cage compatible rear wall.



8. Install the drive cage.



9. Install drives or drive blanks.
10. Install the secondary rear wall or a riser cage.
11. **Cable the drive backplane.**
12. **Install the access panel.**
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.**

The installation is complete.

## Installing a rear 3LFF SAS/SATA drive cage

Before installing this option, the front bays must be fully populated with 12 LFF drives. High-performance fans must be installed in all fan bays.

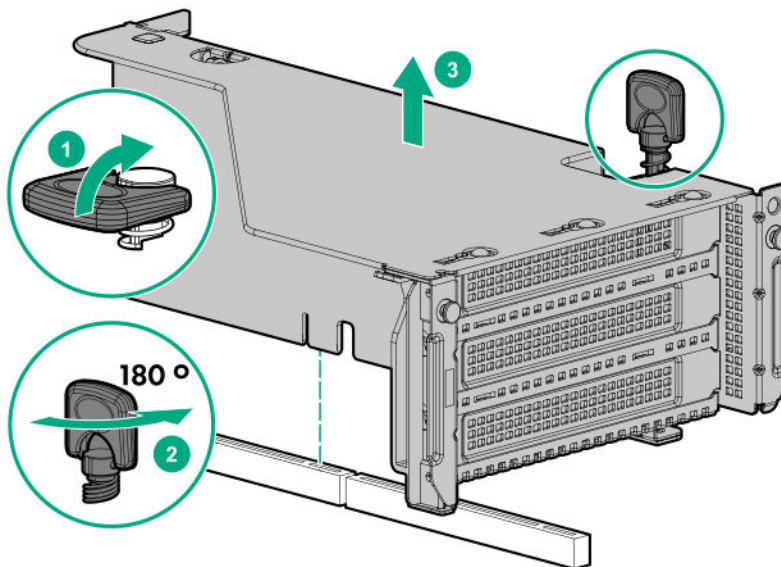
### Prerequisites

Before installing this option, be sure that you have the following:

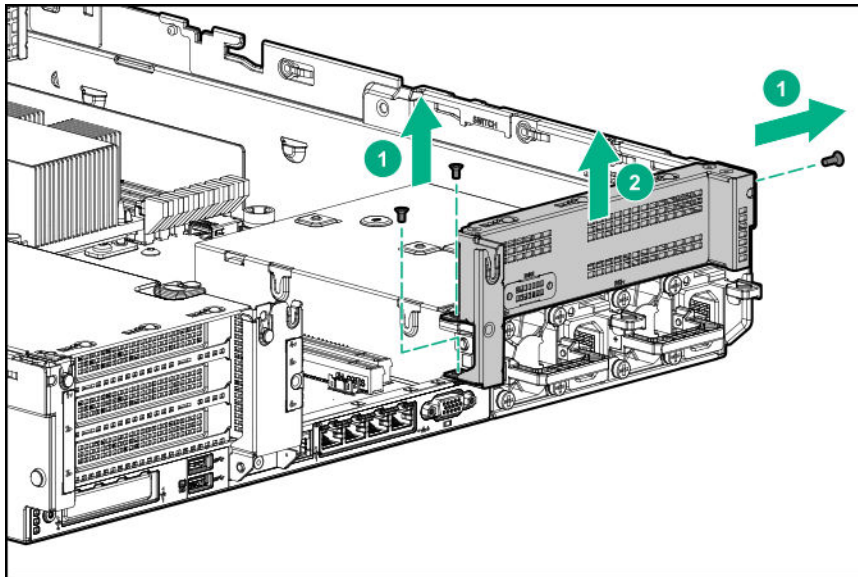
- T-10 Torx screwdriver
- The components included with the hardware option kit

### Procedure

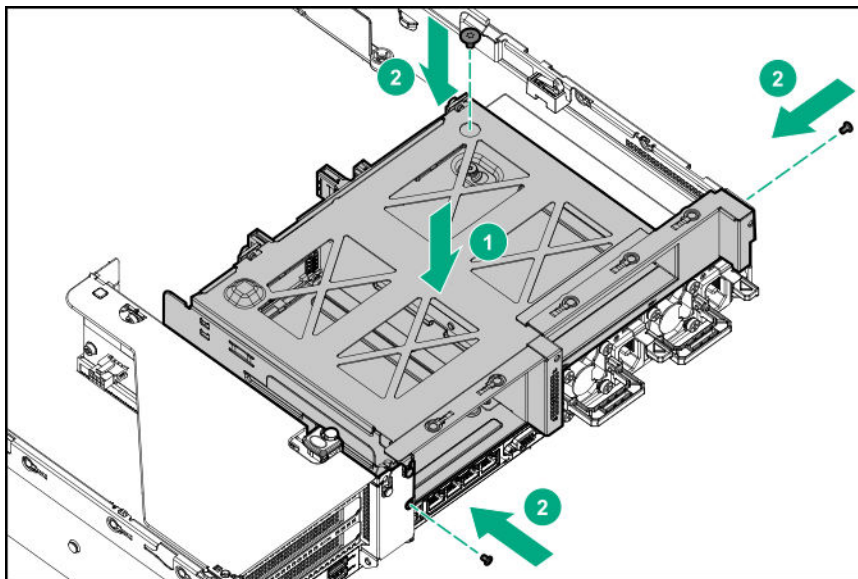
1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. If installed, remove the secondary riser cage. The secondary riser cage is not supported with a three-bay LFF rear configuration.



6. Remove the rear wall blank.



7. Install the three-bay LFF rear drive cage option.



8. Install drives or drive blanks.
9. **Connect the power and data cables.**
10. **Install the access panel.**
11. Slide the server into the rack.
12. Connect each power cord to the server.
13. Connect each power cord to the power source.
14. **Power up the server.**

The installation is complete.

## Riser and riser cage options

# Installing primary and secondary risers

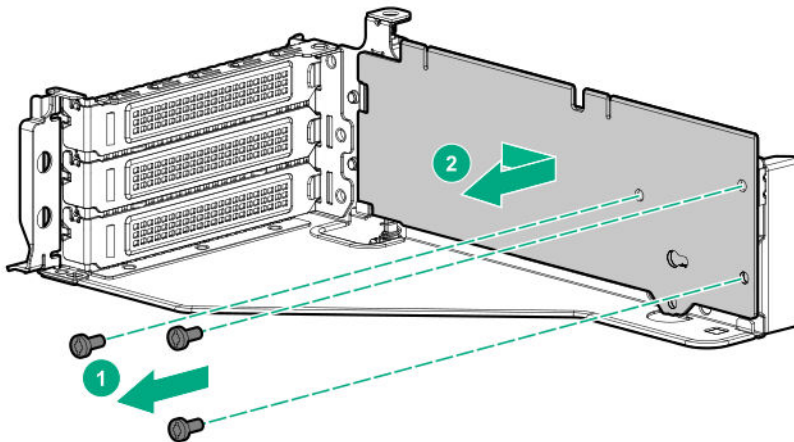
## Prerequisites

Before installing this option, be sure that you have the following:

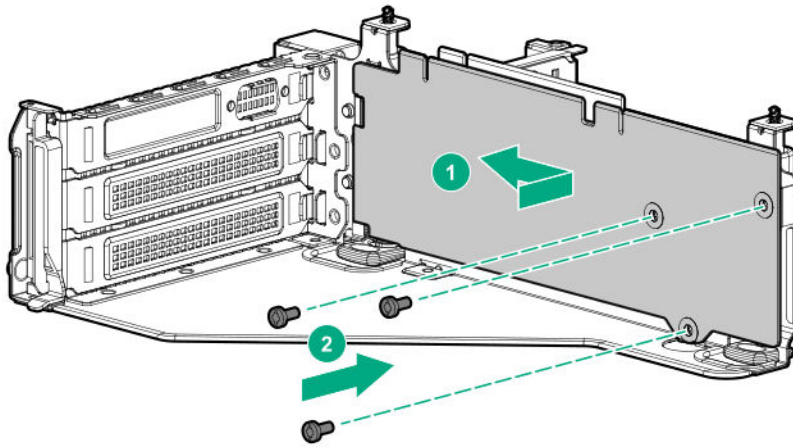
- The components included with the hardware option kit
- T-10 Torx screwdriver

## Procedure

1. **Power down the server .**
2. Do one of the following:
  - Disconnect each power cord from the power source.
  - Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the riser cage.**
6. Remove the riser board.



7. Install the riser.



8. **Install any expansion boards, if needed**
9. Connect data cables to the riser or expansion board, if needed.
10. **Install the riser cage.**
11. If needed, connect data cables to drive backlanes.

The installation is complete.

## Installing tertiary risers

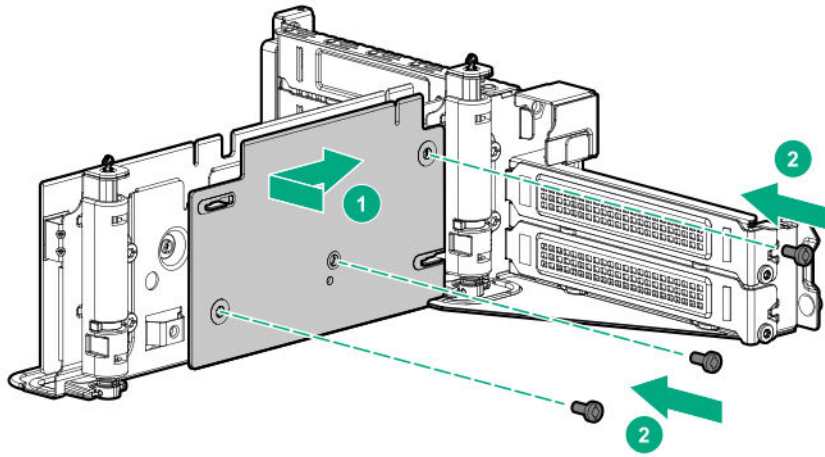
### Prerequisites

Before installing this option, be sure that you have the following:

- The components included with the hardware option kit
- T-10 Torx screwdriver
- A tertiary riser cage is required to install this option.

### Procedure

1. **Power down the server.**
2. Do one of the following:
  - Disconnect each power cord from the power source.
  - Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the riser cage.**
6. Install the riser.



7. **Install any expansion cards, if needed.**
8. Connect any data cables to riser or expansion boards.
9. **Install the tertiary riser cage.**
10. Connect cables to drive backplanes, if needed.

The installation is complete.

## Installing a secondary riser cage

### Prerequisites

Before installing this option, be sure that you have the following:

- The components included with the hardware option kit
- T-10 Torx screwdriver

### Procedure

1. Observe the following alert:



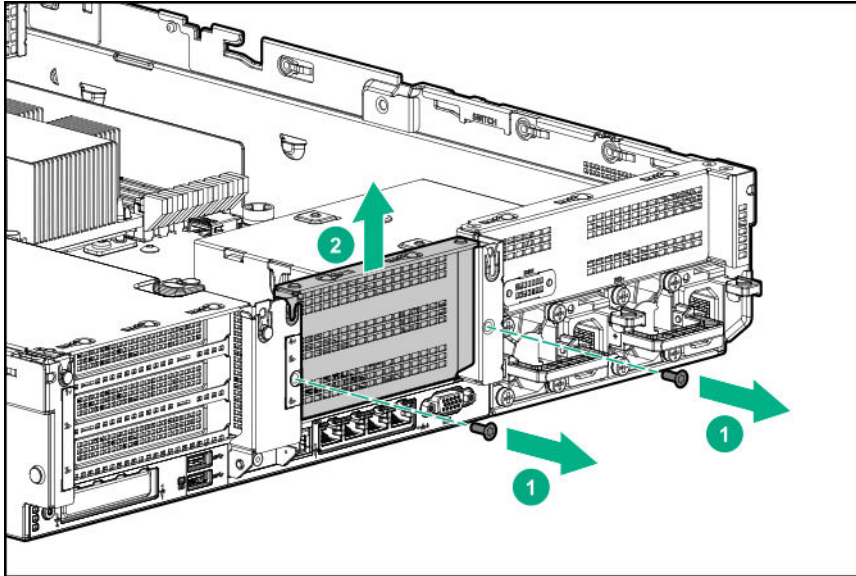
#### **CAUTION:**

To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

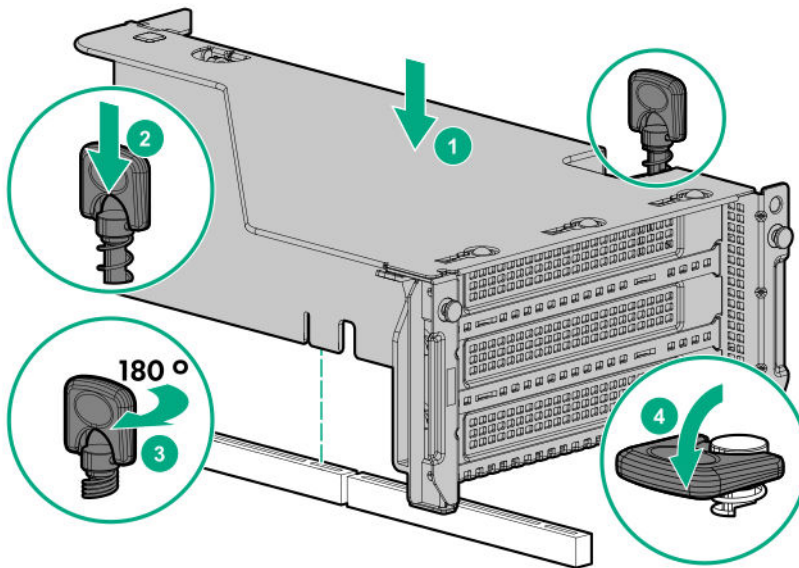
2. **Power down the server.**
3. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
4. Do one of the following:



- Extend the server from the rack.
  - Remove the server from the rack.
5. Remove the access panel.
  6. Remove the rear wall blank.



7. Install any expansion boards, if needed.
8. Install the riser cage:



The installation is complete.

## Installing a tertiary riser cage

### Prerequisites

Before installing this option, be sure that you have the following:

- The components included with the hardware option kit
- T-10 Torx screwdriver

## Procedure

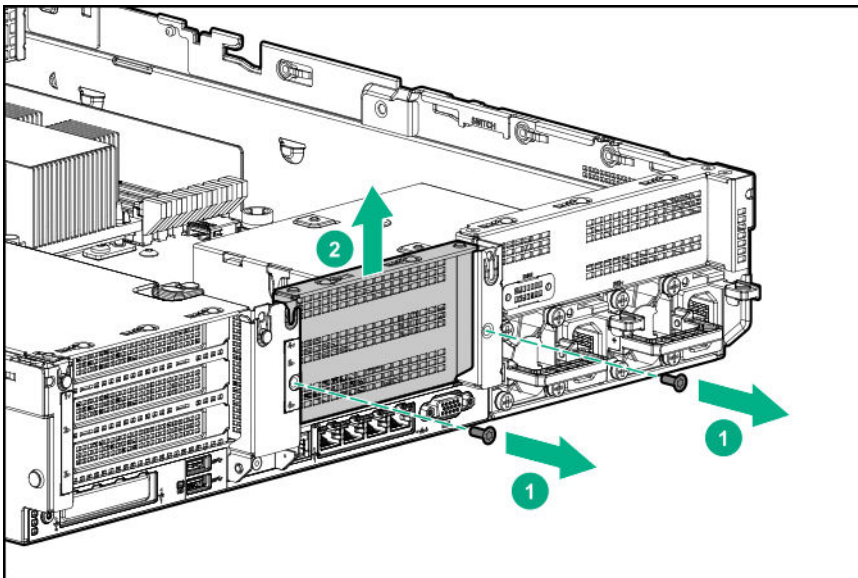
1. Observe the following alert.

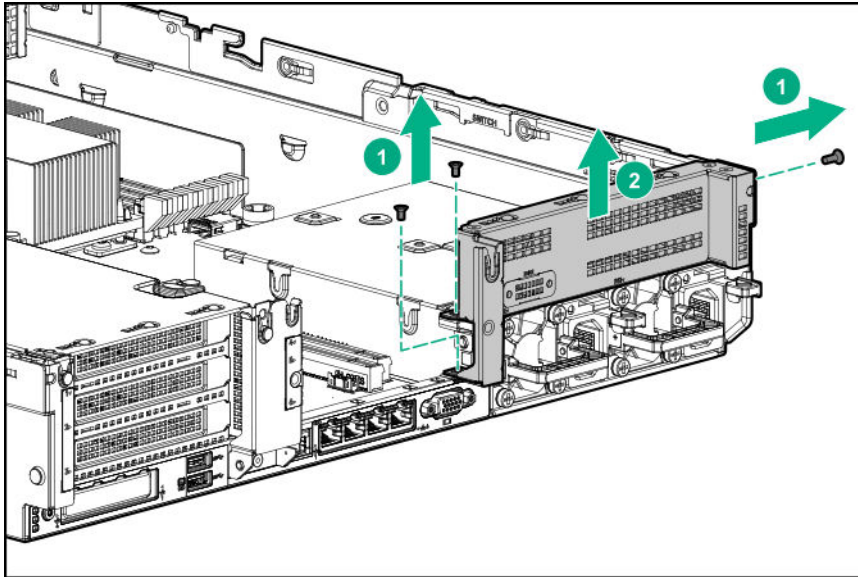


### CAUTION:

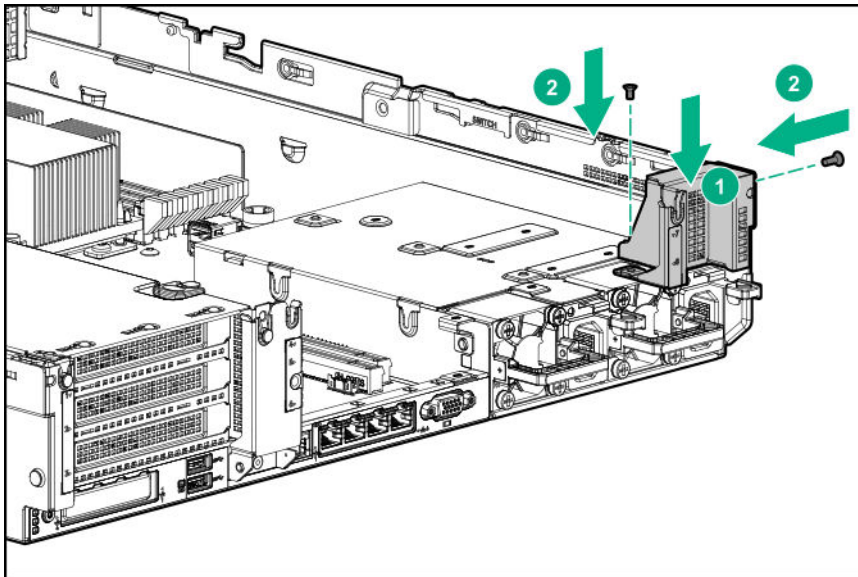
To prevent damage to the server or expansion boards, power down the server and remove all AC power cords before removing or installing the PCI riser cage.

2. **Power down the server.**
3. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
4. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
5. **Remove the access panel.**
6. Remove the rear wall blanks.



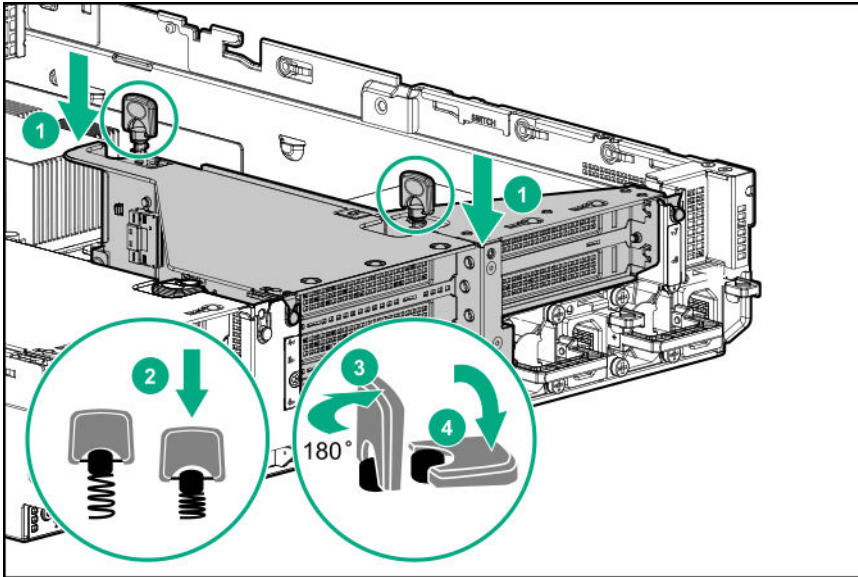


7. Install the rear blank from the option kit.



8. **Install any expansion boards, if needed**

9. Install the tertiary riser cage:



The installation is complete.

## Installing the 2NVMe slimSAS riser option

### Prerequisites

Before installing this option, be sure that you have the following:

- The components included with the hardware option kit
- T-10 Torx screwdriver

### Procedure

1. **Power down the server.**
2. Do one of the following:
  - Disconnect each power cord from the power source.
  - Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Using the labels on the cable, connect the cables to the riser.**
6. **Install the tertiary riser cage.**
7. Connect the cable to the drive backplane.

The installation is complete.

## Installing the 8NVMe slimSAS riser option

The 8NVMe slimSAS riser can be installed in the primary or secondary position.

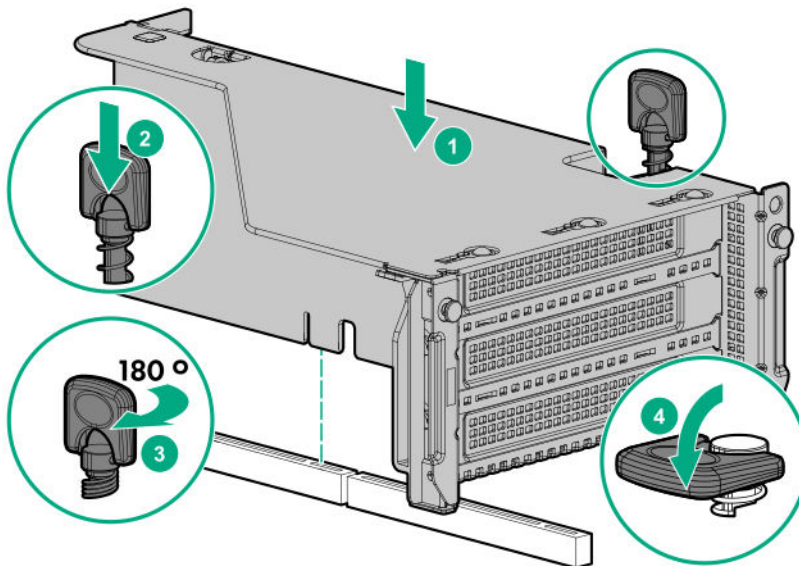
### Prerequisites

Before installing this option, be sure that you have the following:

- The components included with the hardware option kit
- T-10 Torx screwdriver

### Procedure

1. **Power down the server .**
2. Do one of the following:
  - Disconnect each power cord from the power source.
  - Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Using the labels on the cable, connect the cables to the riser.**
6. Do one of the following:  
To install the riser in the primary position:



To install the riser in the secondary position, install the **secondary riser cage**.

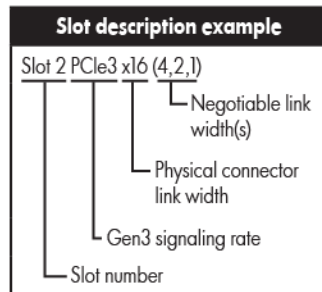
7. Connect data cables to the drive backplane.

## Expansion slots

### Supported PCIe form factors

All slots support full-height expansion cards. Use the following information to find supported lengths for each slot.

#### Slot description example



#### Primary riser connector

PCIe slot and card length	3-slot riser*	2-slot riser (Optional)	2-slot riser (Optional)
Slot 1 - Full-length/Full-height (FL/FH)	PCIe3 x8 (8, 4, 2, 1)	—	PCIe3 x16 (16, 8, 4, 2, 1)
Slot 2 - Full-length/Half-length/Full-height (FL/HL/FH)	PCIe3 x16 (16, 8, 4, 2, 1)	PCIe3 x16 (16, 8, 4, 2, 1)	PCIe3 x16 (16, 8, 4, 2, 1)
Slot 3 - Half-length/Full-height (HL/FH)	PCIe3 x8 (8, 4, 2, 1)	PCIe3 x16 (16, 8, 4, 2, 1)	—

\*The server ships with one PCIe3 riser cage installed in the primary riser cage connector.

#### Secondary riser connector

PCIe slot and card length	3-slot riser*	2-slot riser (Optional)	2-slot riser (Optional)
Slot 4 - Full-length/Full-height (FL/FH)	PCIe3 x8 (8, 4, 2, 1)	—	PCIe3 x16 (16, 8, 4, 2, 1)
Slot 5 - Half-length/Full-height (HL/FH)	PCIe3 x16 (16, 8, 4, 2, 1)	PCIe3 x16 (16, 8, 4, 2, 1)	PCIe3 x16 (16, 8, 4, 2, 1)
Slot 6 - Half-length/Full-height (HL/FH)	PCIe3 x8 (8, 4, 2, 1)	PCIe3 x16 (16, 8, 4, 2, 1)	—

## Tertiary riser connector

PCIe slot and card length	2-slot riser (Optional)	1-slot riser (Optional)
Slot 7 - Full-length/Full-height (FL/FH)	PCIe3 x8 (8, 4, 2, 1)	PCIe3 x16 (16, 8, 4, 2, 1)
Slot 8 - Half-length/Full-height (HL/FH)	PCIe3 x8 (8, 4, 2, 1)	—

## Installing expansion boards



### WARNING:

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



### CAUTION:

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

To install the component:

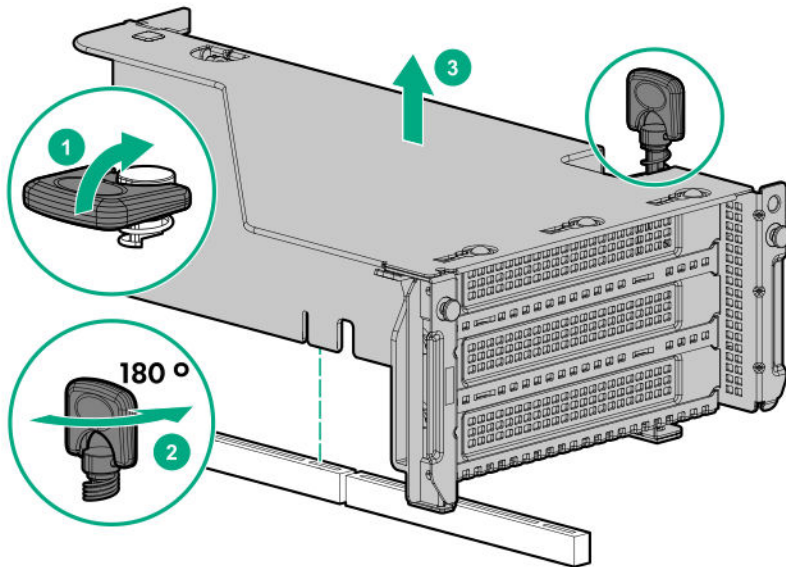
### Prerequisites

Before installing this option, be sure that you have the following:

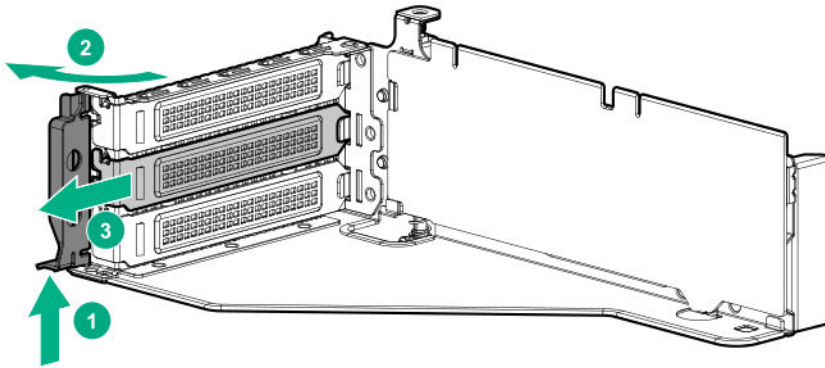
The components included with the hardware option kit

### Procedure

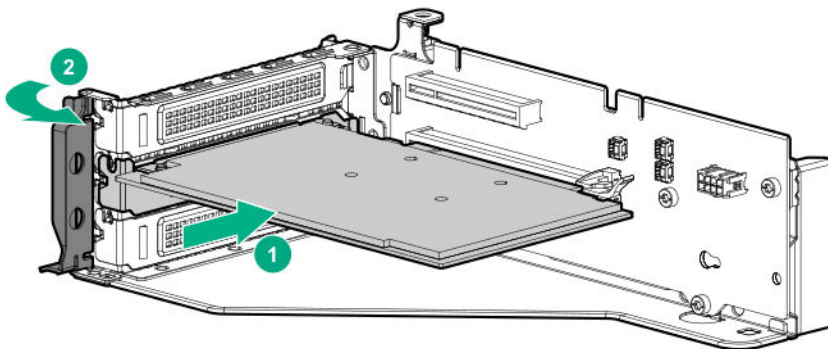
1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. Remove the riser cage.



6. Identify and then remove the PCIe blank from the riser cage.

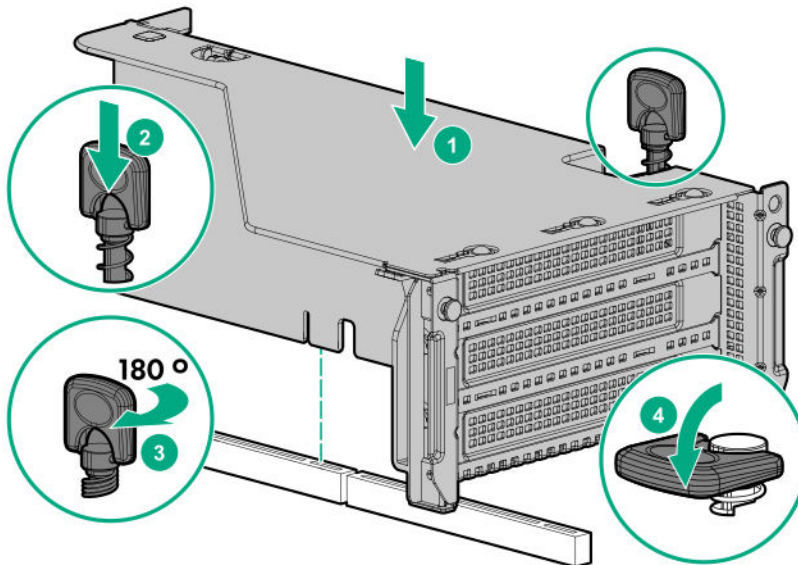


7. Install the expansion board.



8. If internal cables are required for the expansion board, connect the cables.
9. Install the riser cage.





**10. Install the access panel.**

- 11. Slide the server into the rack.
- 12. Connect each power cord to the server.
- 13. Connect each power cord to the power source.
- 14. **Power up the server.**

The installation is complete.

## Installing a 12G SAS Expander Card

- For 24SFF configurations, install 8SFF front drive cages in boxes 1 and 2.
- For configurations including a 2SFF rear drive cage, install the drive cage over the power supplies.
- HPE recommends installing the SAS expander card into slot 3 of the primary PCIe riser expansion card.
- To ensure that cables are connected correctly, observe the labels on the cable and port.
- Be sure that you have the latest firmware for the controllers and the expander card. To download the latest firmware, see the [Hewlett Packard Enterprise website](#).

### Prerequisites

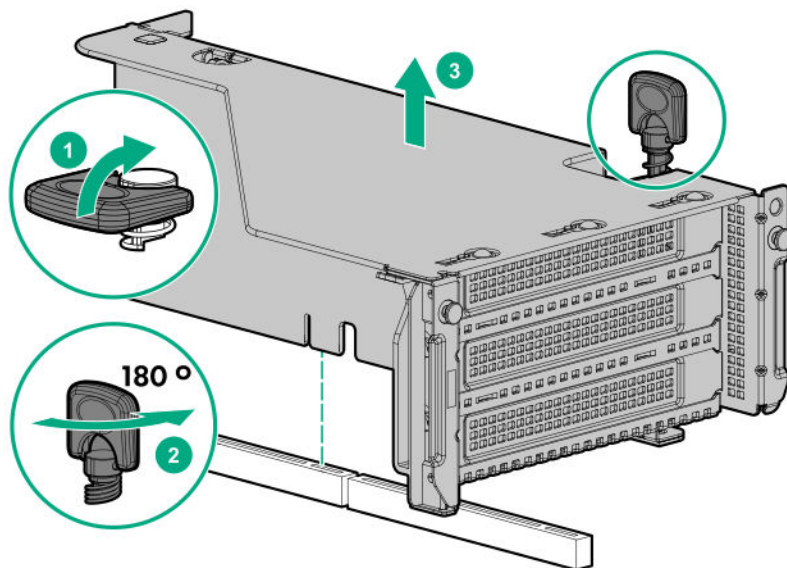
Before installing this option, be sure that you have the following:

- The components included with the hardware option kit
- Storage cables for each drive box
- A storage controller

### Procedure

1. **Power down the server.**
2. Remove all power:

- a. Disconnect each power cord from the power source.
- b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. **Remove the fan cage.**
7. Remove the riser cage.



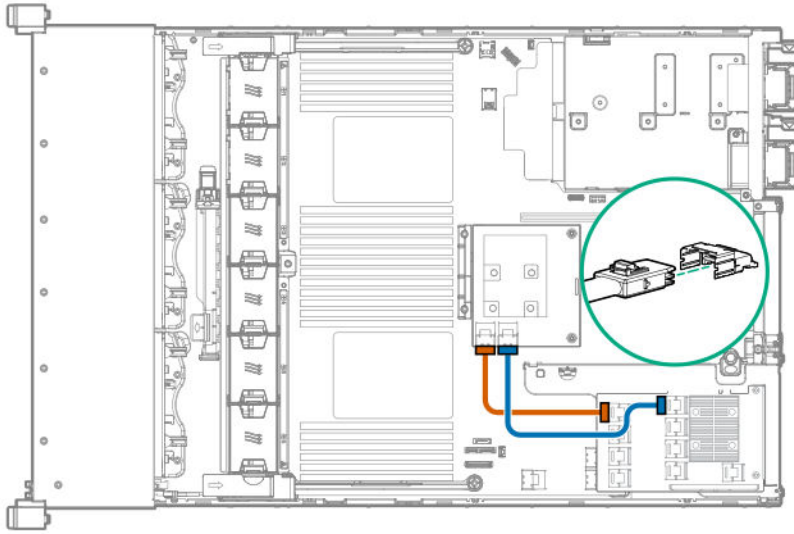
8. Locate slot 3, and then **remove the expansion slot blank.**
9. **Install the 12G SAS expander card.**

---

ⓘ **IMPORTANT:**  
 The 12G SAS expander card requires a controller. The server supports embedded, type-a, and type-p Smart Array controllers. If using a type-p Smart Array controller, then install the controller in slot 1.

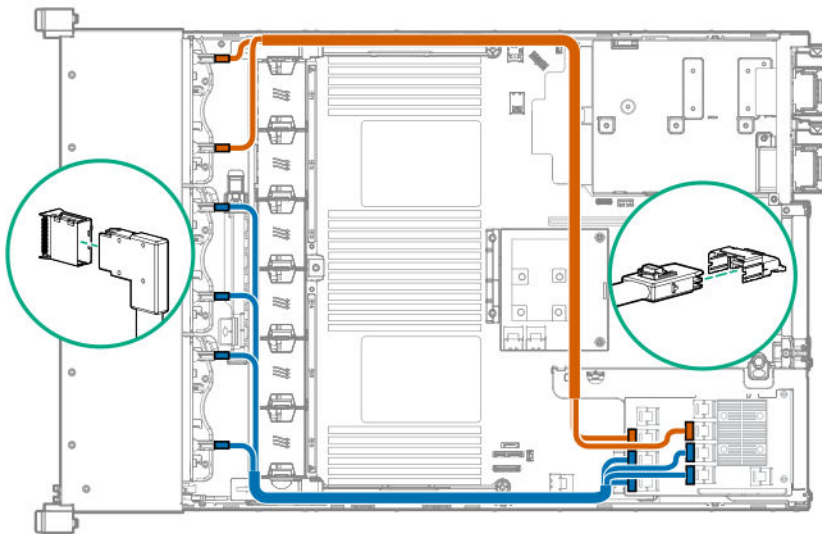
---

10. Using the labels on each cable, connect the cables to the SAS expander.  
 For drive numbering, see "**Drive bay numbering: SAS expander**" on page 35".
11. **Install the riser cage.**
12. **Connect cables from the 12G SAS expander to the controller.**



**13. Connect cables from the 12G SAS expander to the drive backplanes.**

A standard configuration is shown. For additional cabling diagrams, see "[Cabling diagrams](#)" on page 140".



**14. Install the fan cage.**

**15. Install the air baffle.**

**16. Install the access panel.**

**17. Install the server into the rack.**

18. Connect each power cord to the server.

19. Connect each power cord to the power source.

**20. Power up the server.**

The installation is complete.

# Installing a GPU card

A GPU can be installed into the primary, secondary, or tertiary position. This procedure shows installation in the secondary position.

## Prerequisites

Before installing this option, be sure that you have the following:

- The components included with the hardware option kit
- T-30 Torx screwdriver
- T-10 Torx screwdriver
- High-performance heatsinks must be installed with this option.

## Procedure

1. Observe the following alert.

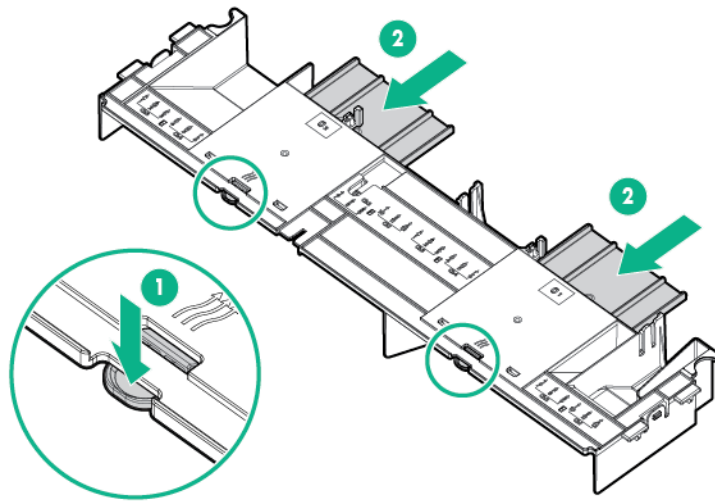


### CAUTION:

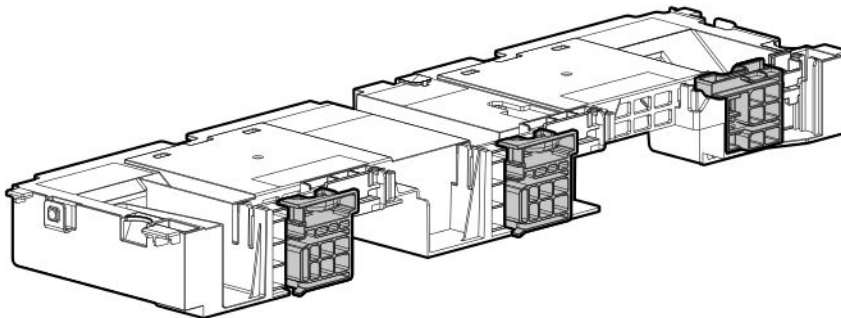
To prevent improper cooling and thermal damage, do not operate the server unless all PCIe slots have either an expansion slot cover or an expansion board installed.

---

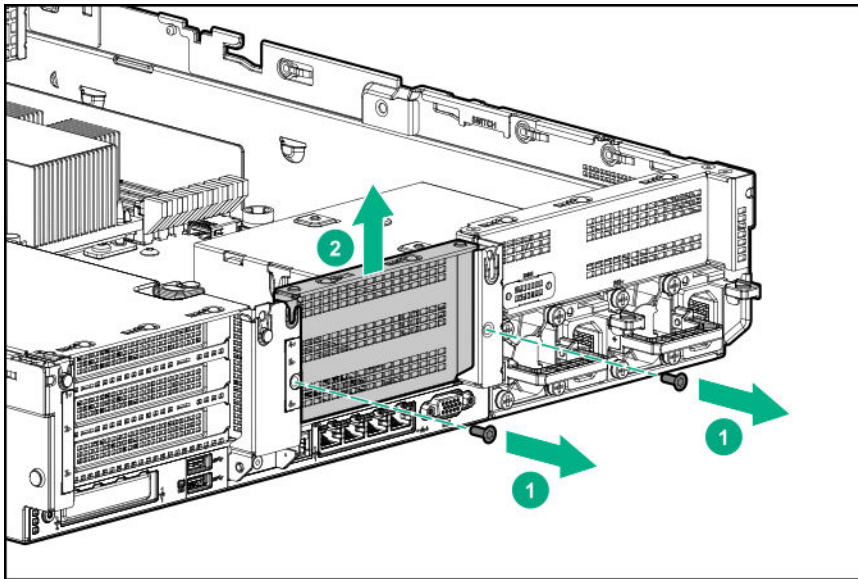
2. **Power down the server.**
3. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
4. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
5. **Remove the access panel.**
6. **Remove the air baffle.**
7. Remove the air diverters from the air baffle.



8. Install the appropriate retention clip onto the air baffle. Install the clip that supports your configuration. Primary, secondary, and tertiary positions are shown.

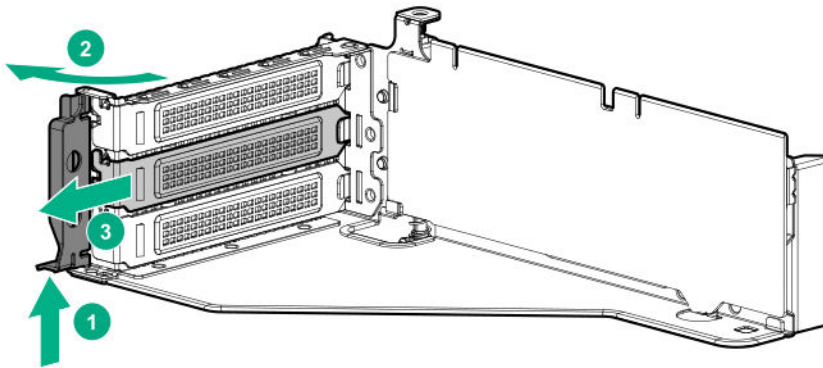


9. **Install high-performance heatsinks.**
10. **Install the air baffle.**
11. Remove the rear wall blank.  
For secondary GPUs, remove the rear wall blank.

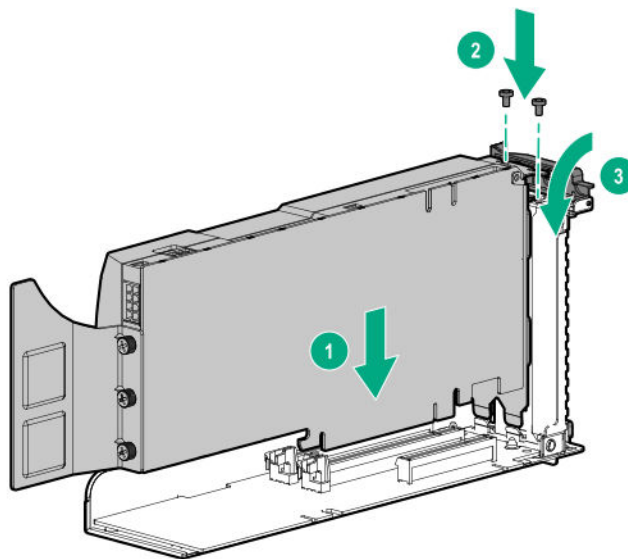


For tertiary GPUs, see "[Installing a tertiary riser cage](#) on page 105".

12. Remove the PCIe blank.

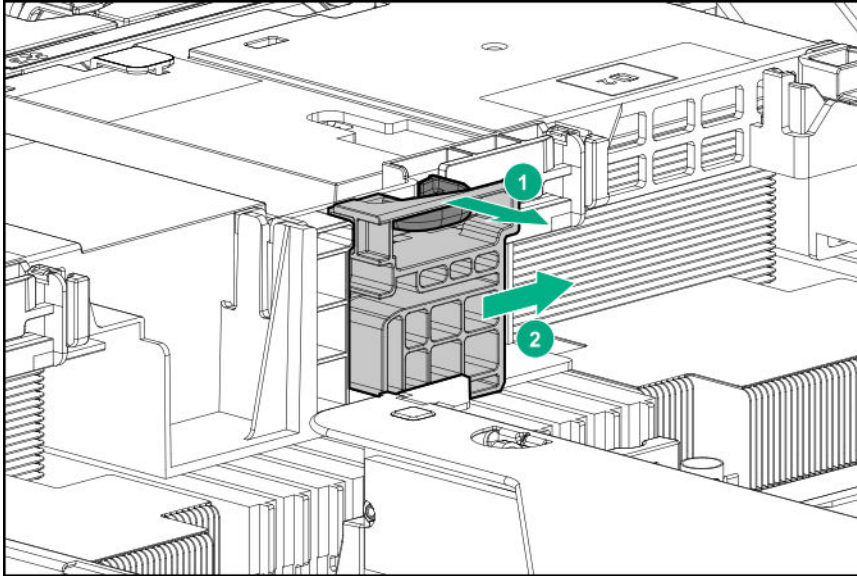


13. Install the GPU into the riser.

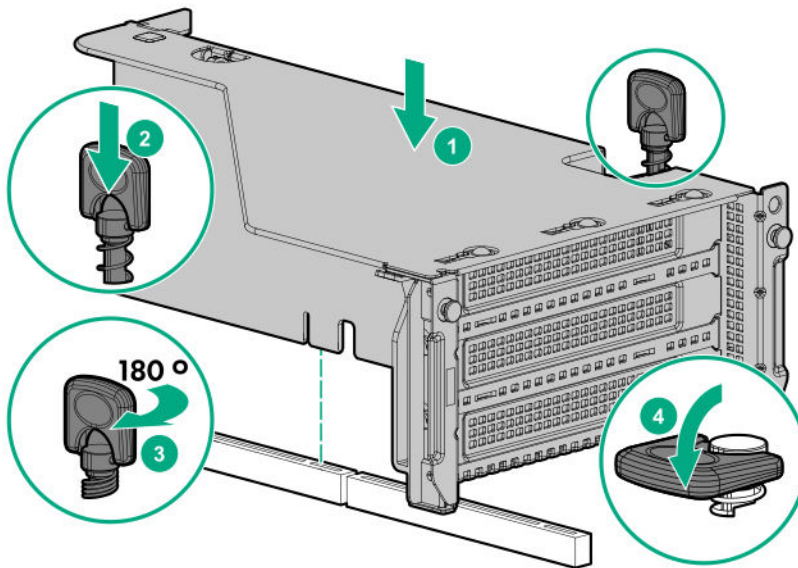


14. Connect the power cable from the GPU to the riser.

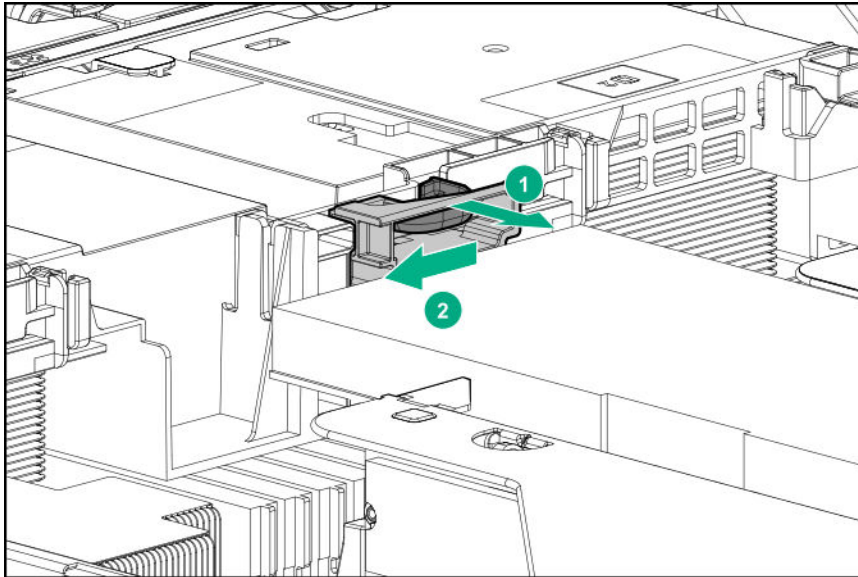
15. Slide the retention clips to the unlocked position.



16. Install the riser cage.



17. Slide the retention clips to the locked position.



The installation is complete.

## Installing an intrusion detection switch

### Prerequisites

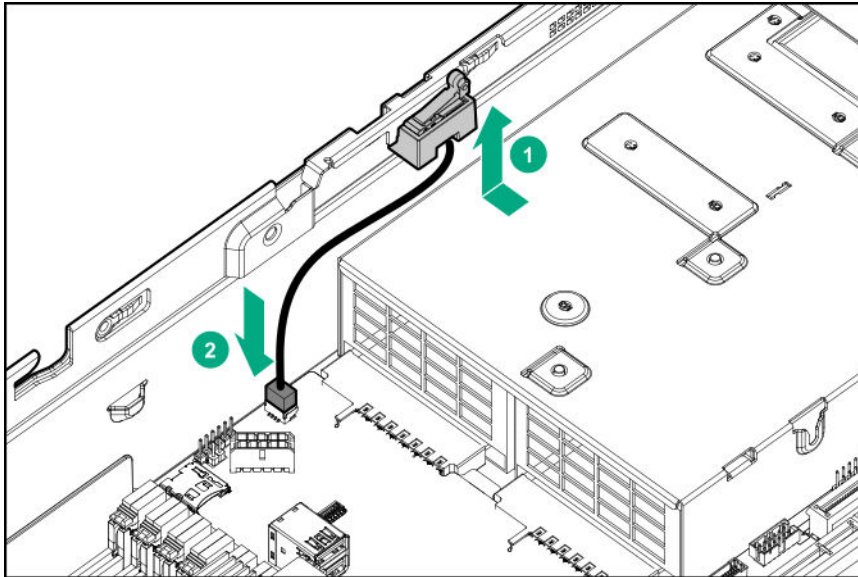
Before installing this option, be sure that you have the following:

The components included with the hardware option kit

### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack .**
4. **Remove the access panel.**
5. **Remove the air baffle.**
6. Install the intrusion detection switch.





## Installing a Smart Storage Battery

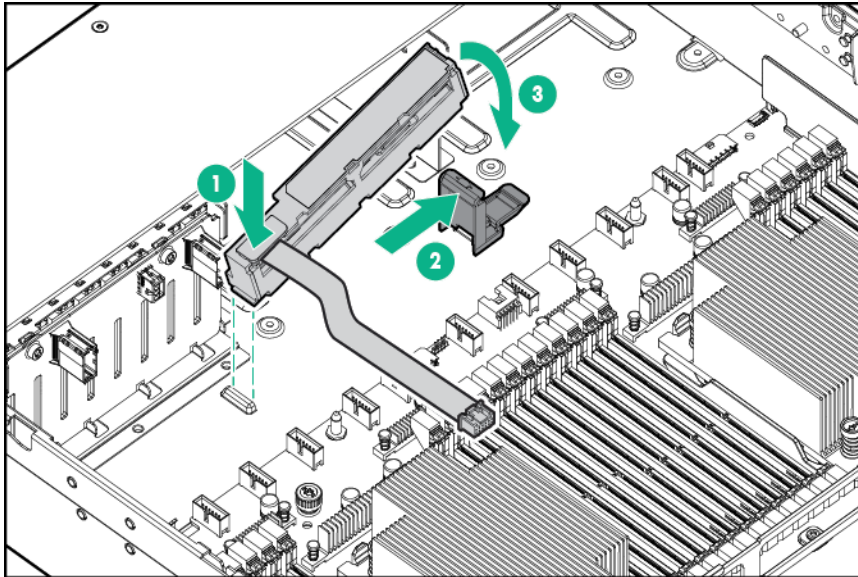
### Prerequisites

Before installing this option, be sure that you have the following:

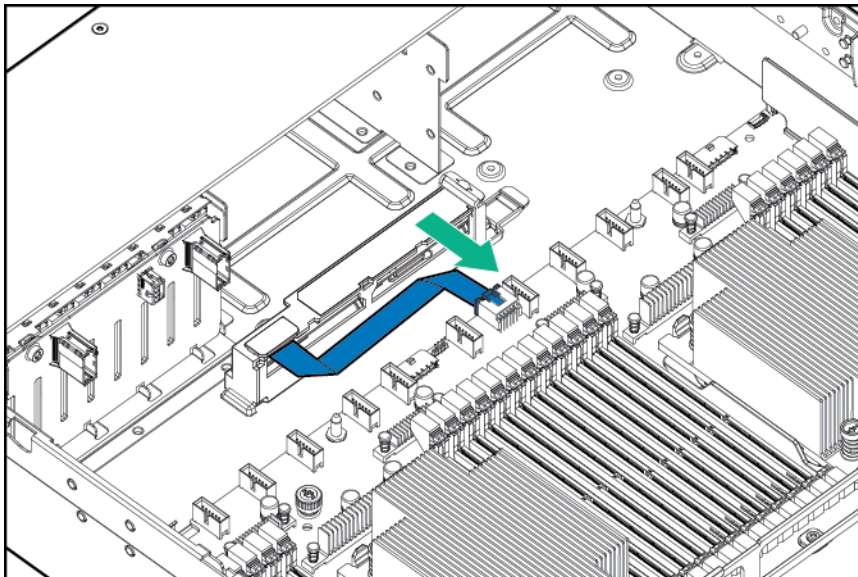
The components included with the hardware option kit

### Procedure

1. **Power down the server.**
2. Do one of the following:
  - Disconnect each power cord from the power source.
  - Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. Do one of the following:
  - **Remove the air baffle.**
  - **If installed on LFF models, remove the midplane drive cage.**
6. Install the Smart Storage battery.



7. Install the cable.



8. Install the fan cage.
9. **Install the air baffle.**
10. **Install the access panel.**
11. Slide the server into the rack.
12. Connect each power cord to the server.
13. Connect each power cord to the power source.
14. **Power up the server.**

The installation is complete.

## Installing a rear serial port interface

If a tertiary riser cage is installed, you can install the serial port into the slot 6.

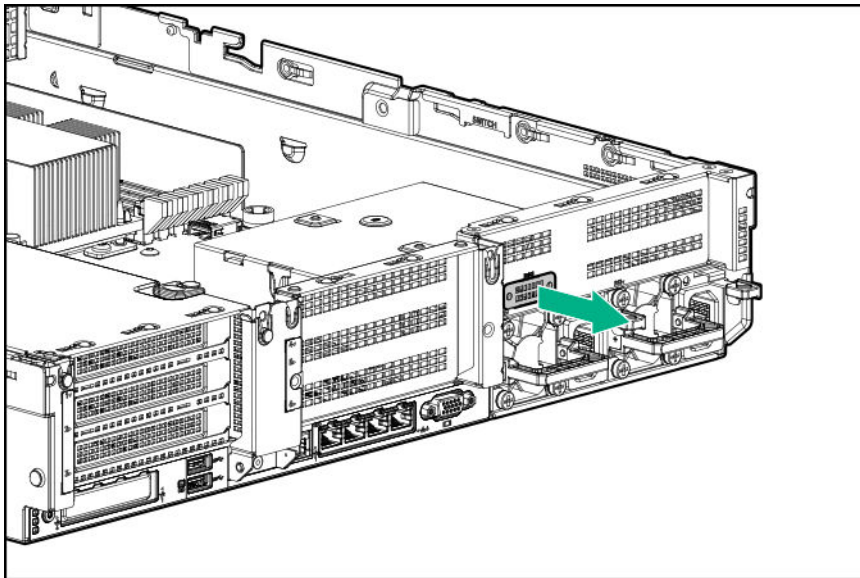
## Prerequisites

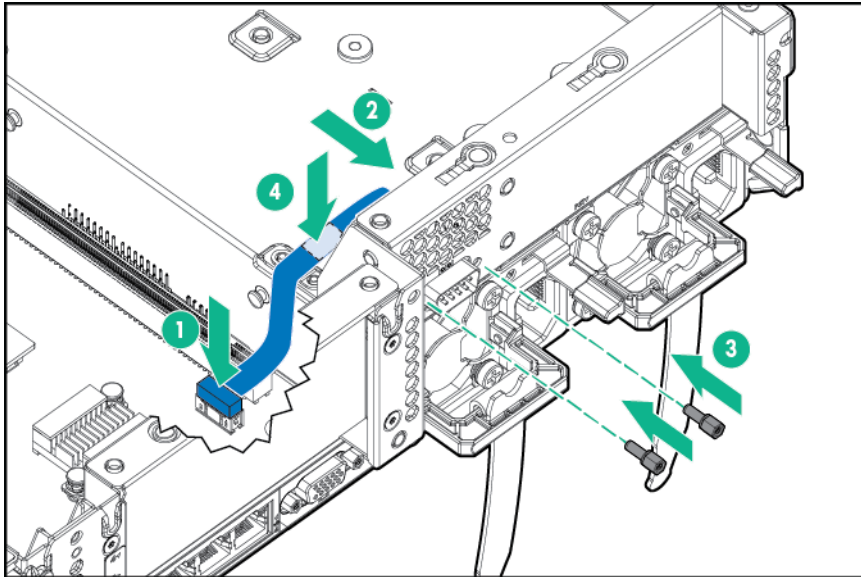
Before installing this option, be sure that you have the following:

The components included with the hardware option kit

## Procedure

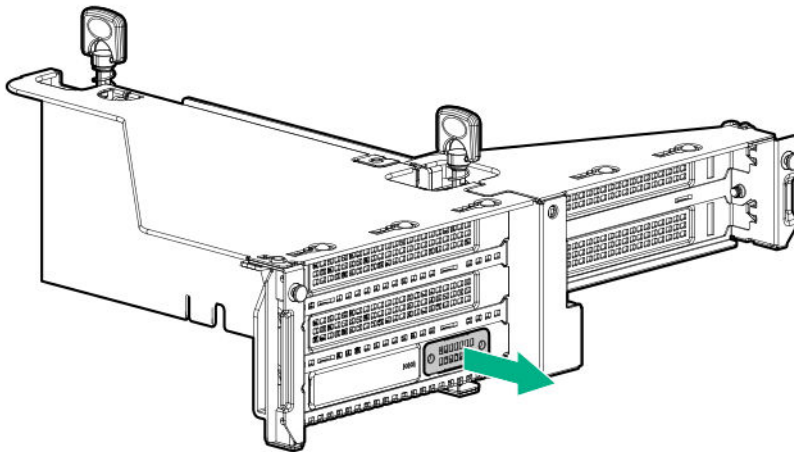
1. **Power down the server.**
2. Do one of the following:
  - Disconnect each power cord from the power source.
  - Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**
4. **Remove the access panel.**
5. Do one of the following:
  - If a tertiary riser cage is not installed, install the serial port.



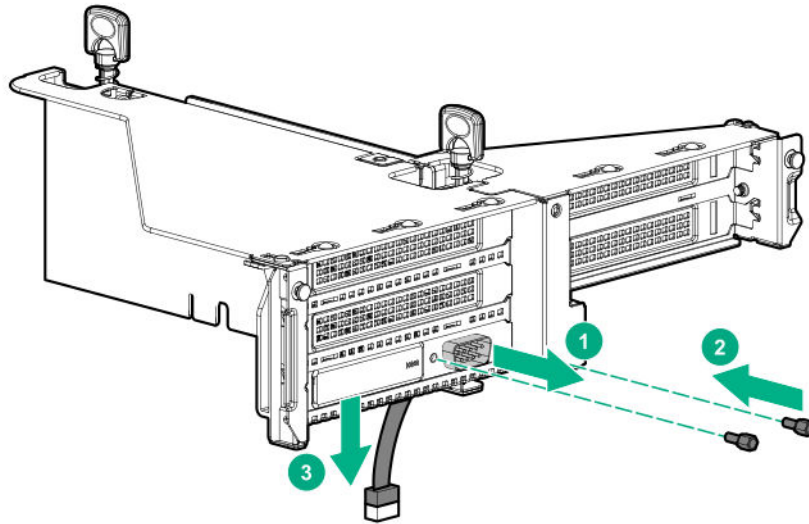


Be sure to remove the backing from the double-sided tape.

- If a tertiary riser cage is installed, remove the riser and the blank.



Install the serial port.



6. **Install the access panel.**
7. Install the server in the rack.
8. Connect each power cord to the server.
9. Connect each power cord to the power source.
10. **Power up the server .**

The installation is complete.

## Installing a Systems Insight Display

### Prerequisites

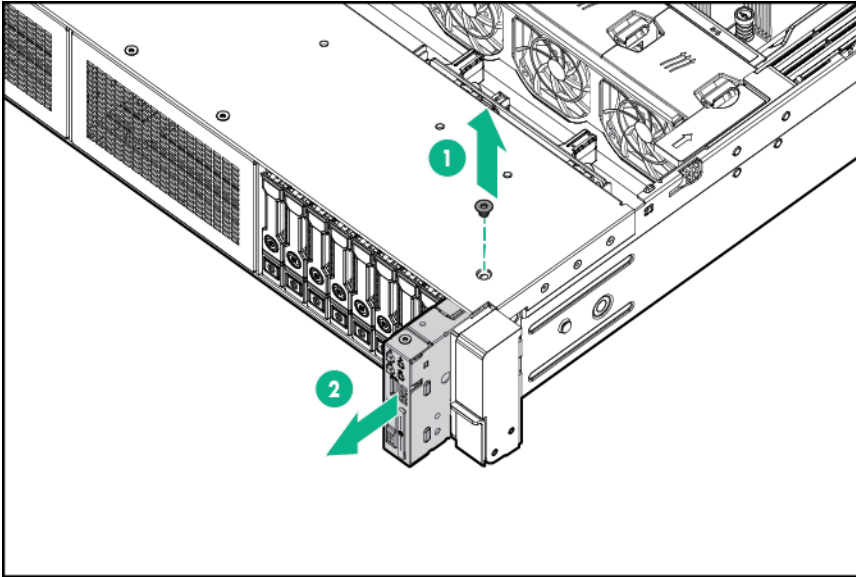
Before installing this option, be sure that you have the following:

- The components included with the hardware option kit
- T-10 Torx screwdriver

### Procedure

1. **Power down the server.**
2. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
3. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**

4. **Remove the access panel.**
5. Do one of the following:
  - **Remove the air baffle.**
  - If installed on LFF models, remove the midplane drive cage.
6. **Remove the fan cage.**
7. Disconnect the cable from the front power/USB 3.0 connector.
8. Remove the power switch module. Retain the T-10 screw for later use.



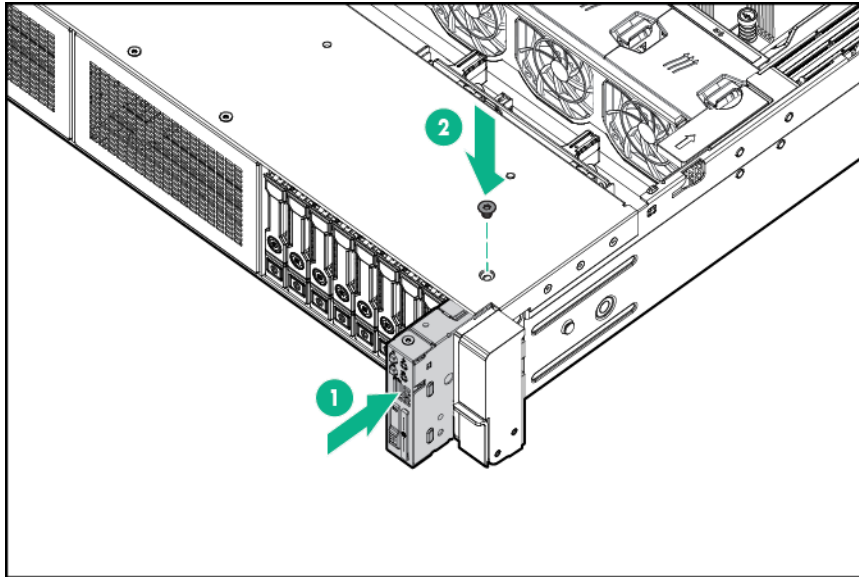
9. Route the cable through the opening in the front of the server, and then install the SID power switch module. Secure the module using the existing screw.



**CAUTION:**

When routing cables, always be sure that the cables are not in a position where they can be pinched or crimped.

---



10. Connect the SID module cable to the front power/USB 3.0 connector.
11. Install the fan cage.
12. **Install the air baffle.**
13. **Install the access panel.**
14. Slide the server into the rack.
15. Connect each power cord to the server.
16. Connect each power cord to the power source.
17. **Power up the server.**

The installation is complete.

## Installing a FlexibleLOM adapter

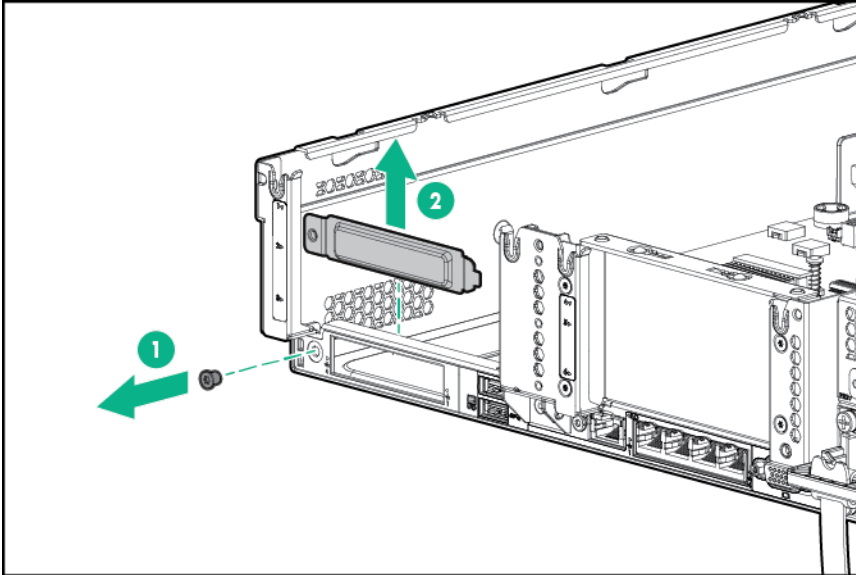
### Prerequisites

- The components included with the hardware option kit
- A T-10 Torx screwdriver might be needed to unlock the access panel.

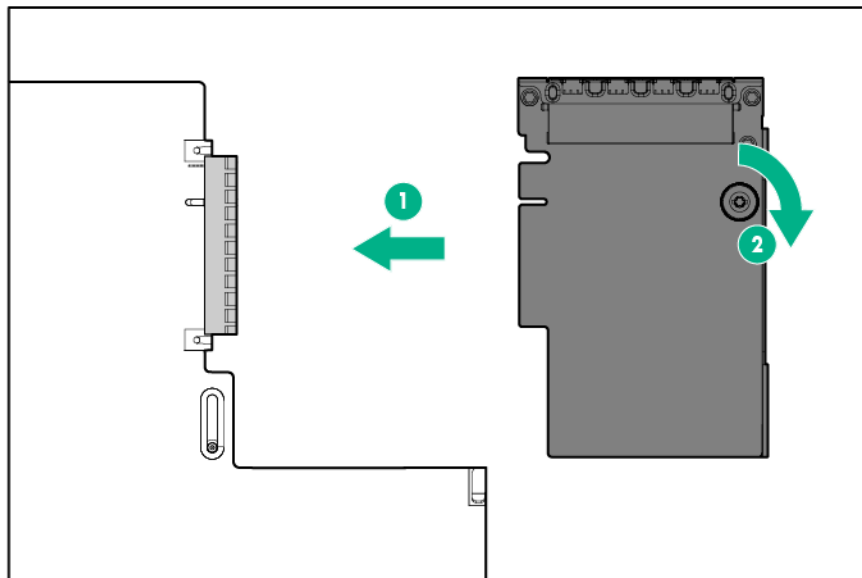
### Procedure

1. **Power down the server .**
2. Do one of the following:
  - Disconnect each power cord from the power source.
  - Disconnect each power cord from the server.
3. Do one of the following:

- Extend the server from the rack.
  - Remove the server from the rack.
4. Remove the access panel.
  5. Remove the primary riser cage.
  6. Remove the FlexibleLOM blank.



7. Install the FlexibleLOM adapter:



8. Install the riser cage.



9. **Install the access panel.**
10. Slide the server into the rack.
11. Connect the LAN segment cables.
12. Connect each power cord to the server.
13. Connect each power cord to the power source.
14. **Power up the server.**

The installation is complete.

## Installing a 1U or high-performance heatsink

This procedure shows a standard heatsink as an example. The installation process is the same for all heatsinks.

HPE recommends **identifying the processor, heatsink, and socket components** before performing this procedure.

### Prerequisites

Before installing this option, be sure that you have the following:

- The components included with the hardware option kit
- T-30 Torx screwdriver

### Procedure

1. Observe the following alerts.



**CAUTION:**

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

---



**CAUTION:**

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

To download firmware and view installation instructions, see the **Hewlett Packard Enterprise Support Center website**.

---



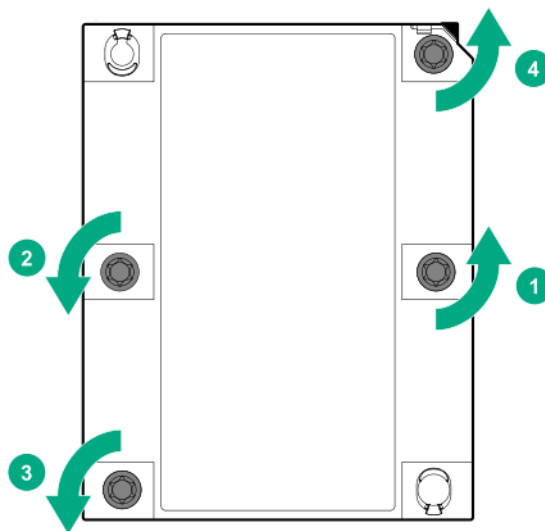
**CAUTION:**

**THE CONTACTS ARE VERY FRAGILE AND EASILY DAMAGED.** To avoid damage to the socket or processor, do not touch the contacts.

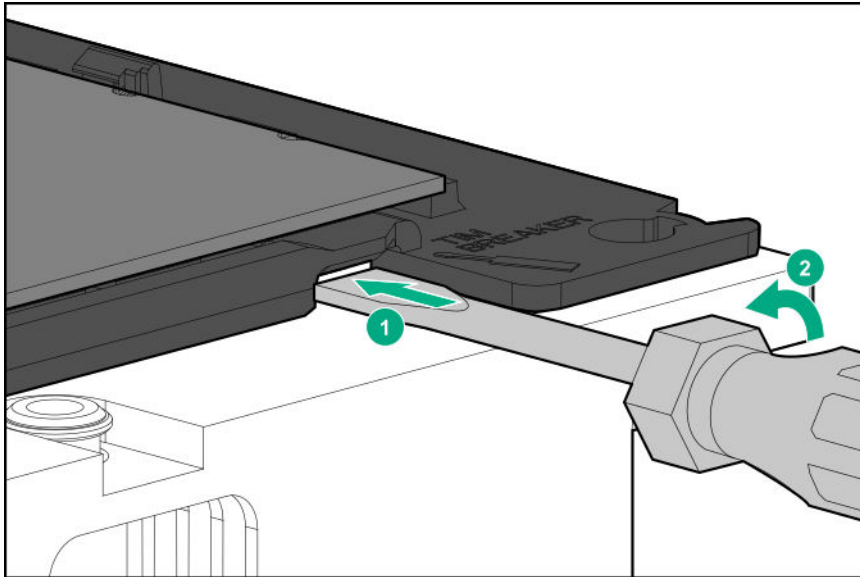
---

2. **Power down the server.**
3. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
4. Do one of the following:

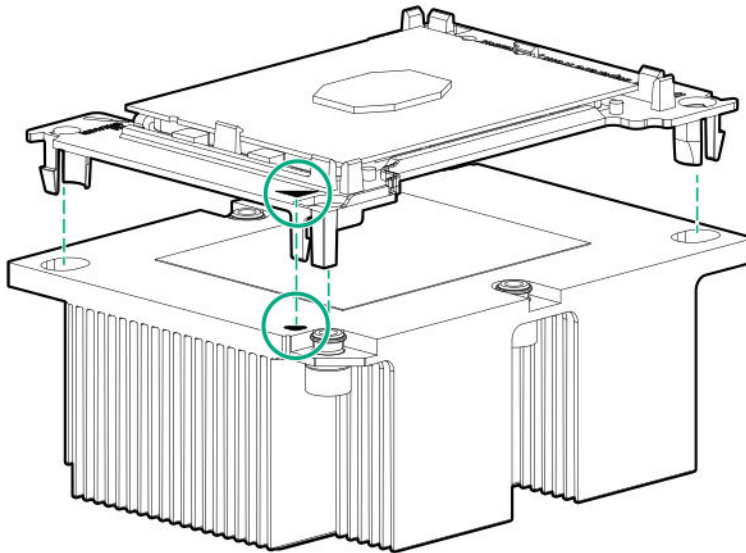
- Extend the server from the rack.
  - Remove the server from the rack.
5. Remove the access panel.
  6. Do one of the following:
    - Remove the air baffle.
    - If installed, remove the 4LFF midplane drive cage.
  7. Remove the processor heatsink assembly:
    - a. Allow the heatsink to cool.
    - b. Loosen the heatsink nuts in the order specified by the label on the heatsink.



- c. Lift the processor heatsink assembly and move it away from the system board.
  - d. Turn the assembly over and place it on a work surface with the processor facing up.
  - e. Install the dust cover.
8. Separate the processor from the heatsink:
    - a. Locate the release slot between the frame and heatsink.  
The release slot is across from the Pin 1 indicator and is labeled with a screwdriver.
    - b. Insert a 1/4" flathead screwdriver into the release slot.  
Be sure that the screwdriver is between the plastic frame and the heatsink.
    - c. To lift the processor frame away from the heatsink, slowly rotate the screwdriver.



- d. Unlatch the remaining corners of the frame.
  - e. Separate the frame from the heatsink.
9. Using an alcohol wipe, remove the existing thermal grease. Allow solvent to dry before making contact with thermal grease.
10. Align the latches and pin 1 indicator, and then install the frame to the heatsink. Verify that all of the latches are engaged with the heatsink.



11. **Install the processor heatsink assembly.**

The installation is complete.

## Installing a processor

Observe the following:

- Before performing this procedure, HPE recommends **identifying the processor-heatsink module components**.
- Intelligent System Tuning supports specific processors and configurations. For more information, see the product QuickSpecs on the HPE website.

## Prerequisites

Before installing this option, be sure that you have the following:

- The components included with the hardware option kit
- T-30 Torx screwdriver

## Procedure

1. Observe the following alerts.

- 
- ⚠ CAUTION:**  
When handling the heatsink, always hold it along the top and bottom of the fins. Holding it from the sides can damage the fins.
- 
- ⚠ CAUTION:**  
To avoid damage to the processor or system board, only authorized personnel should attempt to replace or install the processor in this server.
- 
- ⚠ CAUTION:**  
To prevent possible server malfunction and damage to the equipment, multiprocessor configurations must contain processors with the same part number.
- 
- ⚠ CAUTION:**  
If installing a processor with a faster speed, update the system ROM before installing the processor.  
To download firmware and view installation instructions, see the **Hewlett Packard Enterprise Support Center website**.
- 
- ⚠ CAUTION:**  
**THE CONTACTS ARE VERY FRAGILE AND EASILY DAMAGED.** To avoid damage to the socket or processor, do not touch the contacts.
- 

2. **Power down the server.**
3. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
4. Do one of the following:
  - **Extend the server from the rack.**
  - **Remove the server from the rack.**

**5. Remove the access panel.**

**6. Do one of the following:**

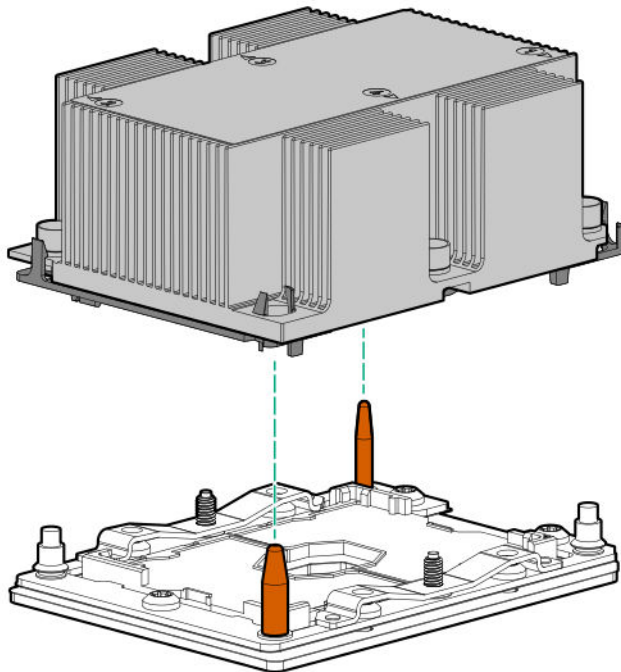
- **Remove the air baffle.**
- **If installed, remove the 4LFF midplane drive cage.**

**7. Install the processor heatsink assembly:**

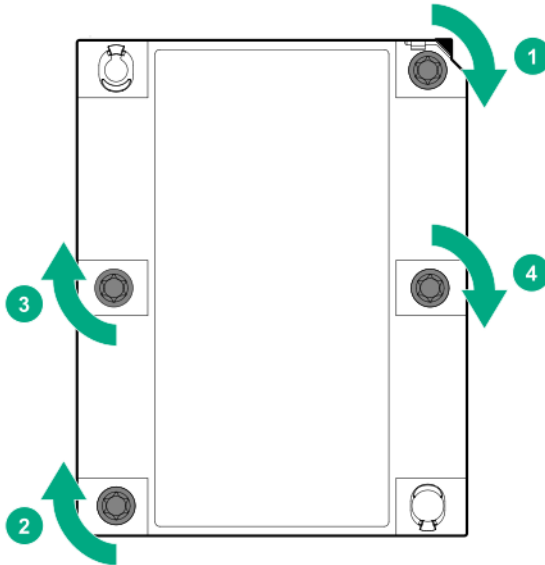
- a. Remove the dust cover.
- b. Locate the Pin 1 indicator on the processor frame and the socket.
- c. Align the processor heatsink assembly with the alignment pins and gently lower it down until it sits evenly on the socket.

The heatsink alignment pins are keyed. The processor will only install one way.

A standard heatsink is shown. Your heatsink might look different.



- d. Using a T-30 Torx screwdriver, tighten the nuts until they stop.



The installation is complete.

## HPE Trusted Platform Module 2.0 Gen10 option

### Overview

Use these instructions to install and enable an HPE TPM 2.0 Gen10 Kit in a supported server. This option is not supported on Gen9 and earlier servers.

This procedure includes three sections:

1. Installing the Trusted Platform Module board.
2. Enabling the Trusted Platform Module.
3. Retaining the recovery key/password.

HPE TPM 2.0 installation is supported with specific operating system support such as Microsoft® Windows Server® 2012 R2 and later. For more information about operating system support, see the product QuickSpecs on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/qs>). For more information about Microsoft® Windows® BitLocker Drive Encryption feature, see the Microsoft website (<http://www.microsoft.com>).



**CAUTION:**

If the TPM is removed from the original server and powered up on a different server, data stored in the TPM including keys will be erased.

---



**IMPORTANT:**

In UEFI Boot Mode, the HPE TPM 2.0 Gen10 Kit can be configured to operate as TPM 2.0 (default) or TPM 1.2 on a supported server. In Legacy Boot Mode, the configuration can be changed between TPM 1.2 and TPM 2.0, but only TPM 1.2 operation is supported.

---

# HPE Trusted Platform Module 2.0 Guidelines

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## **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 is bound to the system board. If an OS is configured to use the TPM and it is removed, the OS may go into recovery mode, data loss can occur, or both.
- 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 the cover of an installed TPM from the system board can damage the TPM cover, the TPM, and the system board.
- If the TPM is removed from the original server and powered up on a different server, data stored in the TPM including keys will be erased.
- When using BitLocker, always retain the recovery key/password. The recovery key/password is required to complete Recovery Mode after BitLocker detects a possible compromise of system integrity or system configuration.
- Hewlett Packard Enterprise is not liable for blocked data access caused by improper TPM use. For operating instructions, see the TPM documentation or the encryption technology feature documentation provided by the operating system.

## Installing and enabling the HPE TPM 2.0 Gen10 Kit

### Installing the Trusted Platform Module board

#### Preparing the server for installation

##### Procedure

1. Observe the following warnings:



#### **WARNING:**

To reduce the risk of personal injury, electric shock, or damage to the equipment, remove power from the server by removing the power cord. The front panel Power On/Standby button does not 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.

---

2. Update the system ROM.

Locate and download the latest ROM version from the [Hewlett Packard Enterprise Support Center website](#). Follow the instructions on the website to update the system ROM.

3. Power down the server (**Power down the server** on page 41).
4. Remove all power:
  - a. Disconnect each power cord from the power source.
  - b. Disconnect each power cord from the server.
5. Do one of the following:
  - Extend the server from the rack.
  - Remove the server from the rack.
6. Place the server on a flat, level work surface.
7. **Remove the access panel.**
8. Do one of the following:
  - **Remove the air baffle.**
  - **If installed, remove the 4LFF midplane drive cage.**
9. Remove any components or cables that may prevent access to the TPM connector.
10. Proceed to **Installing the TPM board and cover** on page 136.

## Installing the TPM board and cover

### Procedure

1. Observe the following alerts:



**CAUTION:**

If the TPM is removed from the original server and powered up on a different server, data stored in the TPM including keys will be erased.

---



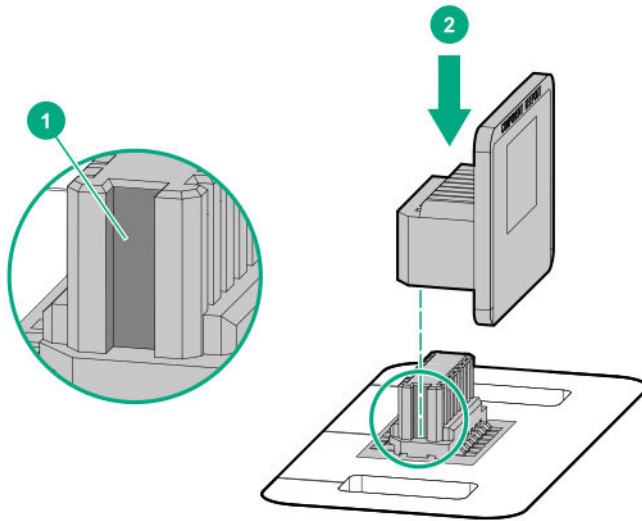
**CAUTION:**

The TPM is keyed to install only in the orientation shown. Any attempt to install the TPM in a different orientation might result in damage to the TPM or system board.

---

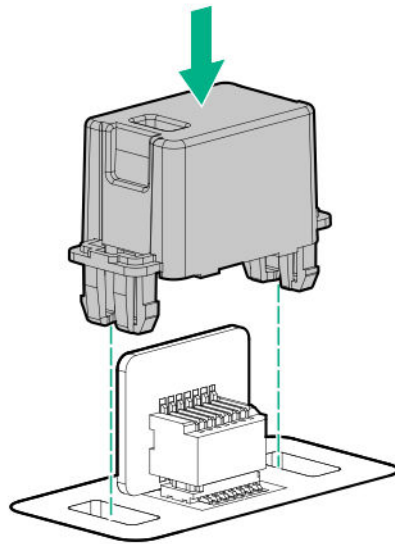
2. Align the TPM board with the key on the connector, and then install the TPM board. To seat the board, press the TPM board firmly into the connector. To locate the TPM connector on the system board, see the server label on the access panel.





3. Install the TPM cover:

- a. Line up the tabs on the cover with the openings on either side of the TPM connector.
- b. To snap the cover into place, firmly press straight down on the middle of the cover.



4. Proceed to **Preparing the server for operation** on page 137.

## Preparing the server for operation

### Procedure

1. Install any options or cables previously removed to access the TPM connector.
2. Do one of the following:

- **Install the air baffle.**
  - **Install the 4LFF midplane drive cage.**
- 3. Install the access panel.**
  4. Install the server in the rack.
  5. Connect power cords to the server.
  6. Press the Power On/Standby button.

## Enabling the Trusted Platform Module

When enabling the Trusted Platform module, observe the following guidelines:

- By default, the Trusted Platform Module is enabled as TPM 2.0 when the server is powered on after installing it.
- In UEFI Boot Mode, the Trusted Platform Module can be configured to operate as TPM 2.0 or TPM 1.2.
- In Legacy Boot Mode, the Trusted Platform Module configuration can be changed between TPM 1.2 and TPM 2.0, but only TPM 1.2 operation is supported.

## Enabling the Trusted Platform Module as TPM 2.0

### Procedure

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 > Trusted Platform Module options**.
3. Verify the following:
  - "Current TPM Type" is set to **TPM 2.0**.
  - "Current TPM State" is set to **Present and Enabled**.
  - "TPM Visibility" is set to **Visible**.
4. If changes were made in the previous step, press the **F10** key to save your selection.
5. If F10 was pressed in the previous step, do one of the following:
  - If in graphical mode, click **Yes**.
  - If in text mode, press the **Y** key.
6. Press the **ESC** key to exit System Utilities.
7. If changes were made and saved, the server prompts for reboot request. Press the **Enter** key to confirm reboot.

If the following actions were performed, the server reboots a second time without user input. During this reboot, the TPM setting becomes effective.

- Changing from TPM 1.2 and TPM 2.0
  - Changing TPM bus from FIFO to CRB
  - Enabling or disabling TPM
  - Clearing the TPM
8. Enable TPM functionality in the OS, such as Microsoft Windows BitLocker or measured boot.  
For more information, see the [Microsoft website](#).

## Enabling the Trusted Platform Module as TPM 1.2

### Procedure

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 > Trusted Platform Module options**.
3. Change the "TPM Mode Switch Operation" to **TPM 1.2**.
4. Verify "TPM Visibility" is **Visible**.
5. Press the **F10** key to save your selection.
6. When prompted to save the change in System Utilities, do one of the following:
  - If in graphical mode, click **Yes**.
  - If in text mode, press the **Y** key.
7. Press the **ESC** key to exit System Utilities.

The server reboots a second time without user input. During this reboot, the TPM setting becomes effective.
8. Enable TPM functionality in the OS, such as Microsoft Windows BitLocker or measured boot.  
For more information, see the [Microsoft website](#).

## 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.

# Cabling

## HPE ProLiant Gen10 DL Servers Storage Cabling Guidelines

When installing cables, observe the following:

- All ports are labeled:
  - System board ports
  - Controller ports
  - 12G SAS Expander ports
- Most data cables have labels near each connector with destination port information.
- Some data cables are pre-bent. Do not unbend or manipulate the cables.
- Before connecting a cable to a port, lay the cable in place to verify the length of the cable.
- When routing cables from the front to the rear of the server, use the cable channels on either side of the chassis.

## Cabling diagrams

Use the following tables to find cabling information and diagrams. For additional cabling configurations, see the HPE Information Library (<http://www.hpe.com/info/CablingMatrixGen10>).

**Table 1: SAS/SATA kits**

Option kit	Cable part number*	From	To	Power cable part number
Front 2SFF SAS/SATA drive cage (SFF)	<a href="#">869826-001</a> <sup>1</sup>	Drive backplane	System board SAS Expander Controller	869810-001 <sup>6</sup> 869825-001 <sup>6</sup>
Front 2SFF SAS/SATA 1U drive cage (LFF)	<a href="#">869826-001</a> <sup>1</sup>	Drive backplane	System board SAS Expander Controller	869810-001 <sup>6</sup>
Front 8SFF SAS/SATA drive cages	<a href="#">776402-001</a> <sup>4</sup>	Drive backplane	System board SAS Expander Controller	869825-001 <sup>6</sup>
Front 4LFF SAS/SATA drive cages	869827-001 <sup>1</sup>	Drive backplane	System board SAS Expander Controller	869825-001 <sup>6</sup>

*Table Continued*

Option kit	Cable part number*	From	To	Power cable part number
Mid 4LFF SAS/SATA drive cage	<b><u>869824-001</u></b> <sup>2</sup>	Drive backplane	System board SAS Expander Controller	869810-001 <sup>6</sup>
Rear 2SFF SAS/SATA riser drive cage	<b><u>869823-001</u></b> <sup>3</sup>	Drive backplane	System board SAS Expander Controller	869806-001 <sup>6</sup>
Rear 3LFF SAS/SATA drive cage	<b><u>869823-001</u></b> <sup>3</sup>	Drive backplane	System board SAS Expander Controller	869810-001 <sup>6</sup>
12G SAS Expander card	<b><u>869802-001</u></b> <sup>5</sup> <b><u>869803-001</u></b> <sup>5</sup>	SAS Expander	Controller	-
SAS/SATA 3-position cable	<b><u>869830-001</u></b> <sup>3</sup> <b><u>869816-001</u></b> <sup>3</sup>	Drive backplane	System board	-

\* To order spare cables, use the following kits and spare part numbers.

<sup>1</sup> Mini-SAS LFF Kit (875090-001)

<sup>2</sup> 12G SAS Expander Kit (875094-001)

<sup>3</sup> Mini-SAS SFF Kit (875089-001)

<sup>4</sup> SAS 8SFF Kit (784629-001)

<sup>5</sup> 12G SAS Expander to controller kit (875093-001)

<sup>6</sup> Power cables kit (875096-001)

**Table 2: NVMe bay/riser kits**

Option kit	Cable part number	From	To	Power cable part number
Front 2SFF NVMe drive cage	<b><u>NVMe cable included with NVMe riser</u></b>	Drive backplane	Tertiary riser	869810-001 <sup>3</sup>
Front 8SFF SAS/SATA/NVMe Premium for SFF	776402-001 <b><u>NVMe cable included with NVMe riser</u></b>	Drive backplane	SATA to Systemboard, controller, or SAS expander Tertiary riser	869825-001 <sup>3</sup>
Front 8SFF NVMe drive cage	<b><u>NVMe cable included with NVMe riser</u></b>	Drive backplane	Primary riser	869825-001 <sup>3</sup>

*Table Continued*

Option kit	Cable part number	From	To	Power cable part number
HPE DL380 Gen10 4-Port Slim SAS Riser, Secondary PCIe	<u>869814-001</u> <sup>1</sup> <u>869813-001</u> <sup>1</sup>	PCIe riser	Backplane	-
HPE DL380 Gen10 2-Port Slim SAS Riser, Tertiary PCIe	<u>869812-001</u> <sup>1</sup> <u>869812-001</u> <sup>1</sup>	PCIe riser	Backplane	-
HPE DL380 Gen10 4-Port Slim SAS Riser	<u>869811-001</u> <u>776402-001</u>	PCIe riser	Backplane	-
HPE DL380 Gen10 1-Port Slim SAS Riser	<u>869812-001</u> <sup>1</sup>	PCIe riser	Backplane	-

<sup>1</sup> NVMe Direct Attach Kit (875092-001)

<sup>2</sup> NVMe SFF Riser Kit (875091-001)

<sup>3</sup> Power cables kit (875096-001)

**Table 3: GPU power**

Option kit	Cable part number	From	To
HPE GPU 6px6p Y-Power Cable Kit	873193-001 <sup>1</sup>	GPU	Riser
HPE GPU 8px6p Y-Power Cable Kit	869805-001 <sup>1</sup>	GPU	Riser
HPE GPU 8p Keyed GPU Cable Kit	869820-001 <sup>1</sup>	GPU	Riser
HPE GPU 8p Cable Kit	869821-001 <sup>1</sup>	GPU	Riser
HPE GPU power adapter	869828-001 <sup>1</sup>	GPU	System board

<sup>1</sup> GPU cables kit (875097-001)

**Table 4: Data kits**

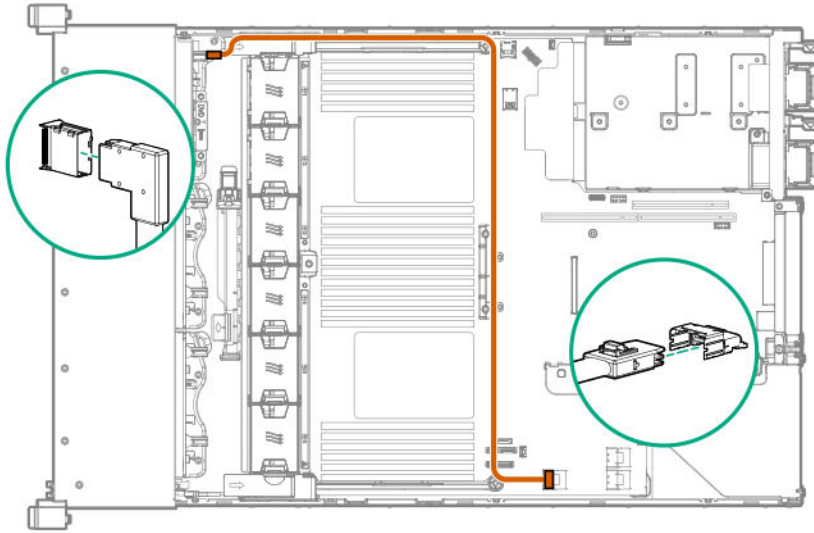
Option kit	Cable part number	From	To
Front USB/display port (SFF UMB)	869804-001 <sup>1</sup>	Component	System board
Front USB port (SFF UMB)	869829-001 <sup>1</sup>	Component	System board
Front display port (LFF)	869808-001 <sup>1</sup>	Component	System board
Optical disk drive	756914-001 <sup>2</sup>	Component	System board
Systems Insight Display	Included with component	Component	System board

<sup>1</sup> Data cables kit (875095-001)

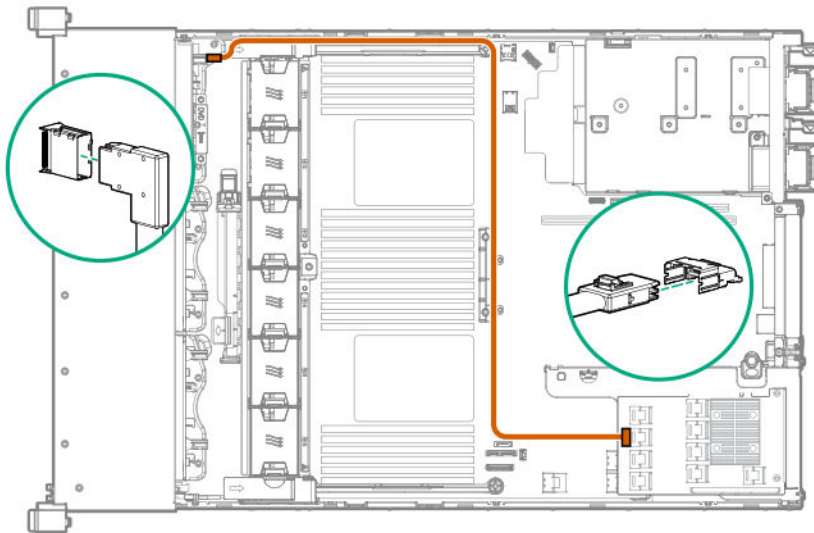
<sup>2</sup> DVD cable kit (784623-001)

## Cable routing: Front 2SFF drive option for SFF

Option 1: System board



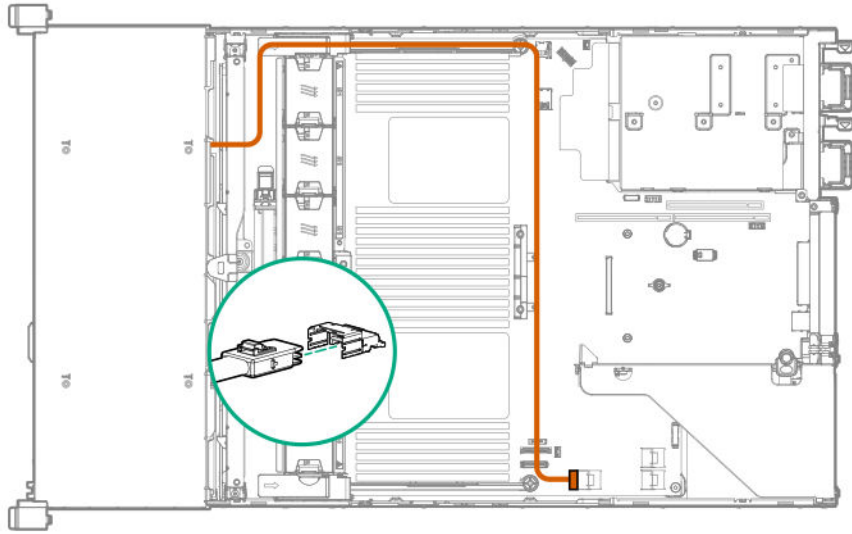
Option 2: SAS Expander



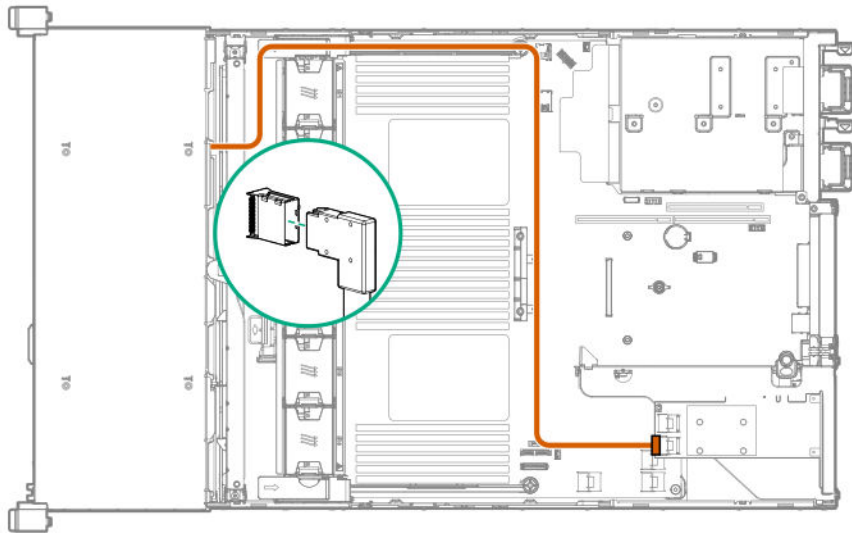
Option 3 (not shown): A controller

## Cable routing: Front 2SFF drive option for LFF

Option 1: System board



Option 2: Controller

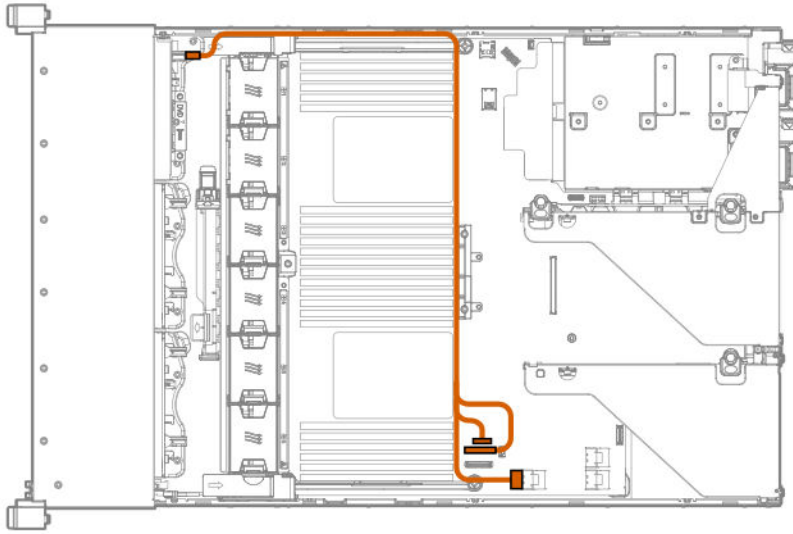


Option 3 (not shown): SAS Expander

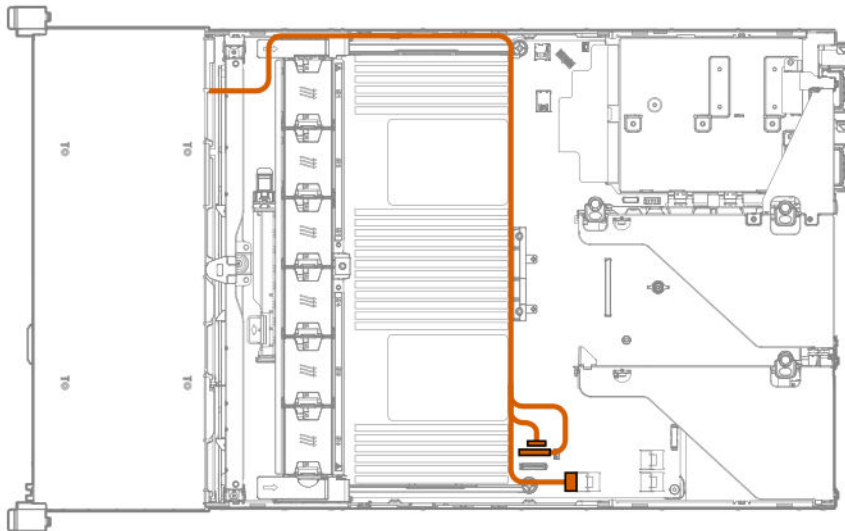
## Cable routing: Front 2SFF drive options (3 position cable)

SFF models



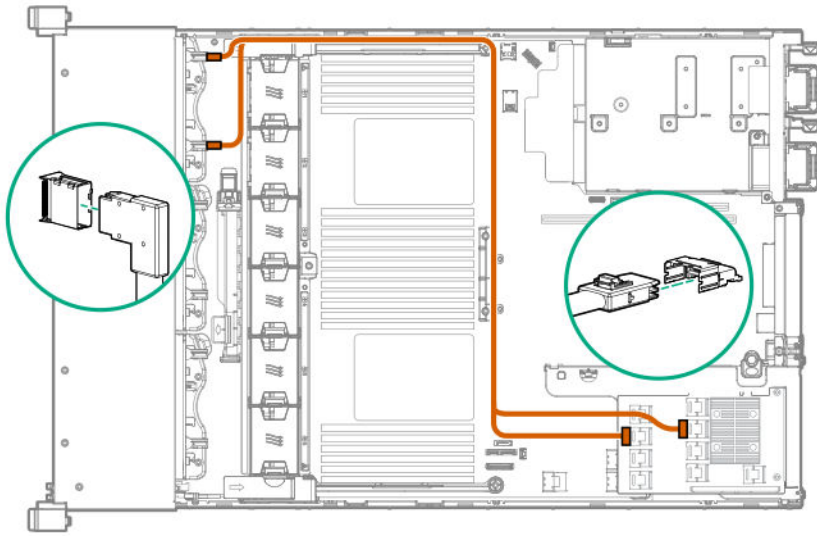


LFF models

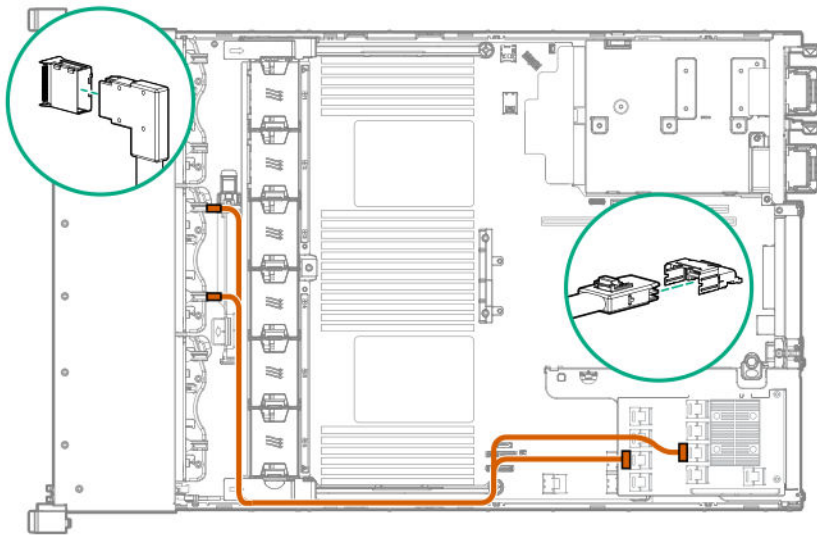


## Cable routing: Front 8SFF drive options

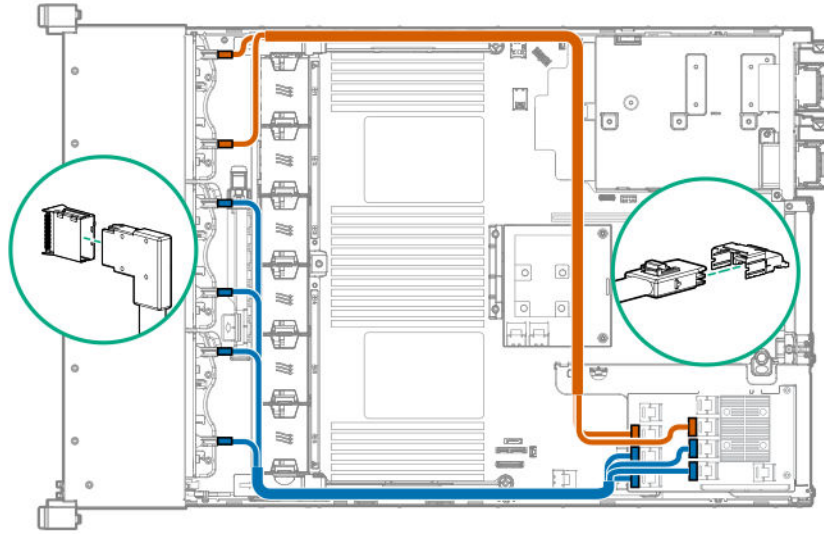
Box 1 to SAS Expander



Box 2 to SAS Expander

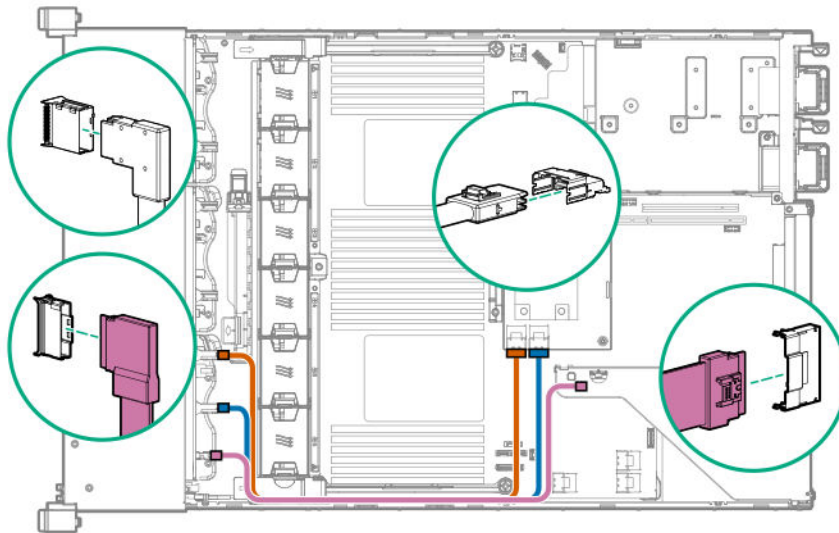


All boxes



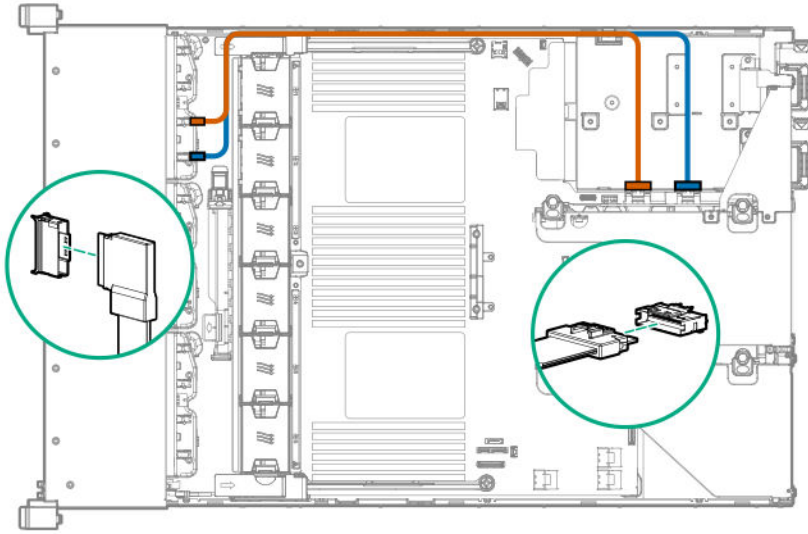
### Cable routing: Front 8SFF NVMe/SAS premium drive option

The backplane shown is in box 3.

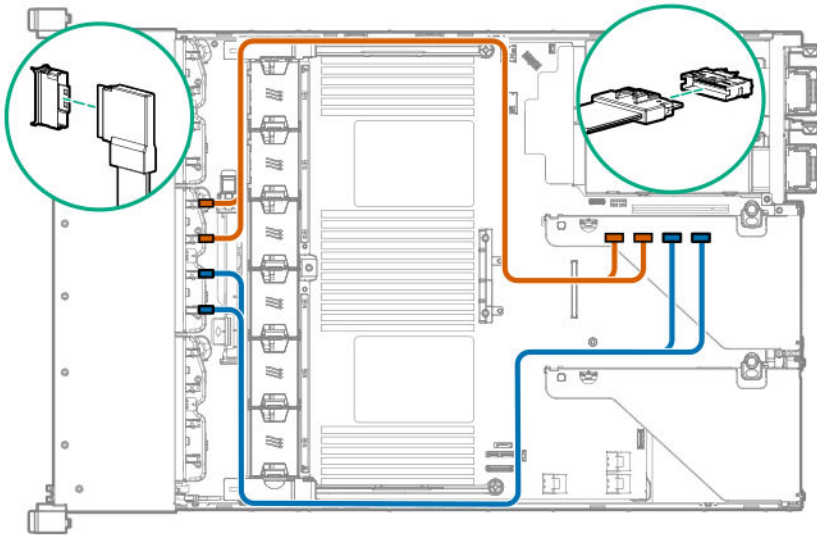


### Cable routing: Front 8SFF NVMe drive options

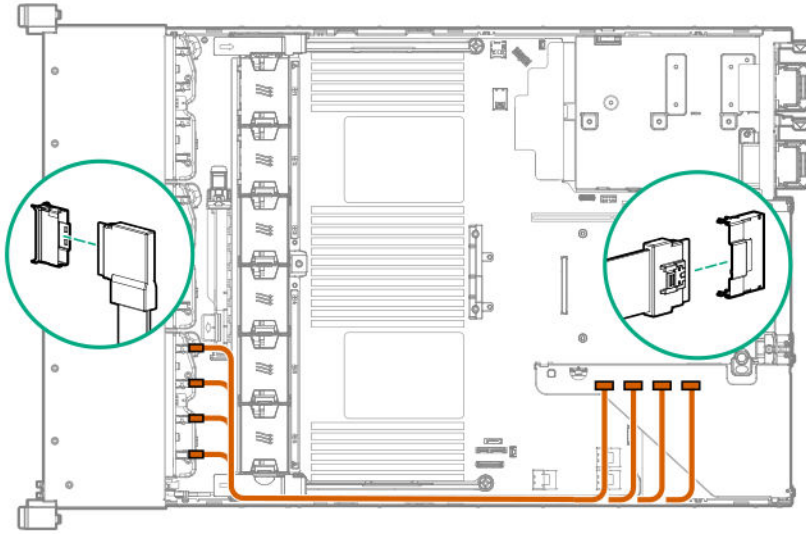
Box 1



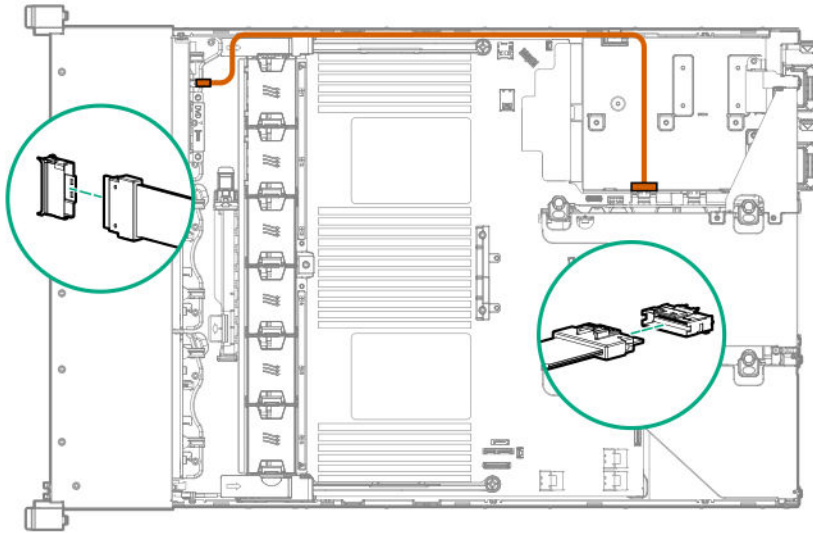
Box 2



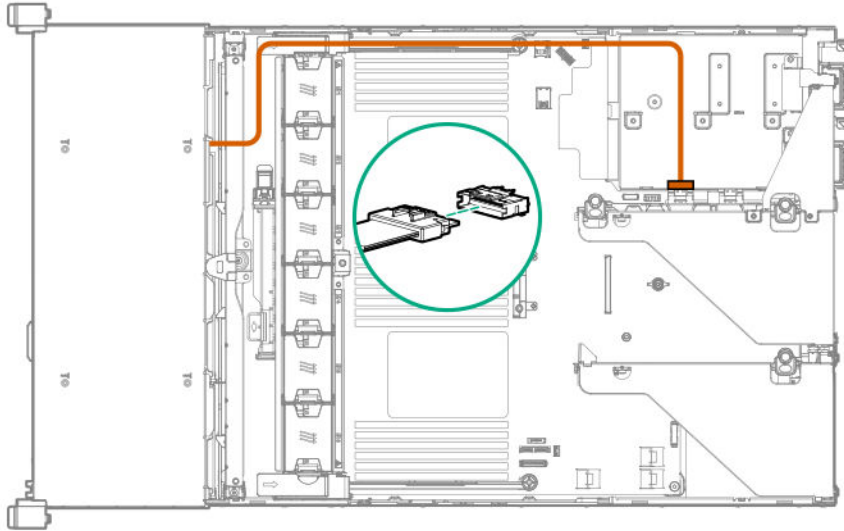
Box 3



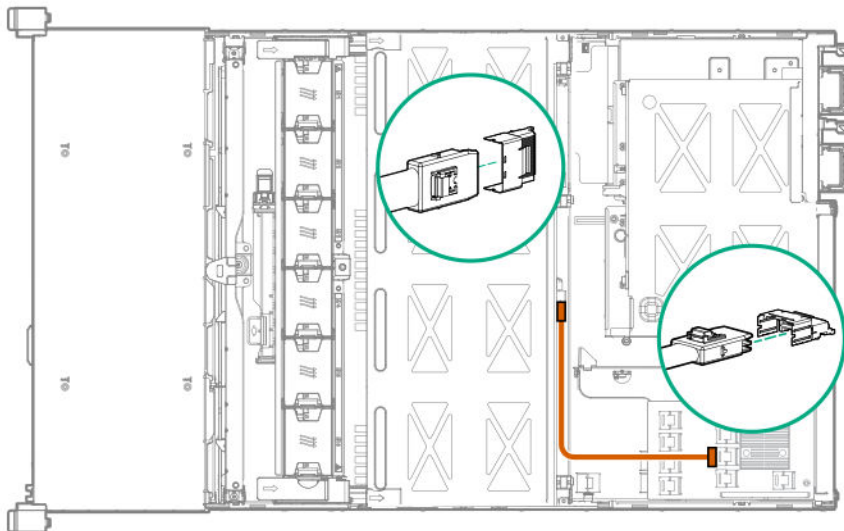
**Cable routing: Front 2SFF NVMe drive option for SFF**



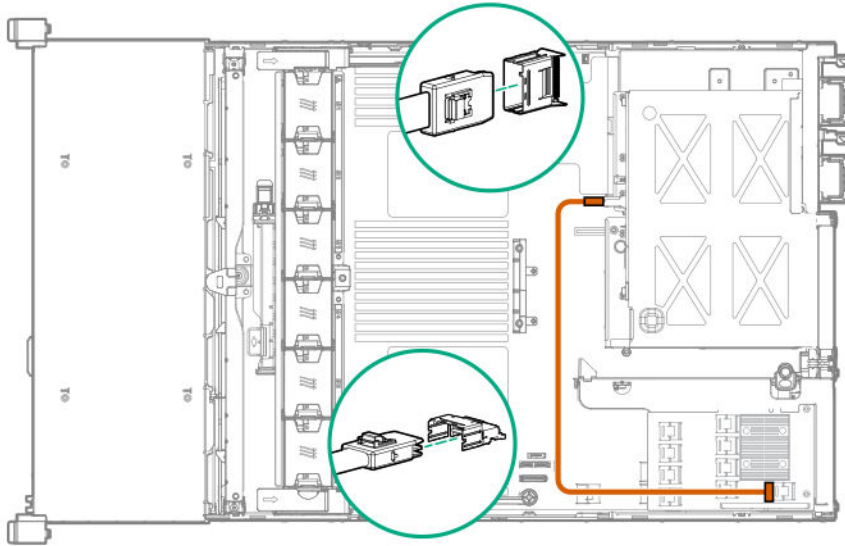
## Cable routing: Front 2SFF NVMe drive option for LFF



## Cable routing: Midplane 4LFF drive option

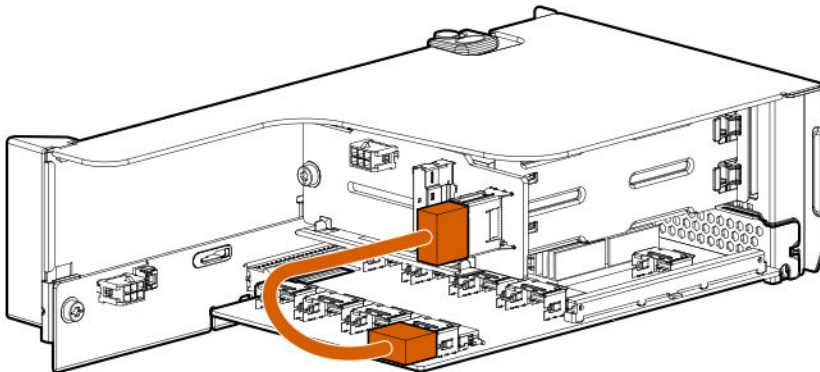


## Cable routing: Rear 3LFF drive option

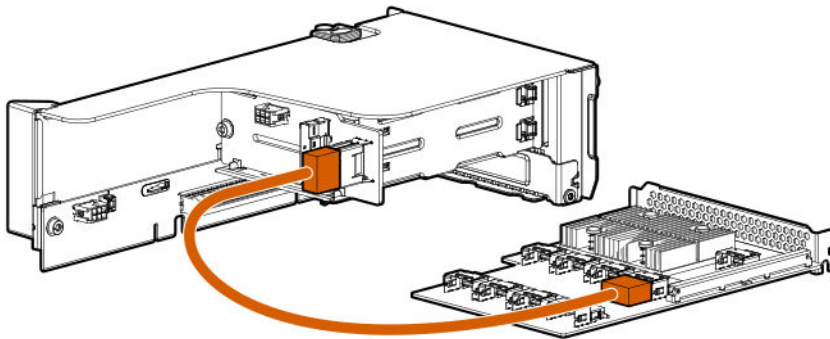


## Cable routing: Rear 2SFF drive options

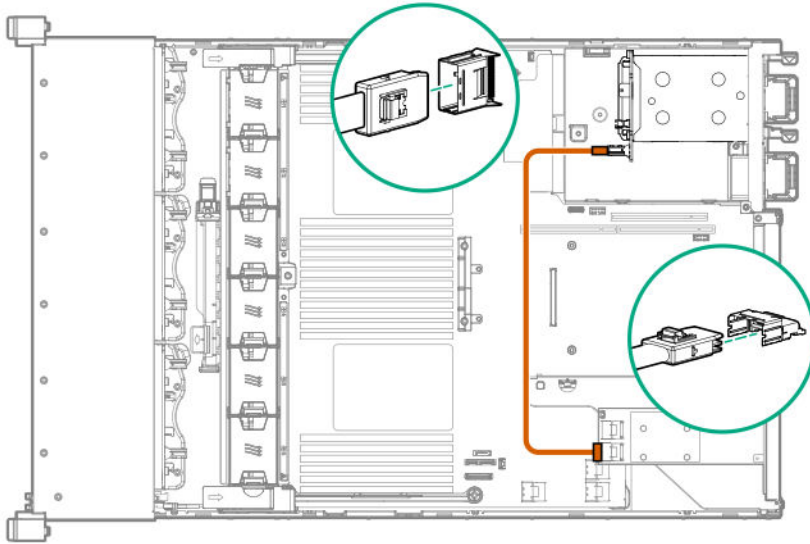
Rear 2SFF drive option to a SAS expander, both in the primary slot



Rear 2SFF drive option in the secondary slot to a SAS Expander in primary slot



Rear 2SFF drive option above the power supplies to a controller

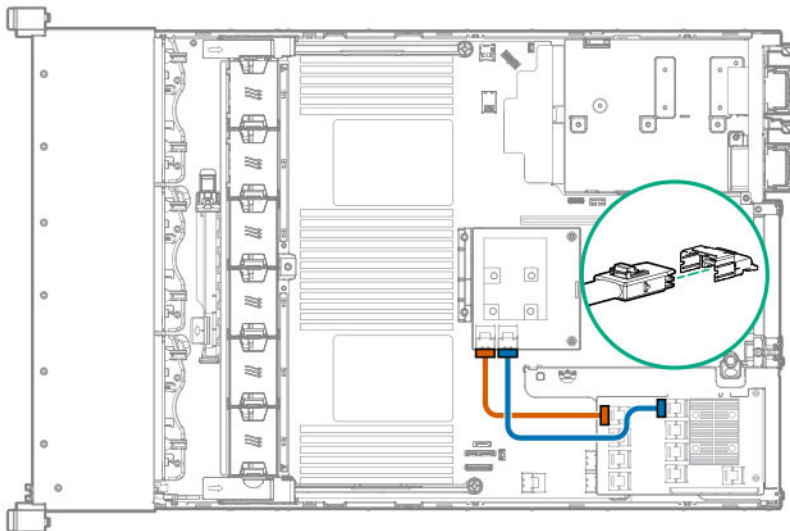


## Cable routing: HPE 12G SAS Expander to a controller

Observe the following:

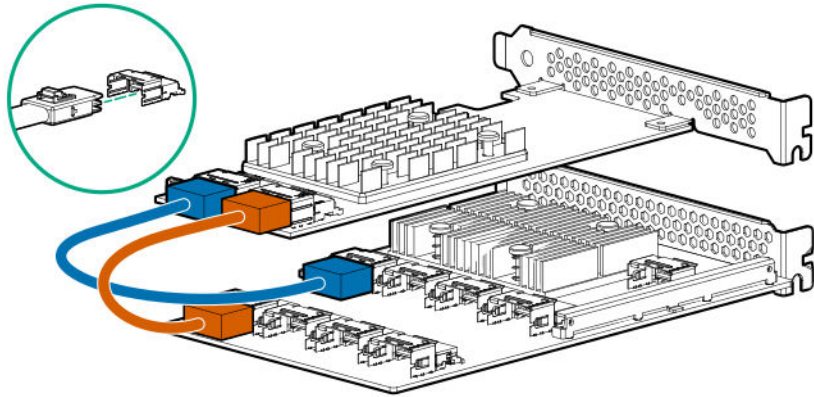
- Port 1 always connects to port 1 of the controller.
- Port 2 always connects to port 2 of the controller.

SAS expander to an a-type controller



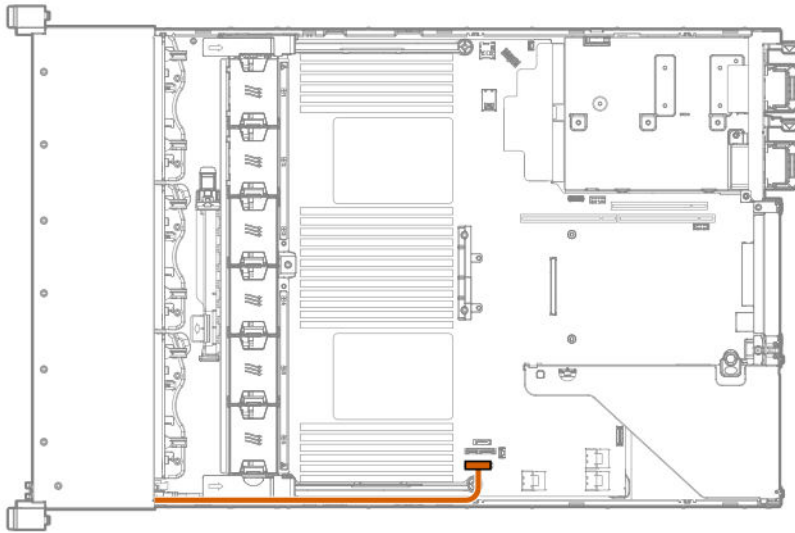
SAS expander to a p-type controller





## Cable routing: Systems Insight Display

An SFF model is shown. The routing is the same for LFF.



# Software and configuration utilities

## Server mode

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

Software or configuration utility	Server mode
<b>Active Health System</b> on page 154	Online and Offline
<b>HPE iLO 5</b> on page 155	Online and Offline
<b>HPE Smart Storage Administrator</b> on page 161	Online and Offline
<b>iLO RESTful API</b> on page 157	Online and Offline
<b>Intelligent Provisioning</b> on page 157	Offline
<b>Scripting Toolkit for Windows and Linux</b> on page 159	Online
<b>Service Pack for ProLiant</b> on page 163	Online and Offline
<b>Smart Update Manager</b> on page 163	Online and Offline
<b>UEFI System Utilities</b> on page 159	Offline

## 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>).

## Active Health System Viewer

Active Health System Viewer (AHSV) is an online tool used to read, diagnose, and resolve server issues quickly using AHS uploaded data. AHSV provides Hewlett Packard Enterprise recommended repair actions based on experience and best practices. AHSV provides the ability to:

- Read server configuration information
- View Driver/Firmware inventory
- Review Event Logs
- Respond to Fault Detection Analytics alerts
- Open new and update existing support cases

## Active Health System

The Active Health System monitors and records changes in the server hardware and system configuration.

The Active Health System provides:

- Continuous health monitoring of over 1600 system parameters
- Logging of all configuration changes
- Consolidated health and service alerts with precise time stamps
- Agentless monitoring that does not affect application performance

For more information about the Active Health System, see the iLO user guide on the Hewlett Packard Enterprise website.

## Active Health System data collection

The Active Health System does not collect information about your operations, finances, customers, employees, or partners.

Examples of information that is collected:

- Server model and serial number
- Processor model and speed
- Storage capacity and speed
- Memory capacity and speed
- Firmware/BIOS and driver versions and settings

The Active Health System does not parse or change OS data from third-party error event log activities (for example, content created or passed through the OS).

## Active Health System Log

The data collected by the Active Health System is stored in the Active Health System Log. The data is logged securely, isolated from the operating system, and separate from customer data.

When the Active Health System Log is full, new data overwrites the oldest data in the log.

It takes less than 5 minutes to download the Active Health System Log and send it to a support professional to help you resolve an issue.

When you download and send Active Health System data to Hewlett Packard Enterprise, you agree to have the data used for analysis, technical resolution, and quality improvements. The data that is collected is managed according to the privacy statement, available at <http://www.hpe.com/info/privacy>.

You can also upload the log to the Active Health System Viewer. For more information, see the Active Health System Viewer documentation at the following website: <http://www.hpe.com/support/ahsv-docs>.

## HPE iLO 5

iLO 5 is a remote server management processor embedded on the system boards of HPE ProLiant servers and Synergy compute modules. iLO enables the monitoring and controlling of servers from remote locations. iLO management is a powerful tool that provides multiple ways to configure, update, monitor, and repair servers remotely. iLO (Standard) comes preconfigured on Hewlett Packard Enterprise servers without an additional cost or license.

Features that enhance server administrator productivity and additional new security features are licensed. For more information, see the iLO licensing guide at the following website: <http://www.hpe.com/support/ilo-docs>.

For more information about iLO, see the iLO user guide on the Hewlett Packard Enterprise website.

## iLO Federation

iLO Federation enables you to manage multiple servers from one system using the iLO web interface.

When configured for iLO Federation, iLO uses multicast discovery and peer-to-peer communication to enable communication between the systems in an iLO Federation group.

When an iLO Federation page loads, a data request is sent from the iLO system running the web interface to its peers, and from those peers to other peers until all data for the selected iLO Federation group is retrieved.

iLO supports the following features:

- Group health status—View server health and model information.
- Group Virtual Media—Connect scripted media for access by the servers in an iLO Federation group.
- Group power control—Manage the power status of the servers in an iLO Federation group.
- Group power capping—Set dynamic power caps for the servers in an iLO Federation group.
- Group firmware update—Update the firmware of the servers in an iLO Federation group.
- Group license installation—Enter a license key to activate iLO licensed features on the servers in an iLO Federation group.
- Group configuration—Add iLO Federation group memberships for multiple iLO systems.

Any user can view information on iLO Federation pages, but a license is required for using the following features: Group Virtual Media, Group power control, Group power capping, Group configuration, and Group firmware update.

For more information about iLO Federation, see the iLO user guide on the Hewlett Packard Enterprise website.

## iLO Service Port

The Service Port is a USB port with the label **iLO** on ProLiant Gen10 servers and Synergy Gen10 compute modules.

When you have physical access to a server, you can use the Service Port to do the following:

- Download the Active Health System Log to a supported USB flash drive.  
When you use this feature, the connected USB flash drive is not accessible by the host operating system.
- Connect a client (such as a laptop) with a supported USB to Ethernet adapter to access the iLO web interface, remote console, CLI, iLO RESTful API, or scripts.  
Hewlett Packard Enterprise recommends the HPE USB to Ethernet Adapter (part number Q7Y55A).

When you use the iLO Service Port:

- Actions are logged in the iLO Event Log.
- The server UID blinks to indicate the Service Port status.  
You can also retrieve the Service Port status by using a REST client and the iLO RESTful API.
- You cannot use the Service Port to boot any device within the server, or the server itself.

- You cannot access the server by connecting to the Service Port.
- You cannot access the connected device from the server.

For more information about the iLO Service Port, see the iLO user guide on the Hewlett Packard Enterprise website.

## iLO RESTful API

iLO includes the iLO RESTful API, which is Redfish API conformant. The iLO RESTful API is a management interface that server management tools can use to perform configuration, inventory, and monitoring tasks by sending basic HTTPS operations (GET, PUT, POST, DELETE, and PATCH) to the iLO web server.

To learn more about the iLO RESTful API, see the Hewlett Packard Enterprise website (<http://www.hpe.com/info/restfulinterface/docs>).

For specific information about automating tasks using the iLO RESTful API, see libraries and sample code at <http://www.hpe.com/info/redfish>.

## RESTful Interface Tool

The RESTful Interface Tool (iLOrest) is a scripting tool that allows you to automate HPE server management tasks. It provides a set of simplified commands that take advantage of the iLO RESTful API. You can install the tool on your computer for remote use or install it locally on a server with a Windows or Linux Operating System. The RESTful Interface Tool offers an interactive mode, a scriptable mode, and a file-based mode similar to CONREP to help decrease automation times.

For more information, see the following website: <http://www.hpe.com/info/resttool>.

## iLO Amplifier Pack

The iLO Amplifier Pack is an advanced server inventory and firmware and driver update solution that enables rapid discovery, detailed inventory reporting, and firmware and driver updates by leveraging iLO advanced functionality. The iLO Amplifier Pack performs rapid server discovery and inventory for thousands of supported servers for the purpose of updating firmware and drivers at scale.

For more information about iLO Amplifier Pack, see the *iLO Amplifier Pack User Guide* at the following website: <http://www.hpe.com/support/ilo-ap-ug-en>.

## Intelligent Provisioning

Intelligent Provisioning is a single-server deployment tool embedded in ProLiant servers and HPE Synergy compute modules. Intelligent Provisioning simplifies server setup, providing a reliable and consistent way to deploy servers.

Intelligent Provisioning prepares the system for installing original, licensed vendor media and Hewlett Packard Enterprise-branded versions of OS software. Intelligent Provisioning also prepares the system to integrate optimized server support software from the Service Pack for ProLiant (SPP). SPP is a comprehensive systems software and firmware solution for ProLiant servers, server blades, their enclosures, and HPE Synergy compute modules. These components are preloaded with a basic set of firmware and OS components that are installed along with Intelligent Provisioning.

---

### **IMPORTANT:**

HPE ProLiant XL servers do not support operating system installation with Intelligent Provisioning, but they do support the maintenance features. For more information, see "Performing Maintenance" in the *Intelligent Provisioning User Guide* and online help.

---

After the server is running, you can update the firmware to install additional components. You can also update any components that have been outdated since the server was manufactured.

To access Intelligent Provisioning:

- Press **F10** from the POST screen.
- From the iLO web browser user interface using **Always On**. **Always On** allows you to access Intelligent Provisioning without rebooting your server.

## Intelligent Provisioning operation

Intelligent Provisioning includes the following components:

- Critical boot drivers
- Active Health System (AHS)
- Erase Utility
- Deployment Settings

---

### **IMPORTANT:**

- Although your server is pre-loaded with firmware and drivers, you should update the firmware upon initial setup to ensure you have the latest versions. Also, downloading and updating the latest version of Intelligent Provisioning ensures the latest supported features are available.
- For ProLiant servers, firmware is updated using the Intelligent Provisioning Firmware Update utility.
- Do not update firmware if the version you are currently running is required for compatibility.

---

### **NOTE:**

Intelligent Provisioning does not function within multihomed configurations. A multihomed host is one that is connected to two or more networks or has two or more IP addresses.

---

Intelligent Provisioning provides installation help for the following operating systems:

- Microsoft Windows Server
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- VMware ESXi/vSphere Custom Image

Not all versions of an OS are supported. For information about specific versions of a supported operating system, see the OS Support Matrix on the Hewlett Packard Enterprise website (<http://www.hpe.com/info/ossupport>).

## Management Security

HPE ProLiant Gen10 servers are built with some of the industry's most advanced security capabilities, out of the box, with a foundation of secure embedded management applications and firmware. The management security provided by HPE embedded management products enables secure support of modern workloads, protecting your components from unauthorized access and unapproved use. The range of embedded management and optional software and firmware available with the iLO Advanced and iLO Advanced

Premium Security Edition licenses provides security features that help ensure protection, detection, and recovery from advanced cyber-attacks. For more information, see the *HPE Gen10 Server Security Reference Guide* on the Hewlett Packard Enterprise Information Library at <http://www.hpe.com/info/EIL>.

For information about the iLO Advanced Premium Security Edition license, see <http://www.hpe.com/servers/ilopremium>.

## Scripting Toolkit for Windows and Linux

The STK for Windows and Linux is a server deployment product that delivers an unattended automated installation for high-volume server deployments. The STK is designed to support ProLiant 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 STK 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 or to download the STK, see the [Hewlett Packard Enterprise website](#).

## UEFI System Utilities

The UEFI System Utilities is embedded in the system ROM. Its features 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 or partition.
- Configuring memory options.
- Launching other preboot environments.

HPE servers with UEFI can provide:

- Support for boot partitions larger than 2.2 TB. Such configurations could previously only be used for boot drives when using RAID solutions.
- Secure Boot that enables the system firmware, option card firmware, operating systems, and software collaborate to enhance platform security.
- UEFI Graphical User Interface (GUI)
- An Embedded UEFI Shell that provides a preboot environment for running scripts and tools.
- Boot support for option cards that only support a UEFI option ROM.

## Selecting the boot mode

This server provides two **Boot Mode** configurations: UEFI Mode and Legacy BIOS Mode. Certain boot options require that you select a specific boot mode. By default, the boot mode is set to **UEFI Mode**. The system must boot in **UEFI Mode** to use certain options, including:

- Secure Boot, UEFI Optimized Boot, Generic USB Boot, IPv6 PXE Boot, iSCSI Boot, and Boot from URL
- Fibre Channel/FCoE Scan Policy

---

**NOTE:**

The boot mode you use must match the operating system installation. If not, changing the boot mode can impact the ability of the server to boot to the installed operating system.

---

**Prerequisite**

When booting to **UEFI Mode**, leave **UEFI Optimized Boot** enabled.

**Procedure**

1. From the **System Utilities** screen, select **System Configuration > BIOS/Platform Configuration (RBSU) > Boot Options > Boot Mode**.
2. Select a setting.
  - **UEFI Mode** (default)—Configures the system to boot to a UEFI compatible operating system.
  - **Legacy BIOS Mode**—Configures the system to boot to a traditional operating system in Legacy BIOS compatibility mode.
3. Save your setting.
4. Reboot the server.

## Secure Boot

Secure Boot is a server security feature that is implemented in the BIOS and does not require special hardware. Secure Boot 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
- Preboot UEFI Shell applications
- OS UEFI boot loaders

When Secure Boot is enabled:

- Firmware components and operating systems with boot loaders must have an appropriate digital signature to execute during the boot process.
- Operating systems must support Secure Boot and have an EFI boot loader signed with one of the authorized keys to boot. For more information about supported operating systems, see <http://www.hpe.com/servers/ossupport>.

You can customize the certificates embedded in the UEFI BIOS by adding or removing your own certificates, either from a management console directly attached to the server, or by remotely connecting to the server using the iLO Remote Console.

You can configure Secure Boot:



- Using the **System Utilities** options described in the following sections.
- Using the iLO RESTful API to clear and restore certificates. For more information, see the Hewlett Packard Enterprise website (<http://www.hpe.com/info/redfish>).
- Using the `secboot` command in the Embedded UEFI Shell to display Secure Boot databases, keys, and security reports.

## Launching the Embedded UEFI Shell

Use the **Embedded UEFI Shell** option to launch the Embedded UEFI Shell. The Embedded UEFI Shell is a pre-boot command-line environment for scripting and running UEFI applications, including UEFI boot loaders. The Shell also provides CLI-based commands you can use to obtain system information, and to configure and update the system BIOS.

### Prerequisites

**Embedded UEFI Shell** is set to enabled.

### Procedure

1. From the **System Utilities** screen, select **Embedded Applications > Embedded UEFI Shell**.

The **Embedded UEFI Shell** screen appears.

2. Press any key to acknowledge that you are physically present.

This step ensures that certain features, such as disabling **Secure Boot** or managing the **Secure Boot** certificates using third-party UEFI tools, are not restricted.

3. If an administrator password is set, enter it at the prompt and press **Enter**.

The `Shell>` prompt appears.

4. Enter the commands required to complete your task.

5. Enter the `exit` command to exit the Shell.

## HPE Smart Storage Administrator

HPE SSA is the main tool for configuring arrays on HPE Smart Array SR controllers. It exists in three interface formats: the HPE SSA GUI, the HPE SSA CLI, and HPE SSA Scripting. All formats provide support for configuration tasks. Some of the advanced tasks are available in only one format.

The diagnostic features in HPE SSA are also available in the standalone software HPE Smart Storage Administrator Diagnostics Utility CLI.

During the initial provisioning of the server or compute module, an array is required to be configured before the operating system can be installed. You can configure the array using SSA.

HPE SSA is accessible both offline (either through HPE Intelligent Provisioning or as a standalone bootable ISO image) and online:

- Accessing HPE SSA in the offline environment



### **IMPORTANT:**

If you are updating an existing server in an offline environment, obtain the latest version of HPE SSA through Service Pack for ProLiant before performing configuration procedures.

---

Using one of multiple methods, you can run HPE SSA before launching the host operating system. In offline mode, users can configure or maintain detected and supported devices, such as optional Smart Array controllers and integrated Smart Array controllers. Some HPE SSA features are only available in the offline environment, such as setting the boot controller and boot volume.

- Accessing HPE SSA in the online environment

This method requires an administrator to download the HPE SSA executables and install them. You can run HPE SSA online after launching the host operating system.

For more information, see *HPE Smart Array SR Gen10 Configuration Guide* at the [Hewlett Packard Enterprise website](#).

## USB support

Hewlett Packard Enterprise Gen10 servers support all USB operating speeds depending on the device that is connected to the server.

### 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

### Updating firmware or system ROM

To update firmware or system ROM, use one of the following methods:

- The **Firmware Update** option in the System Utilities.
- The `fwupdate` command in the **Embedded UEFI Shell**.
- Service Pack for ProLiant (SPP)
- HPE online flash components
- Moonshot Component Pack

## Service Pack for ProLiant

SPP is a systems software and firmware solution delivered as a single ISO file download. This solution uses SUM as the deployment tool and is tested on supported ProLiant servers.

SPP, along with SUM and SUT, provides Smart Update system maintenance tools that systematically update ProLiant servers and BladeSystem infrastructure.

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 in the ISO file.

To download the SPP, see the SPP download page at <https://www.hpe.com/servers/spp/download>.

### Smart Update Manager

SUM is an innovative tool for maintaining the firmware, drivers, and system software of HPE ProLiant, HPE Synergy, HPE BladeSystem and HPE Moonshot infrastructures and associated options up to date and secure.

SUM identifies associated nodes you can update at the same time to avoid interdependency issues.

Key features of SUM include:

- Discovery engine that finds installed versions of hardware, firmware, and software on nodes.
- SUM deploys updates in the correct order and ensures that all dependencies are met before deploying an update.
- Interdependency checking.
- Automatic and step-by-step Localhost Guided Update process.
- Web browser-based mode.
- Ability to create custom baselines and ISOs.
- Support for iLO Repository (Gen10 iLO 5 nodes only).
- Simultaneous firmware and software deployment for multiple remote nodes.
- Local offline firmware deployments with SPP deliverables.
- Extensive logging in all modes.

---

#### NOTE:

SUM does not support third-party controllers, including flashing hard drives behind the controllers.

---

### Integrated Smart Update Tools

Smart Update Tools is a software utility used with iLO 4 (Gen9 servers), iLO 5 (Gen10 servers), HPE OneView, iLO Amplifier Pack, Service Pack for ProLiant (SPP), and Smart Update Manager (SUM) to stage, install, and activate firmware and driver updates.

---

#### NOTE:

HPE OneView and iLO Amplifier Pack manage the iLO while SUT runs on each server and deploys the updates. The same administrator might not manage both applications. Create a process that notifies the administrators when updates are available.

---

- **Smart Update Tools:** Polls an iLO, HPE OneView, or iLO Amplifier Pack for updates through the management network and orchestrates staging, deploying, and activating updates. You can adjust the

polling interval by issuing the appropriate command-line option provided by SUT. Performs inventory on target servers, stages deployment, deploys updates, and then reboots the servers.

- **iLO 5 with integrated Smart Update** (Gen10 servers only): Loads Install Sets to the iLO Repository on iLO 5 nodes. SUT deploys OS-based updates from the iLO Repository.
- **iLO Amplifier Pack**: Displays available updates for servers. Communicates with SUT, or SUT 1.x to initiate updates, reports the status to iLO Amplifier Pack.
- **HPE OneView**: Displays available updates for servers. Communicates with iSUT to initiate updates, reports the status on the **Firmware** section of the **Server Profile** page of HPE OneView. HPE OneView provides automated compliance reporting in the dashboard.
- **SPP**: A comprehensive systems software and firmware update solution, which is delivered as a single ISO image.
- **SUM**: A tool for firmware and driver maintenance for HPE ProLiant servers and associated options.

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**NOTE:**

Do not manage one node with iLO Amplifier Pack and HPE OneView at the same time.

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## Updating firmware from the System Utilities

Use the **Firmware Updates** option to update firmware components in the system, including the system BIOS, NICs, and storage cards.

### Procedure

1. Access the System ROM Flash Binary component for your server from the Hewlett Packard Enterprise Support Center.
2. Copy the binary file to a USB media or iLO virtual media.
3. Attach the media to the server.
4. Launch the **System Utilities**, and select **Embedded Applications > Firmware Update**.
5. Select a device.

The **Firmware Updates** screen lists details about your selected device, including the current firmware version in use.

6. Select **Select Firmware File**.
7. Select the flash file in the **File Explorer** list.  
The firmware file is loaded and the **Firmware Updates** screen lists details of the file in the **Selected firmware file** field.
8. Select **Image Description**, and then select a firmware image.  
A device can have multiple firmware images.
9. Select **Start firmware update**.

## Updating the firmware from the UEFI Embedded Shell

### Procedure


1. Access the System ROM Flash Binary component for your server from the Hewlett Packard Enterprise Support Center (<http://www.hpe.com/support/hpesc>).
2. Copy the binary file to a USB media or iLO virtual media.
3. Attach the media to the server.
4. Boot to the UEFI Embedded Shell.
5. To obtain the assigned file system volume for the USB key, enter `map -r`.
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. Flash the system ROM by entering `fwupdate -d BIOS -f filename`.
9. Reboot the server. A reboot is required after the firmware update in order 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 SUM, 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.

---

Update drivers using any of the following **Smart Update Solutions**:

- Download the latest Service Pack for ProLiant (includes Smart Update Manager)
- Create a custom SPP download
- Download Smart Update Manager for Linux
- Download specific drivers

To locate the drivers for a server, go to the **Hewlett Packard Enterprise Support Center website**, and then search for the product name/number.

### Software and firmware

Update software and firmware 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 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](#).

## HPE Technology Service Portfolio

HPE Technology Services deliver confidence, reduces risk and helps customers realize agility and stability. We help customers succeed through Hybrid IT by simplifying and enriching the on-premise experience, informed by public cloud qualities and attributes. HPE Support Services enables you to choose the right service level, length of coverage and response time to fit your business needs. Connect to HPE to help prevent problems and solve issues faster. By connecting, you will receive 24x7 monitoring, prefailure alerts, automatic call logging, and automatic parts dispatch. To learn more about getting connected, see the [Hewlett Packard Enterprise website](#).

For more information about support services, see the [Hewlett Packard Enterprise website](#).

Utilize our consulting expertise in the following areas:

- Private or hybrid cloud computing
- Big data and mobility requirements
- Improving data center infrastructure
- Better use of server, storage, and networking technology

For more information, see the [Hewlett Packard Enterprise website](#).

## Change control and proactive notification

Hewlett Packard Enterprise offers Change Control and Proactive Notification to notify customers 30 to 60 days in advance of the following:

- Upcoming hardware and software changes
- Bulletins
- Patches

Let us know what Hewlett Packard Enterprise commercial products you own and we will send you the latest updates to keep your business running smoothly.

For more information, see the [Hewlett Packard Enterprise website](#).

# Troubleshooting

## NMI functionality

An NMI crash dump enables administrators to create crash dump files when a system is hung and not responding to traditional debugging methods.

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

To force the OS to invoke the NMI handler and generate a crash dump log, the administrator can use the iLO Virtual NMI feature.

## Troubleshooting resources

Troubleshooting resources are available for HPE Gen10 server products in the following documents:

- *Troubleshooting Guide for HPE ProLiant Gen10 servers* provides procedures for resolving common problems and comprehensive courses of action for fault isolation and identification, issue resolution, and software maintenance.
- *Error Message Guide for HPE ProLiant Gen10 servers and HPE Synergy* provides a list of error messages and information to assist with interpreting and resolving error messages.
- *Integrated Management Log Messages and Troubleshooting Guide for HPE ProLiant Gen10 and HPE Synergy* provides IML messages and associated troubleshooting information to resolve critical and cautionary IML events.

To access the troubleshooting resources, see the Hewlett Packard Enterprise Information Library (<http://www.hpe.com/info/gen10-troubleshooting>).

# Safety, warranty, and 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>).

## Warranty information

[HPE ProLiant and x86 Servers and Options](#)

[HPE Enterprise Servers](#)

[HPE Storage Products](#)

[HPE Networking Products](#)

## Regulatory information

### 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
<b>Temperature range</b> <sup>1</sup>	—
Operating	10°C to 35°C (50°F to 95°F)
Nonoperating	-30°C to 60°C (-22°F to 140°F)
<b>Relative humidity (noncondensing)</b>	—
Operating	Minimum to be the higher (more moisture) of -12°C (10.4°F) dew point or 8% relative humidity Maximum to be 24°C (75.2°F) dew point or 90% relative humidity
Nonoperating	5% to 95% 38.7°C (101.7°F), maximum wet bulb temperature

<sup>1</sup> All temperature ratings shown are for sea level. An altitude derating of 1.0°C per 304.8 m (1.8°F per 1000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed. Maximum rate of change is 20°C per hour (36°F per hour). The upper limit and rate of change might be limited by the type and number of options installed.

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

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

The approved hardware configurations for this system are listed on the [Hewlett Packard Enterprise website](#).

## Mechanical specifications

Specification	Value
Height	8.73 cm (3.44 in)
Depth, SFF	67.94 cm (26.75 in)
Depth, LFF	73.02 cm (28.75 in)
Width	44.54 cm (17.54 in)
Weight, SFF minimum	14.9 kg (32.75 lbs)
Weight, SFF maximum	19.5kg (43.00 lbs)
Weight, LFF minimum	17.1 kg (37.75 lbs)
Weight, LFF maximum	24.5 kg (54 lbs)

The SFF configuration includes the following components:

- SFF drive (1)
- Drive blanks (7)
- Drive bay blanks for bays 1 and 2 (2)
- Fan assemblies (4)
- Fan blanks (2)
- Standard heatsink (1)
- 1P air baffle (1)
- X8 HPE Flexible Smart Array Controller (1)
- Primary riser cage (1)
- Secondary riser cage blank (1)
- Power supply (1)
- Power supply blank (1)
- Cables for the above components

The LFF configuration includes the following components:

- LFF drives (12)
- Fan assemblies (6)
- SE heatsinks (2)
- 2P air baffle (1)
- X8 HPE Flexible Smart Array Controller (1)
- Primary riser cage (1)
- Secondary riser cage (1)
- Power supplies (2)
- Cables for the above components

The 12 LFF configuration does not contain a rear three-bay LFF drive cage option.

## Power supply specifications

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

- **HPE 500W Flex Slot Platinum Hot Plug Low Halogen Power Supply** on page 172
- **HPE 800W Flex Slot Platinum Hot Plug Low Halogen Power Supply** on page 173
- **HPE 800W Flex Slot Titanium Hot Plug Low Halogen Power Supply** on page 173
- **HPE 800W Flex Slot Universal Hot Plug Low Halogen Power Supply** on page 174
- **HPE 800W Flex Slot -48VDC Hot Plug Low Halogen Power Supply** on page 175

- [HPE 800W Flex Slot Scalable Persistent Memory Power Supply](#) on page 176
- [HPE 1600W Flex Slot Platinum Hot Plug Low Halogen Power Supply](#) on page 177

For detailed power supply specifications, see the QuickSpecs on the [Hewlett Packard Enterprise website](#).

## HPE 500W Flex Slot Platinum Hot Plug Low Halogen Power Supply

Specification	Value
<b>Input requirements</b>	
Rated input voltage	100 VAC to 127 VAC 100 VAC to 240 VAC 240 VDC for China only
Rated input frequency	50 Hz to 60 Hz Not applicable to 240 VDC
Rated input current	5.8 A at 100 VAC 2.8 A at 200 VAC 2.4 A at 240 VDC for China only
Maximum rated input power	557 W at 100 VAC 539 W at 200 VAC 537 W at 240 VDC for China only
BTUs per hour	1,902 at 100 VAC 1,840 at 200 VAC 1,832 at 240 VDC for China only
<b>Power supply output</b>	
Rated steady-state power	500 W at 100 VAC to 127 VAC input 500 W at 100 VAC to 240 VAC input 500 W at 240 VDC input for China only
Maximum peak power	500 W at 100 VAC to 127 VAC input 500 W at 100 VAC to 240 VAC input 500 W at 240 VDC input for China only

## HPE 800W Flex Slot Platinum Hot Plug Low Halogen Power Supply

Specification	Value
<b>Input requirements</b>	
Rated input voltage	100 VAC to 127 VAC 100 VAC to 240 VAC 240 VDC for China only
Rated input frequency	50 Hz to 60 Hz Not applicable to 240 VDC
Rated input current	9.4 A at 100 VAC 4.5 A at 200 VAC 3.8 A at 240 VDC for China only
Maximum rated input power	899 W at 100 VAC 867 W at 200 VAC 864 W at 240 VDC for China only
BTUs per hour	3,067 at 100 VAC 2,958 at 200 VAC 2,949 at 240 VAC for China only
<b>Power supply output</b>	
Rated steady-state power	800 W at 100 VAC to 127 VAC input 800 W at 100 VAC to 240 VAC input 800 W at 240 VDC input for China only
Maximum peak power	800 W at 100 VAC to 127 VAC input 800 W at 100 VAC to 240 VAC input 800 W at 240 VDC input for China only

## HPE 800W Flex Slot Titanium Hot Plug Low Halogen Power Supply

Specification	Value
<b>Input requirements</b>	
Rated input voltage	200 VAC to 240 VAC 240 VDC for China only
Rated input frequency	50 Hz to 60 Hz Not applicable to 240 VDC

*Table Continued*

Specification	Value
Rated input current	4.35 A at 200 VAC 3.62 A at 240 VAC 3.62 A at 240 VDC for China only
Maximum rated input power	851 W at 200 VAC 848 W at 240 VAC 848 W at 240 VDC for China only
BTUs per hour	2,905 at 200 VAC 2,969 at 240 VAC 2,969 at 240 VDC for China only
<b>Power supply output</b>	
Rated steady-state power	800 W at 200 VAC to 240 VAC input 800 W at 240 VDC input for China only
Maximum peak power	800 W at 200 VAC to 240 VAC input 800 W at 240 VDC input for China only

## HPE 800W Flex Slot Universal Hot Plug Low Halogen Power Supply

Specification	Value
<b>Input requirements</b>	
Rated input voltage	200 VAC to 277 VAC
Rated input frequency	50 Hz to 60 Hz
Rated input current	4.4 A at 200 VAC 3.8 A at 230 VAC 3.1 A at 277 VAC
Maximum rated input power	869 W at 200 VAC 865 W at 230 VAC 861 W at 277 VAC
BTUs per hour	2,964 at 200 VAC 2,951 at 230 VAC 2,936 at 277 VAC
<b>Power supply output</b>	
Rated steady-state power	800 W at 200 VAC to 277 VAC input
Maximum peak power	800 W at 200 VAC to 277 VAC input

## HPE 800W Flex Slot -48VDC Hot Plug Low Halogen Power Supply

Specification	Value
<b>Input requirements</b>	
Rated input voltage	-40 VDC to -72 VDC -48 VDC nominal input
Rated input current	24 A at -40 VDC input 19 A at -48 VDC input, nominal input 12.4 A at -72 VDC input
Rated input power (W)	874 W at -40 VDC input 865 W at -48 VDC input, nominal input 854 W at -72 VDC input
Rated input power (BTUs per hour)	2,983 at -40 VDC input 2,951 at -48 VDC input, nominal input 2,912 at -72 VDC input
<b>Power supply output</b>	
Rated steady-state power (W)	800 W at -40 VDC to -72 VDC
Maximum peak power (W)	800 W at -40 VDC to -72 VDC
Maximum peak power	800 W at 200 VAC to 277 VAC input 800 W at 380 VDC input



### **WARNING:**

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 secondary circuit source. A secondary circuit has no direct connection to a primary circuit and derives its power from a transformer, converter, or equivalent isolation device.
- The branch circuit overcurrent protection must be rated 27 A.

**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.

## HPE 800W Flex Slot Scalable Persistent Memory Power Supply

Specification	Value
<b>Input requirements</b>	
Rated input voltage	100 VAC to 127 VAC 200 VAC to 240 VAC 240 VDC for China only
Rated input frequency	50 Hz to 60 Hz Not applicable to 240 VDC
Rated input current	5.8 A at 100 VAC 4.5 A at 200 VAC 3.8 A at 240 VDC for China only
Maximum rated input power	580 W at 100 VAC 900 W at 200 VAC 912 W at 240 VDC for China only
BTUs per hour	1,979 at 100 VAC 3,071 at 240 VAC 3,112 at 240 VDC for China only
<b>Power supply output</b>	

*Table Continued*



Specification	Value
Rated steady-state power	500 W at 100 VAC to 127 VAC input 800 W at 200 VAC to 240 VAC input 800 W at 240 VDC input for China only
Maximum peak power	500 W at 90 VAC to 132 VAC input 800 W at 180 VAC to 264 VAC input 800 W at 240 VDC input for China only

## HPE 1600W Flex Slot Platinum Hot Plug Low Halogen Power Supply

Specification	Value
<b>Input requirements</b>	
Rated input voltage	200 VAC to 240 VAC 240 VDC for China only
Rated input frequency	50 Hz to 60 Hz
Rated input current	8.7 A at 200 VAC 7.2 A at 240 VAC
Maximum rated input power	1,734 W at 200 VAC 1,725 W at 240 VAC
BTUs per hour	5,918 at 200 VAC 5,884 at 240 VAC
<b>Power supply output</b>	
Rated steady-state power	1,600 W at 200 VAC to 240 VAC input 1,600 W at 240 VDC input
Maximum peak power	2,200 W for 1 ms (turbo mode) at 200 VAC 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:

### **Hewlett Packard Enterprise Support Center**

[www.hpe.com/support/hpesc](http://www.hpe.com/support/hpesc)

### **Hewlett Packard Enterprise Support Center: Software downloads**

[www.hpe.com/support/downloads](http://www.hpe.com/support/downloads)

### **Software Depot**

[www.hpe.com/support/softwaredepot](http://www.hpe.com/support/softwaredepot)

- To subscribe to eNewsletters and alerts:

[www.hpe.com/support/e-updates](http://www.hpe.com/support/e-updates)

- 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:

[www.hpe.com/support/AccessToSupportMaterials](http://www.hpe.com/support/AccessToSupportMaterials)

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**!** **IMPORTANT:**

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

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## Customer self repair

Hewlett Packard Enterprise customer self repair (CSR) programs allow you to repair your product. If a CSR part needs to be replaced, it will be shipped directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your Hewlett Packard Enterprise authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider or go to the CSR website:

<http://www.hpe.com/support/selfrepair>

## 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.

If your product includes additional remote support details, use search to locate that information.

### Remote support and Proactive Care information

#### HPE Get Connected

[www.hpe.com/services/getconnected](http://www.hpe.com/services/getconnected)

#### HPE Proactive Care services

[www.hpe.com/services/proactivecare](http://www.hpe.com/services/proactivecare)

#### HPE Proactive Care service: Supported products list

[www.hpe.com/services/proactivecaresupportedproducts](http://www.hpe.com/services/proactivecaresupportedproducts)

#### HPE Proactive Care advanced service: Supported products list

[www.hpe.com/services/proactivecareadvancedsupportedproducts](http://www.hpe.com/services/proactivecareadvancedsupportedproducts)

### Proactive Care customer information

#### Proactive Care central

[www.hpe.com/services/proactivecarecentral](http://www.hpe.com/services/proactivecarecentral)

#### Proactive Care service activation

[www.hpe.com/services/proactivecarecentralgetstarted](http://www.hpe.com/services/proactivecarecentralgetstarted)

## Warranty information

To view the warranty for your product or to view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products* reference document, go to the Enterprise Safety and Compliance website:

[www.hpe.com/support/Safety-Compliance-EnterpriseProducts](http://www.hpe.com/support/Safety-Compliance-EnterpriseProducts)

### Additional warranty information

#### HPE ProLiant and x86 Servers and Options

[www.hpe.com/support/ProLiantServers-Warranties](http://www.hpe.com/support/ProLiantServers-Warranties)

## HPE Enterprise Servers

[www.hpe.com/support/EnterpriseServers-Warranties](http://www.hpe.com/support/EnterpriseServers-Warranties)

## HPE Storage Products

[www.hpe.com/support/Storage-Warranties](http://www.hpe.com/support/Storage-Warranties)

## HPE Networking Products

[www.hpe.com/support/Networking-Warranties](http://www.hpe.com/support/Networking-Warranties)

# Regulatory information

To view the regulatory information for your product, view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the Hewlett Packard Enterprise Support Center:

[www.hpe.com/support/Safety-Compliance-EnterpriseProducts](http://www.hpe.com/support/Safety-Compliance-EnterpriseProducts)

### Additional regulatory information

Hewlett Packard Enterprise is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements such as REACH (Regulation EC No 1907/2006 of the European Parliament and the Council). A chemical information report for this product can be found at:

[www.hpe.com/info/reach](http://www.hpe.com/info/reach)

For Hewlett Packard Enterprise product environmental and safety information and compliance data, including RoHS and REACH, see:

[www.hpe.com/info/ecodata](http://www.hpe.com/info/ecodata)

For Hewlett Packard Enterprise environmental information, including company programs, product recycling, and energy efficiency, see:

[www.hpe.com/info/environment](http://www.hpe.com/info/environment)

# 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 ([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.

# 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](#). 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.