HP Apollo 4200 Gen9 Server
Maintenance and Service Guide

Abstract
This guide describes identification and maintenance procedures, diagnostic tools, specifications and requirements for hardware components and software. This guide is for an experienced service technician. HP assumes that you are qualified in the servicing of computer equipment, trained in recognizing hazards in products, and are familiar with weight and stability precautions.
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HP continually improves and changes product parts. For complete and current supported parts information, see the HP PartSurfer website (http://partsurfer.hp.com).

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<td>Miscellaneous Blanks Kit</td>
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<td>a) PCI expansion slots 5-7 cover air blocker</td>
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<td>b) Chassis retention brackets</td>
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<td>c) Fan blank</td>
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<td>f) Air flow blocker for front drive cage 2</td>
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<td>g) Cable management holder</td>
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<td>h) FlexibleLOM slot blank</td>
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<tr>
<td></td>
<td>i) Chassis rear bracket</td>
<td>—</td>
<td>Mandatory¹</td>
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1 Mandatory—Parts for which customer self repair is mandatory. If you request HP to replace these parts, you will be charged for the travel and labor costs of this service.

2 Optional—Parts for which customer self repair is optional. These parts are also designed for customer self repair. If, however, you require that HP replace them for you, there may or may not be additional charges, depending on the type of warranty service designated for your product.

3 No—Some HP parts are not designed for customer self repair. In order to satisfy the customer warranty, HP requires that an authorized service provider replace the part. These parts are identified as “No” in the Illustrated Parts Catalog.
1 Mandatory: Obrigatória — Peças cujo reparo feito pelo cliente é obrigatório. Se desejar que a HP substitua essas peças, serão cobradas as despesas de transporte e mão-de-obra do serviço.

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

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

1 Mandatory: 必须 — 自己维修必修的部件。当该部件不适用于 HP 产品时，客户必须自行维修，否则 HP 有权收取费用。客户可以要求 HP 替换这些部件，但必须支付相应的费用。

2 Optional: 可选的 — 客户可以选择是否自行维修的部件。这些部件也是为客户自行维修设计的。如果客户选择自行维修，则由客户自行承担维修费用。HP 可能会收取额外的费用。

3 No: 否 — 一些 HP 产品的设计并未考虑客户自行维修。为了满足客户维修的要求，HP 要求授权服务提供商更换相关部件。这些部件在部件目录中标记为“否”。

1 Mandatory: 必须 — 客户自行维修的部件。如果客户要求 HP 更换这些部件，则必须由授权服务提供商进行维修。

2 Optional: 可选的 — 客户可以自行更换的部件。这些部件也是为客户自行维修设计的。如果客户选择自行更换，则由客户自行承担更换费用。HP 可能会收取额外的费用。

3 No: 否 — 一些 HP 部件没有消费者可自行更换的设计。为符合客户保修，HP 需要授权的维修服务提供商更换零件。这些零件在目录的部件列表中，被标记为“否”。

1 Mandatory: 必须 — 客户自行维修的部件。如果客户要求 HP 更换这些部件，则必须由授权服务提供商进行维修。

2 Optional: 可选的 — 客户可以自行更换的部件。这些部件也是为客户自行维修设计的。如果客户选择自行更换，则由客户自行承担更换费用。HP 可能会收取额外的费用。

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Illustrated parts catalog 8
**System components**

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<td>Optional²</td>
</tr>
<tr>
<td>11</td>
<td>Power input module</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>HP 1400W Flex Slot Platinum Plus Hot-plug Power Supply Kit</td>
<td>754383-001</td>
<td>Mandatory¹</td>
</tr>
<tr>
<td>b)</td>
<td>HP 800W Flex Slot Platinum Hot-plug Power Supply Kit*</td>
<td>754381-001</td>
<td>Mandatory¹</td>
</tr>
<tr>
<td>c)</td>
<td>HP 800W Common Slot Titanium Hot-plug Power Supply Kit*</td>
<td>754378-001</td>
<td>Mandatory¹</td>
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<tr>
<td>d)</td>
<td>HP 800W Flex Slot 48V DC Hot-plug Power Supply Kit*</td>
<td>754382-001</td>
<td>Mandatory¹</td>
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<tr>
<td>e)</td>
<td>HP 800W Flex Slot Universal Hot-plug Power Supply Kit*</td>
<td>754379-001</td>
<td>Mandatory¹</td>
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<tr>
<td>12</td>
<td>Power pass-through board</td>
<td>809945-001</td>
<td>Optional²</td>
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<td>13</td>
<td>SATA M.2 SSD single module enablement kit</td>
<td>797907-001</td>
<td>Optional²</td>
</tr>
<tr>
<td>a)</td>
<td>M.2 SSD enablement board</td>
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<tr>
<td>b)</td>
<td>M.2 SSD module</td>
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<tr>
<td>c)</td>
<td>SATA cable*</td>
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<td>SATA M.2 SSD dual module enablement kit</td>
<td>797908-001</td>
<td>Optional²</td>
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<td>a)</td>
<td>M.2 SSD enablement board</td>
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<tr>
<td>b)</td>
<td>M.2 SSD module</td>
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<tr>
<td>c)</td>
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<td>2 slot PCI riser board</td>
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<td>Optional²</td>
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<td>Item</td>
<td>Description</td>
<td>Spare part number</td>
<td>Customer self repair</td>
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<td>16</td>
<td>Dedicated iLO management module</td>
<td>809944-001</td>
<td>Optional²</td>
</tr>
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<td>System board (include alcohol pad and thermal compound)</td>
<td>809943-001</td>
<td>Optional²</td>
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<td>18</td>
<td>4-bay LFF rear drive backplane</td>
<td>809949-001</td>
<td>Optional²</td>
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<td>2-bay SFF rear drive backplane</td>
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<td>Optional²</td>
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<td>System cables*</td>
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<td>Signal and power cables for 12-bay LFF front drive cage 1 and cage 2*</td>
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<td>c)</td>
<td>Cable kit*</td>
<td>810246-001</td>
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<tr>
<td>i)</td>
<td>2-SFF multi-connector drive signal cable*</td>
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</tr>
<tr>
<td>ii)</td>
<td>Power Y-cable for 2-SFF or 4-LFF rear drive*</td>
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<td></td>
</tr>
<tr>
<td>iii)</td>
<td>Ambient temperature sensor cable*</td>
<td></td>
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</tr>
<tr>
<td>iv)</td>
<td>Mini-SAS cable*</td>
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</tr>
</tbody>
</table>

* Not shown

¹Mandatory—Parts for which customer self repair is mandatory. If you request HP to replace these parts, you will be charged for the travel and labor costs of this service.

²Optional—Parts for which customer self repair is optional. These parts are also designed for customer self repair. If, however, you require that HP replace them for you, there may or may not be additional charges, depending on the type of warranty service designated for your product.

³No—Some HP parts are not designed for customer self repair. In order to satisfy the customer warranty, HP requires that an authorized service provider replace the part. These parts are identified as “No” in the Illustrated Parts Catalog.

¹Mandatory: Obligatoire—Pièces pour lesquelles la réparation par le client est obligatoire. Si vous demandez à HP de remplacer ces pièces, les coûts de déplacement et main d’œuvre du service vous seront facturés.

²Optional: Facultatif—Pièces pour lesquelles la réparation par le client est facultative. Ces pièces sont également conçues pour permettre au client d’effectuer lui-même la réparation. Toutefois, si vous demandez à HP de remplacer ces pièces, l’intervention peut ou non vous être facturée, selon le type de garantie applicable à votre produit.

³No: Non—Certaines pièces HP ne sont pas conçues pour permettre au client d’effectuer lui-même la réparation. Pour que la garantie puisse s’appliquer, HP exige que le remplacement de la pièce soit effectué par un Mainteneur Agréé. Ces pièces sont identifiées par la mention “Non” dans le Catalogue illustré.

¹Mandatory: Obbligatorie—Parti che devono essere necessariamente riparate dal cliente. Se il cliente ne affida la riparazione ad HP, deve sostenere le spese di spedizione e di manodopera per il servizio.
Optional: Opzionali—Parti la cui riparazione da parte del cliente è facoltativa. Si tratta comunque di componenti progettati per questo scopo. Se tuttavia il cliente ne richiede la sostituzione ad HP, potrebbe dover sostenere spese addizionali a seconda del tipo di garanzia previsto per il prodotto.

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


Mandatory: Obligatorio—componentes para los que la reparación por parte del usuario es obligatoria. Si solicita a HP que realice la sustitución de estos componentes, tendrá que hacerse cargo de los gastos de desplazamiento y de mano de obra de dicho servicio.

Optional: Opcional—componentes para los que la reparación por parte del usuario es opcional. Estos componentes también están diseñados para que puedan ser reparados por el usuario. Sin embargo, si precisa que HP realice su sustitución, puede o no conllevar costes adicionales, dependiendo del tipo de servicio de garantía correspondiente al producto.

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

Mandatory: Verplicht—Onderdelen waarvoor Customer Self Repair verplicht is. Als u HP verzoekt deze onderdelen te vervangen, komen de reiskosten en het arbeidsloon voor uw rekening.

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

No: Nee—Sommige HP onderdelen zijn niet ontwikkeld voor reparatie door de klant. In verband met de garantievoorwaarden moet het onderdeel door een geautoriseerde Service Partner worden vervangen. Deze onderdelen worden in de geïllustreerde onderdelencatalogus aangemerkt met “Nee”.

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

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

No: Nenhuma—Algumas peças da HP não são projetadas para o reparo feito pelo cliente. A fim de cumprir a garantia do cliente, a HP exige que um técnico autorizado substitua a peça. Essas peças estão identificadas com a marca “No” (Não), no catálogo de peças ilustrado.
1 Mandatory: 必須 - 顧客自己修理が必要の部品。当該部品について、もしお客様がHPに交換作業を依頼される場合には、その修理サービスにに関する交通費および人件費がお客様に請求されます。

2 Optional: 任意 - 顧客自己修理が必要の部品。当該部品も顧客自己修理用です。当該部品について、もしお客様がHPに交換作業を依頼される場合には、お客様ご自身で製品に適用される保証サービス内容の範囲内においては、費用を負担していただくことなく保証サービスを受けることができます。

3 No: 除外 - HP製品の一部の部品は、顧客自己修理用ではありません。製品の保証を継続するためには、HPまたはHP正規保守代理店による交換作業が必須となります。部品カタログには、当該部品が顧客自己修理除外品である旨が記載されています。

1 Mandatory: 強制的 - 要求客户必须自行维修的部件。如果您要求HP更换这些部件，则必须为您支付差旅费和人工费。

2 Optional: 可选的 - 客户可以选择是否自行维修的部件。这些部件也是为客户自行维修设计的。不过，如果您要求HP为您更换这些部件，则根据你的产品指定的保修服务类型，HP可能收取或不再收取任何附加费用。

3 No: 否 - 某些HP部件的设计并未考虑客户自行维修。为了满足客户保修的需要，HP要求授权服务提供商更换相关部件。这些部件在部件目录中标记为“否”。

1 Mandatory: 強制的 - 客戶自行維修所使用的部件是強制性的。如果您要求HP更換這些零件，HP將會向您收取此服務所需的外出費用與勞動成本。

2 Optional: 選購的 - 客戶自行維修所使用的零件是選購的。這些零件也設計用於客戶自行維修之用。不過，如果您要求HP為您更換，則可能需要也可能不需要額外的費用，端視對此產品指定的保固服務類型而定。

3 No: 否 - 某些HP零件沒有消費者可自行維修的設計。為符合客戶保固，HP需要授權的服務供應商更換零件。這些零件在顯示的零件目錄中，標示為「否」。

1 Mandatory: 必須 - 買方選的選項。使用HP時，此部件的修理要充滿成本的，如服務費出分價格及住宿費用。

2 Optional: 選購 - 客戶自行維修的選項。此部件也必須由貴方自行維修。然而，使用此部件時，修理要充滿成本約分價格及住宿費用。根據使用HP保固規定，此部件的修理要充滿成本約分價格及住宿費用。使用此部件時，選擇自願修理的部件。

3 No: 否 - 買方選的選項。使用HP時，此部件的修理要充滿成本的。貴方不需支付修理費用。
Removal and replacement procedures

**Required tools**

You need the following items for some procedures:

- T-25 Torx screwdriver (to loosen the chassis rack mounting screws located inside the rack ears)
- T-10/T-15 Torx screwdriver
- HP Insight Diagnostics (on page 124)

**Safety considerations**

Before performing service procedures, review all the safety information.

**Preventing electrostatic discharge**

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

To prevent electrostatic damage:

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

**Symbols on equipment**

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

- This symbol indicates the presence of hazardous energy circuits or electric shock hazards. Refer all servicing to qualified personnel.
  
  **WARNING:** To reduce the risk of injury from electric shock hazards, do not open this enclosure. Refer all maintenance, upgrades, and servicing to qualified personnel.

- This symbol indicates the presence of electric shock hazards. The area contains no user or field serviceable parts. Do not open for any reason.
  
  **WARNING:** To reduce the risk of injury from electric shock hazards, do not open this enclosure.
This symbol on an RJ-45 receptacle indicates a network interface connection. **WARNING:** To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

This symbol indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists. **WARNING:** To reduce the risk of injury from a hot component, allow the surface to cool before touching.

This symbol indicates that the component exceeds the recommended weight for one individual to handle safely. **WARNING:** To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

These symbols, on power supplies or systems, indicate that the equipment is supplied by multiple sources of power. **WARNING:** To reduce the risk of injury from electric shock, remove all power cords to completely disconnect power from the system.

### Server warnings and cautions

**WARNING:** This server is very heavy. To reduce the risk of personal injury or damage to the equipment:
- Observe local occupational health and safety requirements and guidelines for manual handling.
- Reduce the weight of the server by removing the drives and power supplies before installing or removing the server from the rack.
- Obtain adequate assistance to lift and stabilize the server during installation or removal. HP recommends that a minimum of four people are required for installing or removing the server from the rack. A fifth person might be required to help align the server if the server is installed higher than chest level.
- Use caution when installing or removing the server from the rack; it is unstable when not fastened to the rails.

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

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

**CAUTION:** Protect the server from power fluctuations and temporary interruptions with a regulating uninterruptible power supply. This device protects the hardware from damage caused by power surges and voltage spikes and keeps the system in operation during a power failure.
CAUTION: Do not operate the server for long periods with the front drive cages extended. When the front drive cage is extended while the server is powered on, do one of the following:

- If the front drive health/thermal LED is functional, monitor the status of this LED. When this LED starts flashing amber, immediately slide the drive cage back into the chassis and keep it there until the LED turns green.
- If the front drive health/thermal LED is not functional, do not keep the drive cage out of the chassis for more than 140 sec. After 140 sec, slide the drive cage inside the chassis and keep it there for at least 300 sec before extending it out again.

Failure to observe this caution will result in improper airflow and insufficient cooling that can lead to thermal damage.

Rack warnings

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

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

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

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

WARNING: 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.

Preparation procedures

To access some components and perform certain service procedures, you must perform one or more of the following procedures:

- Access the product front panel ("Remove the security bezel" on page 24).
- Power down the server (on page 17).

If you must remove a server from a rack or a non-hot-plug component from a server, power down the server.

- Extend the front drive cages from the chassis ("Extend the front drive cages" on page 21).
- Access the product rear panel.
- Remove the server from the rack (on page 27).
  
  If the rack environment, cabling configuration, or the server location in the rack creates awkward conditions, remove the server from the rack.
- Remove the access panel ("Access panel" on page 36).
- Remove the PCI riser cages ("Remove the PCI riser cage" on page 30).
- Remove the air baffle ("Air baffle" on page 37).

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 iLO4.
  This method initiates a controlled remote shutdown of applications and the OS before the server enters standby mode.

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

Remove a power input module

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

1. If the server is using a single hot-plug power input module only, power down the server (on page 17).
2. Release the power cords from the strain relief straps.
Removal and replacement procedures
3. For an AC power input module, disconnect the power cord from the module.

4. For a DC power input module, do the following:
   a. Detach the ground (earthed) cable from the ground screw and washer.
b. Remove the terminal block connector from the power input module.

5. Remove the power input module.
   - AC power input module
   - DC power input module
Extend the front drive cages

**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.

**CAUTION:** Do not operate the server for long periods with the front drive cages extended. When the front drive cage is extended while the server is powered on, do one of the following:

- If the front drive health/thermal LED is functional, monitor the status of this LED. When this LED starts flashing amber, immediately slide the drive cage back into the chassis and keep it there until the LED turns green.
- If the front drive health/thermal LED is not functional, do not keep the drive cage out of the chassis for more than 140 sec. After 140 sec, slide the drive cage inside the chassis and keep it there for at least 300 sec before extending it out again. Failure to observe this caution will result in improper airflow and insufficient cooling that can lead to thermal damage.

1. If installed, remove the security bezel (on page 24).

2. The front drive cages are secured to the chassis by shipping screws. The location and number of these shipping screws depends on whether the server was part of a BTO or a rack CTO shipment. Do one of the following:
   - For a server that was shipped as a rack CTO model, there are two screws located on the chassis ears. Proceed to step 3.
   - For a server that was shipped as a BTO model, there are two screws each on the sides of the front drive cages. Proceed to step 4.

3. For a server that was shipped as a rack CTO model, remove the shipping screws on the chassis ears.

4. For a server that was shipped as a BTO model, remove the shipping screws on the sides of the front drive cages:
   - Loosen the thumbscrews on the chassis ears till the screws are protruding out.
b. Pull on the chassis ear thumbscrews to extend the server out of the rack until the rack rail lock is engaged.

c. Press the server release latches and extend the server out of the rack till about halfway the depth of the front drive cage 2.
d. Remove the shipping screws on the sides of the front drive cages.

5. Pull down the front drive cage release latches and use them to completely extend the front drive cages from the chassis.
6. Pull and hold the drive cage rail release latches, and then slide the front drive cages back into the chassis.

Remove the security bezel

To access the front panel components, unlock and then remove the security bezel.

Remove a drive from the front drive cages

⚠️ **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.

⚠️ **CAUTION:** Do not operate the server with any of the front drive cage 1 bays empty. To maintain proper airflow and sufficient cooling in the front drive cage 1, all drive bays in this cage should have a drive or a drive blank.
1. Back up all server data.
2. If installed, remove the security bezel (on page 24).
3. To remove an LFF drive:
   a. Determine the status of the drive from the drive LED definitions.
   b. Wait until the Online/Activity LED stops flashing.
   c. Press the latch to open the release lever.
   d. Pull the release lever to disengage the drive from the backplane, and then slide the drive out of the drive bay.
4. To remove an SFF drive:
   a. Determine the status of the drive from the drive LED definitions.
   b. Wait until the icon in the Do Not Remove button stops flashing and is no longer illuminated.
   c. Press the Do Not Remove button to open the release lever.
   d. Pull the release lever to disengage the drive from the backplane, and then slide the drive out of the drive bay.
Removal and replacement procedures

CAUTION: Do not operate the server for long periods with the front drive cages extended. When the front drive cage is extended while the server is powered on, do one of the following:

- If the front drive health/thermal LED is functional, monitor the status of this LED. When this LED starts flashing amber, immediately slide the drive cage back into the chassis and keep it there until the LED turns green.

- If the front drive health/thermal LED is not functional, do not keep the drive cage out of the chassis for more than 140 sec. After 140 sec, slide the drive cage inside the chassis and keep it there for at least 300 sec before extending it out again.

Failure to observe this caution will result in improper airflow and insufficient cooling that can lead to thermal damage.

1. If you intend to remove a drive from the front drive cage 2:
   a. Extend the front drive cages from the chassis ("Extend the front drive cages" on page 21).
   b. Remove the drive from the front drive cage 2. See the procedural images in the previous step of this section.

Remove a drive from the rear drive cage

1. Back up all server data.
2. Access the product rear panel.
3. To remove an LFF drive:
   a. Determine the status of the drive from the drive LED definitions.
   b. Wait until the Online/Activity LED stops flashing.
   c. Press the latch to open the release lever.
   d. Pull the release lever to disengage the drive from the backplane, and then slide the drive out of the drive bay.

4. To remove an SFF drive:
   a. Determine the status of the drive from the drive LED definitions.
   b. Wait until the icon in the Do Not Remove button stops flashing and is no longer illuminated.
   c. Press the Do Not Remove button to open the release lever.
d. Pull the release lever to disengage the drive from the backplane, and then slide the drive out of the drive bay.

Remove the server from the rack

⚠️ **WARNING:** This server is very heavy. To reduce the risk of personal injury or damage to the equipment:
- Observe local occupational health and safety requirements and guidelines for manual handling.
- Reduce the weight of the server by removing the drives and power supplies before installing or removing the server from the rack.
- Obtain adequate assistance to lift and stabilize the server during installation or removal. HP recommends that a minimum of four people are required for installing or removing the server from the rack. A fifth person might be required to help align the server if the server is installed higher than chest level.
- Use caution when installing 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, power input modules, 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.

1. Back up all server data.
2. Press the Power On/Standy button.
   The server powers down and enters standby mode. The system power LED changes from green to amber. Power is still applied to the server.
3. Disconnect all peripheral cables from the server.
4. Release the power cords from the strain relief straps.
5. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.

6. Remove all power input modules.
7. If a rear drive cage option is installed, remove all rear drives. ("Hotplug drive" on page 35, "Remove a drive from the rear drive cage" on page 26).

8. Remove all the drives installed in the front drive cages 1 and 2 ("Extend the front drive cages" on page 21).

9. Remove the server from the rack:
   a. Loosen the thumbscrews on the chassis ears till the screws are protruding out.
b. Pull on the chassis ear thumbscrews to extend the server out of the rack until the rack rail lock is engaged.

c. Press the server release latches, and remove the server from the rack.

10. Place the server on a sturdy, level surface.

Remove the PCI riser cage

⚠️ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives, power input modules, 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.

To remove the component:
1. Power down the server (on page 17).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Remove the server from the rack (on page 27).
4. Remove the access panel ("Access panel" on page 36).
5. If expansion boards with internal cabling are installed on the PCI riser cage, disconnect all internal
cables from the expansion boards to completely remove the cage from the server.
6. Remove the PCI riser cage:
   a. Disconnect the power cable from the riser board.
   b. Loosen the captive screw on the front end of the PCI riser cage.
   c. Loosen the thumbscrew on the rear end of the PCI riser cage.
   d. Grasp the PCI riser cage at the touch points and lift it out of the chassis.
Open the cable management holder

1. Power down the server (on page 17).
2. Remove the server from the rack (on page 27).
3. Remove the access panel ("Access panel" on page 36).
4. Remove the air baffle ("Air baffle" on page 37).
5. Pull down the front drive cage release latches and use them to completely extend the front drive cages from the chassis.

6. Disconnect all system cables secured in the cable management holder from the system board or controller board, and then release them from the holder.
7. Press and hold the cable management holder release latch, and then move the holder up.

Close the cable management holder

1. Return the cable management holder to its original position.

2. Secure all disconnected system cables in the cable management holder, and then connect them to the system board and/or controller board.
3. Pull and hold the drive cage rail release latches, and then slide the front drive cages back into the chassis.

4. Install the air baffle.
5. Install the access panel.
6. Install the server into the rack.
7. Power up the server.

**Hot-plug drive blank**

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

To remove the component:
1. If installed, remove the security bezel (on page 24).
2. Remove the drive blank.

To replace the LFF drive blank, slide the component into the bay until it clicks.
CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all bays are populated with either a component or a blank.

To remove the component:
1. Back up all server data on the drive.
2. If installed, remove the security bezel (on page 24).
3. Determine the status of the drive from the drive LED definitions.
4. Remove the hot-plug drive.
   a. Rear SFF drive removal
   b. Front SFF drive removal
c. Rear/front LFF drive removal

To replace the component, reverse the removal procedure.

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.

To remove the component:

1. Power down the server (on page 17).
2. Remove the server from the rack (on page 27).
3. Use a screwdriver to loosen the access panel screws.
4. Slide the access panel toward the rear of the server, then lift it from the server.

To replace the component, reverse the removal procedure.
Air baffle

To remove the component:

1. Power down the server (on page 17).
2. Remove the server from the rack (on page 27).
3. Remove the access panel ("Access panel" on page 36).
4. If an HP Smart Storage Battery is installed on the air baffle, disconnect the battery cable.

5. Remove the air baffle.

To replace the component, reverse the removal procedure.

Four-bay LFF hot-plug rear drive backplane
**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, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

To remove the component:

1. Power down the server (on page 17).
2. Remove the server from the rack (on page 27).
3. Remove the access panel ("Access panel" on page 36).
4. Remove the air baffle ("Air baffle" on page 37).
5. Disconnect all cables connected to the drive cage backplane.
   - Disconnecting the cables from the four-bay LFF hot-plug rear drive cage connected to the front drive cage 2 backplane
Disconnecting the cables from the four-bay LFF hot-plug rear drive cage connected to the system board.

6. Remove the rear drive cage:
   a. Loosen the captive screws to detach the rear drive cage from system board.
   b. Loosen the thumbscrews to detach the drive cage from the rear panel.
   c. Grasp and lift the rear drive cage out of the chassis.
7. Remove the drive backplane.

To replace the component, reverse the removal procedure.

Two-bay SFF hot-plug rear drive backplane

⚠️ 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, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

To remove the component:
1. Power down the server (on page 17).
2. Remove the server from the rack (on page 27).
3. Remove the access panel ("Access panel" on page 36).
4. Remove the air baffle ("Air baffle" on page 37).
5. Disconnect all cables connected to the drive cage backplane.
6. Remove the rear drive cage:
   a. Loosen the captive screws to detach the rear drive cage from system board.
   b. Loosen the thumbscrews to detach the drive cage from the rear panel.
**LFF hot-plug front drive backplane**

**Removing drive backplane from LFF front drive cage**

⚠️ **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, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.
To remove the component:

1. Power down the server (on page 17).
2. Remove the server from the rack (on page 27).
3. Pull down the front drive cage release latches and use them to completely extend the front drive cages from the chassis.

4. Remove the backplane cover.
5. Disconnect all cables connected to the drive cage backplane.

6. Remove the drive backplane.

To replace the component, reverse the removal procedure.

Removing drive backplane from LFF front drive cage 2

⚠️ **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, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

To remove the component:

1. Power down the server (on page 17).
2. Remove the server from the rack (on page 27).
3. Pull down the front drive cage release latches and use them to completely extend the front drive cages from the chassis.

4. Remove the air flow blocker.
5. Disconnect all cables connected to the drive cage backplane.

6. Move the cable bracket away from the drive backplane.
7. Remove the drive backplane.

To replace the component, reverse the removal procedure.

SFF hot-plug front drive backplane

Removing drive backplane from SFF front drive cage 1

⚠️ **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, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

To remove the component:

1. Power down the server (on page 17).
2. Remove the server from the rack (on page 27).
3. Pull down the front drive cage release latches and use them to completely extend the front drive cages from the chassis.

4. Remove the drive cage top cover.
5. Remove the backplane cover.

6. Disconnect all cables connected to the drive cage backplane.
7. Remove the drive backplane.

To replace the component, reverse the removal procedure.

Removing drive backplane from SFF front drive cage 2

⚠️ **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, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

To remove the component:

1. Power down the server (on page 17).
2. Remove the server from the rack (on page 27).
3. Pull down the front drive cage release latches and use them to completely extend the front drive cages from the chassis.

4. Remove the drive cage top cover.
5. Remove the air flow blocker.

6. Remove the backplane cover.
7. Disconnect all cables connected to the drive cage backplane.

8. Remove the drive backplane.

To replace the component, reverse the removal procedure.

**FBWC module**

⚠️ **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:** In systems that use external data storage, be sure that the server is the first unit to be powered down and the last to be powered back up. Taking this precaution ensures that the system does not erroneously mark the drives as failed when the server is powered up.
CAUTION: To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

To remove the component:

1. Power down the server (on page 17).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Remove the server from the rack (on page 27).
4. Remove the access panel ("Access panel" on page 36).
5. If the cache module is installed on a storage controller board that is installed in a PCI riser cage, remove the riser cage ("Remove the PCI riser cage" on page 30).
6. If necessary for easier access to the cache module connector and/or removal of an air scoop, remove the storage controller from the PCI riser cage or from the system board.

CAUTION: When connecting or disconnecting the cache module cable, the connectors on the cache module and cable are susceptible to damage. Avoid excessive force and use caution to avoid damage to these connectors.

7. Disconnect the cache module backup power cable from the cache module.
8. Remove the cache module.

To replace the component, reverse the removal procedure.

**M.2 SSD enablement kit**

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

To remove the component:
1. Power down the server (on page 17).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Remove the server from the rack (on page 27).
4. Remove the access panel ("Access panel" on page 36).
5. Release the M.2 SSD SATA cables from the cable management holder.
6. Open the cable management holder (on page 32).
7. Disconnect the SATA cables from the M.2 SSD enablement board and the system board.
8. Remove the M.2 SSD enablement board.
- M.2 SSD enablement board removal from the system board
  
  - M.2 SSD enablement board removal from the PCI riser cage slot
    
    i. Remove the PCI riser cage (on page 30).
    
    ii. Remove the M.2 SSD enablement board.

To replace the component, reverse the removal procedure.
Fan and fan blank

Fan population guidelines

To provide sufficient airflow to the system if a fan fails, the server supports redundant fans.

- Single processor, non-redundant configuration:
  - Fans are required in fan bays 1–4.
  - Fan blank is required in fan bay 5.
  - Fan bays 6–10 have a single fan cage cover.

- Single processor, redundant configuration:
  - Fans are required in fan bays 1–4 and 6–9.
  - Fan blank is required in fan bay 5.
  - Fan bay 10 is empty.

- Dual processor, non-redundant configuration:
  - Fans are required in fan bays 1–5.
  - Fan bays 6–10 have a single fan cage cover.

- Dual processor, redundant configuration—Fans are required in all 10 fan bays.

- In a redundant fan mode:
  - If one fan fails, the system continues to operate without redundancy. This condition is indicated by a flashing amber Health LED.
  - If two fans fail, the system shuts down.

- The minimum fan requirement to make this server bootable is:
  - Fans 1–4 in a single processor configuration
  - Fans 1–5 in dual processor configuration
**Fan blank**

- **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, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

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

To remove the component:
1. Power down the server (on page 17).
2. Remove the server from the rack (on page 27).
3. Remove the access panel (“Access panel” on page 36).
4. Remove the fan blank.

To replace the component, reverse the removal procedure.

**Fan Module**

- **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, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

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

1. Power down the server (on page 17).
2. Remove the server from the rack (on page 27).
3. Remove the access panel ("Access panel" on page 36).

△ **CAUTION:** The fan does not have a fan guard. Special attention is needed when removing or installing the fan to prevent finger injury.

4. Remove the fan.

To replace the component, reverse the removal procedure.

**Fan cage cover**

△ **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, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

To remove the component:

1. Power down the server (on page 17).
2. Remove the server from the rack (on page 27).
3. Remove the access panel ("Access panel" on page 36).
4. Remove the fan cage cover.

To replace the component, reverse the removal procedure.

**DIMM**

⚠️ **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, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

To remove the component:

1. Power down the server (on page 17).
2. Remove the server from the rack (on page 27).
3. Remove the access panel ("Access panel" on page 36).
4. Remove the air baffle ("Air baffle" on page 37).
5. Open the DIMM slot latches.
6. Remove the DIMM.

To replace the component, reverse the removal procedure.

**Processor**

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

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

⚠️ **CAUTION:** To prevent possible server overheating, always populate each processor socket with a processor socket cover or a processor and a heatsink.

⚠️ **CAUTION:** To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

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

ℹ️ **IMPORTANT:** Processor socket 1 must be populated at all times or the server does not function.

To remove the component:

1. Power down the server (on page 17).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Remove the server from the rack (on page 27).
4. Remove the access panel ("Access panel" on page 36).
5. Remove the air baffle ("Air baffle" on page 37).
6. Remove the heatsink ("Heatsink" on page 66).
7. Open each of the processor locking levers in the order indicated, and then open the processor retaining bracket.

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

8. Remove the processor from the processor retaining bracket.
To replace the component:

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

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

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

2. Close the processor retaining bracket. When the processor is installed properly inside the processor retaining bracket, the processor retaining bracket clears the flange on the front of the socket.
3. Press and hold the processor retaining bracket in place, and then close each processor locking lever. Press only in the area indicated on the processor retaining bracket.

4. Clean the old thermal grease from the heatsink with the alcohol swab. Allow the alcohol to evaporate before continuing.

5. Apply all the grease to the top of the processor in the following pattern to ensure even distribution.

6. Install the heatsink:
   a. Position the heatsink on the processor backplate.
   b. Tighten one pair of diagonally opposite screws halfway, and then tighten the other pair of screws.
c. Finish the installation by completely tightening the screws in the same sequence.

7. Install the air baffle.
8. Install the access panel.
9. Install the server into the rack.
10. Power up the server.

**Heatsink**

⚠️ **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, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

To remove the component:

1. Power down the server (on page 17).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Remove the server from the rack (on page 27).
4. Remove the access panel ("Access panel" on page 36).
5. Remove the air baffle ("Air baffle" on page 37).
6. Remove the heatsink:
   a. Loosen one pair of diagonally opposite screws halfway, and then loosen the other pair of screws.
   b. Completely loosen all screws in the same sequence.
c. Remove the heatsink from the processor backplate.

To replace the component:

1. Clean the old thermal grease from the processor with the alcohol swab. Allow the alcohol to evaporate before continuing.

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

3. Install the heatsink:
   a. Position the heatsink on the processor backplate.
   b. Tighten one pair of diagonally opposite screws halfway, and then tighten the other pair of screws.
c. Finish the installation by completely tightening the screws in the same sequence.

4. Install the air baffle.
5. Install the access panel.
6. Install the server into the rack.
7. Power up the server.

**Expansion board**

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

⚠️ **CAUTION:** To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

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

To remove the component:

1. Power down the server (on page 17).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Remove the server from the rack (on page 27).
4. Remove the access panel ("Access panel" on page 36).
5. If you are removing an expansion board installed in the PCI riser cage, remove the riser cage ("Remove the PCI riser cage" on page 30).
6. Disconnect any internal cables that are connected to the expansion board.
7. Remove the expansion board.
- Expansion board removal from an onboard expansion slot ("FBWC module" on page 53)

- Expansion board removal from the two-slot PCI riser cage

- FlexibleLOM adapter removal
8. If you are removing a storage controller board with a cache module installed, remove the cache module ("FBWC module" on page 53).

To replace the component, reverse the removal procedure.

### Onboard PCI expansion slot air blocker

△ **CAUTION:** To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

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

To remove the component:

1. Power down the server (on page 17).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Remove the server from the rack (on page 27).
4. Remove the access panel ("Access panel" on page 36).
5. Remove the onboard PCI expansion slot cover.

To replace the component, reverse the removal procedure.

### FlexibleLOM blank

△ **CAUTION:** To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.
To remove the component:

1. Power down the server (on page 17).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Remove the server from the rack (on page 27).
4. Remove the access panel ("Access panel" on page 36).
5. Remove the FlexibleLOM blank.

To replace the component, reverse the removal procedure.

### Chassis rear bracket

⚠️ **CAUTION:** To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

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

To remove the component:

1. Power down the server (on page 17).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Remove the server from the rack (on page 27).
4. Remove the access panel ("Access panel" on page 36).
5. Remove the rear option blank.

To replace the component, reverse the removal procedure.

**Chassis retention bracket**

⚠️ **CAUTION:** To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

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

To remove the component:

1. Power down the server (on page 17).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Remove the server from the rack (on page 27).
4. Remove the chassis retention brackets from the non-shelf portion of the rack rail.

To replace the component, reverse the removal procedure.

**Air-flow blocker**

⚠️ **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, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

To remove the component:

1. Power down the server (on page 17).
2. Remove the server from the rack (on page 27).
3. Pull down the front drive cage release latches and use them to completely extend the front drive cages from the chassis.
4. Remove the air flow blocker.
To replace the component, reverse the removal procedure.

**Cable management holder**

⚠️ **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, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

To remove the component:

1. Power down the server (on page 17).
2. Remove the server from the rack (on page 27).

3. Remove the access panel ("Access panel" on page 36).

4. Remove the air baffle ("Air baffle" on page 37).

5. Open the cable management holder (on page 32).

6. Pull down the front drive cage release latches and use them to completely extend the front drive cages from the chassis.

7. Disconnect all system cables secured in the cable management holder from the system board or controller board, and then release them from the holder.

8. Press and hold the cable management holder release latch, and then move the holder up.
9. Disconnect the front drive cage 1 and cage 2 power cables from the system board.

10. Remove the cable management holder.

To replace the component, reverse the removal procedure.

Cable kit for 12-bay LFF Front drive cages

⚠️ 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, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

To remove the component:
1. Power down the server (on page 17).
2. Remove the server from the rack (on page 27).

3. Pull down the front drive cage release latches and use them to completely extend the front drive cages from the chassis.

4. Remove the access panel ("Access panel" on page 36).

5. Remove the air baffle ("Air baffle" on page 37).

6. Open the cable management holder (on page 32).

7. Disconnect the front drive cage 1 and cage 2 power cables from the system board.

8. Remove the cable management holder.
9. Release the flex track 1 and 2 thumbscrews.

10. To remove all the cables connected to the front drive cage 1 backplane:
   a. Remove the backplane cover.
b. Disconnect all cables connected to the drive cage backplane.

c. Release one screw of front drive cage 1 cable rigid.

d. Release the rail kit screws on both side of the chassis.
e. Move the front drive cage 2 towards front drive cage 1.

f. Remove front drive cage 1 cable rigid.

11. To remove all the cables connected to front drive cage 2 backplane:
a. Remove the air flow blocker.

b. Disconnect all cables connected to the drive cage backplane.
c. Release one screw of cage 2 flex track and detach the flex track 2.

d. Remove the flex track 2.

To replace the component, reverse the removal procedure.

**Cable kit for 24-bay SFF Front drive cages**

⚠️ **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, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

To remove the component:

1. Power down the server (on page 17).
2. Remove the server from the rack (on page 27).
3. Pull down the front drive cage release latches and use them to completely extend the front drive cages from the chassis.

4. Remove the access panel ("Access panel" on page 36).
5. Remove the air baffle ("Air baffle" on page 37).
6. Open the cable management holder (on page 32).
7. Disconnect the front drive cage 1 and cage 2 power cables from the system board.

8. Remove the cable management holder.
9. Release the flex track 1 and 2 thumbscrews.

10. To remove all the cables connected to the front drive cage 1 backplane:
    a. Remove the drive cage top cover.
b. Remove the backplane cover.

c. Disconnect all cables connected to the drive cage backplane.
d. Release one screw of front drive cage 1 cable rigid.

e. Move the front drive cage 2 towards front drive cage 1.
f. Remove front drive cage 1 cable rigid.

11. To remove all the cables connected to front drive cage 2 backplane:
   a. Remove the drive cage top cover.
b. Remove the air flow blocker.

c. Remove the backplane cover.
d. Disconnect all cables connected to the drive cage backplane.

e. Release one screw of cage 2 flex track and detach the flex track 2.
f. Remove the flex track 2.

To replace the component, reverse the removal procedure.

**Two-slot PCI riser board**

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

⚠️ **CAUTION:** To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

To remove the component:

1. Power down the server (on page 17).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Remove the server from the rack (on page 27).
4. Remove the access panel ("Access panel" on page 36).
5. Remove the two-slot PCI riser cage ("Remove the PCI riser cage" on page 30).
6. Remove any existing expansion board from the riser board.
7. Remove the PCIe riser board.

To replace the component, reverse the removal procedure.

---

**HP Flexible Smart Array P840ar Controller**

⚠️ **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, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

To remove the component:

1. Power down the server (on page 17).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Remove the server from the rack (on page 27).
4. Remove the access panel ("Access panel" on page 36).
5. If installed, removed the rear drive cage:
   a. Disconnect all cables from the drive backplane;
— Disconnecting the cables from the four-bay LFF hot-plug rear drive cage connected to the front drive cage 2 backplane

— Disconnecting the cables from the four-bay LFF hot-plug rear drive cage connected to the system board
b. Remove the rear drive cage.
- Four-bay LFF hot-plug rear drive cage removal ("Hot plug drive" on page 35, "Remove a drive from the rear drive cage" on page 26)

- Two-bay SFF hot-plug rear drive cage removal ("Hot plug drive" on page 35, "Remove a drive from the rear drive cage" on page 26)
6. Disconnect all cables connected to the array controller board.

7. Remove the array controller board.

To replace the component, reverse the removal procedure.
System battery

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

⚠️ **WARNING:** The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:
- Do not attempt to recharge the battery.
- Do not expose the battery to temperatures higher than 60°C (140°F).
- Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
- Replace only with the spare designated for this product.

To remove the component:
1. Power down the server (on page 17).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Remove the server from the rack (on page 27).
4. Remove the access panel ("Access panel" on page 36).
5. Remove the air baffle ("Air baffle" on page 37).
6. Locate the battery on the system board ("System board components" on page 132).
7. Remove the battery.

![Image of battery removal](image)

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

To replace the component, reverse the removal procedure.

For more information about battery replacement or proper disposal, contact an authorized reseller or an authorized service provider.
Front I/O board

⚠️ **CAUTION:** To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

To remove the component:

1. Power down the server (on page 17).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Extend the front drive cages (on page 21).
4. Remove the right ear assembly.

![Diagram of removal process]
5. Disconnect the front I/O module cable.

6. Remove the front I/O board.

To replace the component, reverse the removal procedure.

System board

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

⚠️ **CAUTION:** To prevent damage to electrical components, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.
To avoid ESD damage, when removing electrostatic-sensitive components from the failed system board, place the components on a static-dissipating work surface or inside separate antistatic bags.

To remove the system board:

1. Power down the server (on page 17).
2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.
3. Remove the server from the rack (on page 27).
4. Remove the access panel ("Access panel" on page 36).
5. Remove the air baffle ("Air baffle" on page 37).
6. If installed, removed the rear drive cage:
   a. Disconnect all cables from the drive backplane:
      — Disconnecting the cables from the four-bay LFF hot-plug rear drive cage connected to the front drive cage 2 backplane
— Disconnecting the cables from the four-bay LFF hot-plug rear drive cage connected to the system board

— Disconnecting the cables from the two-bay SFF hot-plug rear drive cage connected to the front drive cage 2 backplane
Disconnecting the cables from the two-bay SFF hot-plug rear drive cage connected to the system board

b. Remove the rear drive cage:
   - Four-bay LFF hot-plug rear drive cage removal
7. If installed, remove the PCI riser cage (on page 30).
8. Remove all expansion boards from the onboard PCIe expansion slots ("HP Flexible Smart Array P840ar Controller" on page 93).
9. Remove the FlexibleLOM blank ("FlexibleLOM blank" on page 70).
10. Remove all DIMMs ("DIMM" on page 61).
11. Remove the heatsink:
   a. Loosen one pair of diagonally opposite screws halfway, and then loosen the other pair of screws.
   b. Completely loosen all screws in the same sequence.
   c. Remove the heatsink from the processor backplate.
12. Open each of the processor locking levers in the order indicated, and then open the processor retaining bracket.

![Diagram of processor locking levers being opened]

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

13. Remove the processor from the processor retaining bracket.

14. Disconnect all cables connected to the system board.

15. If installed, remove the dedicated iLO module (“Dedicated iLO management module” on page 111).

16. Remove the power pass-through module (“Power pass-through module” on page 115).

17. Remove the cable management holder.
18. Remove the failed system board.

To replace the system board:
1. Install the system board.
2. Open each of the processor locking levers in the order indicated, and then open the processor retaining bracket.

3. Remove the clear processor socket cover. Retain the processor socket cover for future use.
4. Install the processor. Verify that the processor is fully seated in the processor retaining bracket by visually inspecting the processor installation guides on either side of the processor. **THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED.**

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

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

5. Close the processor retaining bracket. When the processor is installed properly inside the processor retaining bracket, the processor retaining bracket clears the flange on the front of the socket.
6. Press and hold the processor retaining bracket in place, and then close each processor locking lever. Press only in the area indicated on the processor retaining bracket.

7. Install the processor socket cover on the failed system board.

8. Clean the old thermal grease from the heatsink and the top of the processor with the alcohol swab. Allow the alcohol to evaporate before continuing.

9. Apply all the grease to the top of the processor in the following pattern to ensure even distribution.

10. Install the heatsink:
   a. Position the heatsink on the processor backplate.
   b. Tighten one pair of diagonally opposite screws halfway, and then tighten the other pair of screws.
c. Finish the installation by completely tightening the screws in the same sequence.

11. Install all components removed from the failed system board.
12. Connect all cables disconnected from the failed system board.
13. If removed, install the dedicated iLO management module.
14. If removed, install the rear drive cage and connect the drive backplane cables.
15. If removed, install the PCI riser cage.
16. Install the cable management holder.
17. Install the air baffle.
18. Install the access panel.
19. Install the server into the rack.
20. Connect each power cord to the server.
21. Connect each power cord to the power source.
22. Press the Power On/Standby button.

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

   **IMPORTANT:** Install all components with the same configuration that was used on the failed system board.

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

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

   The serial number should only be modified by qualified service personnel. This value should always match the serial number located on the chassis.

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

7. Enter the product ID and press the **Enter** key.

8. Press the **F10** key to confirm exiting System Utilities. The server automatically reboots.

---

**Dedicated iLO management module**

⚠️ **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, take the appropriate anti-static precautions before beginning any installation, removal, or replacement procedure. Improper grounding can cause electrostatic discharge.

To remove the component:

1. Power down the server (on page 17).

2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.

3. Remove the server from the rack (on page 27).

4. Remove the access panel ("Access panel" on page 36).

5. If installed, remove the rear drive cage:
   a. Disconnect all cables from the drive backplane:
      - Disconnecting the cables from the four-bay LFF hot-plug rear drive cage connected to the front drive cage 2 backplane.
— Disconnecting the cables from the four-bay LFF hot-plug rear drive cage connected to the system board

— Disconnecting the cables from the two-bay SFF hot-plug rear drive cage connected to the front drive cage 2 backplane
Disconnecting the cables from the two-bay SFF hot-plug rear drive cage connected to the system board

b. Remove the rear drive cage:

- Four-bay LFF hot-plug rear drive cage removal ("Hot-plug drive" on page 35, "Remove a drive from the rear drive cage" on page 26)
6. Remove the dedicated iLO management module.

To replace the component, reverse the removal procedure. After installing the new dedicated iLO management module, enable the dedicated iLO connector ("Enabling the dedicated iLO management module" on page 114).

Enabling the dedicated iLO management module

The onboard NIC 1/shared iLO connector is set as the default system iLO connector. To enable the dedicated iLO management module, use the iLO 4 Configuration Utility accessible within the HP UEFI System Utilities.

For more information on the HP UEFI System Utilities, see the UEFI documentation on the HP website (http://www.hp.com/go/ProLiantUEFI/docs).
IMPORTANT: If the iLO configuration settings are reset to the default values, remote access to the machine will be lost. Access the physical machine and repeat the procedure described in this section to re-enable the dedicated iLO management connector.

To enable the dedicated iLO management module:

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

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

3. Select **Network Options**, and then press **Enter**. The Network Options screen appears.

4. Set the **Network Interface Adapter** field to **ON**, and then press **Enter**.

5. Press **F10** to save your changes. A message prompt to confirm the iLO settings reset appears.

6. Press **Enter** to reboot the iLO settings.

7. Press **Esc** until the main menu is displayed.

8. Select **Reboot the System** to exit the utility and resume the boot process. The IP address of the enabled dedicated iLO connector appears on the POST screen on the subsequent boot-up. Access the Network Options screen again to view this IP address for later reference.

### Power pass-through module

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

To remove the component:

1. Power down the server (on page 17).

2. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.

3. Remove the server from the rack (on page 27).

4. Remove the access panel ("Access panel" on page 36).
5. Pull down the front drive cage release latches and use them to completely extend the front drive cages from the chassis.

6. Remove the power pass-through module.

To replace the component, reverse the removal procedure.

AC power supply

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

To remove the component:

1. Power down the server (on page 17).
2. Release the power cords from the strain relief straps.

3. Remove all power:
   a. Disconnect each power cord from the power source.
   b. Disconnect each power cord from the server.

4. Remove the power supply.

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

To replace the component, reverse the removal procedure.

**HP Trusted Platform Module**

The TPM is not a customer-removable part.
CAUTION: Any attempt to remove an installed TPM from the system board breaks or disfigures the TPM security rivet. Upon locating a broken or disfigured rivet on an installed TPM, administrators should consider the system compromised and take appropriate measures to ensure the integrity of the system data.

If you suspect a TPM board failure, leave the TPM installed and remove the system board. Contact an HP authorized service provider for a replacement system board and TPM board.
Troubleshooting

Troubleshooting resources

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

- English ([http://www.hp.com/support/Gen9_TSG_en](http://www.hp.com/support/Gen9_TSG_en))
- German ([http://www.hp.com/support/Gen9_TSG_de](http://www.hp.com/support/Gen9_TSG_de))
- Simplified Chinese ([http://www.hp.com/support/Gen9_TSG_zh_cn](http://www.hp.com/support/Gen9_TSG_zh_cn))

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

- German ([http://www.hp.com/support/Gen9_EMG_de](http://www.hp.com/support/Gen9_EMG_de))
Diagnostic tools

Product QuickSpecs

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

HP iLO

The iLO4 subsystem is a standard component of HP ProLiant servers that simplifies initial server setup, server health monitoring, power and thermal optimization, and remote server administration. The iLO4 subsystem includes an intelligent microprocessor, secure memory, and a dedicated network interface. This design makes iLO4 independent of the host server and its operating system.

iLO4 enables and manages the Active Health System (on page 121) and also features Agentless Management. All key internal subsystems are monitored by iLO4. If enabled, SNMP alerts are sent directly by iLO4 regardless of the host operating system or even if no host operating system is installed.

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

Using iLO4, you can do the following:

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

For more information about iLO4 features, see the iLO4 documentation on the HP website (http://www.hp.com/go/ilodocs).

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

HP Active Health System provides the following features:

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

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

The Active Health System collects the following types of data:

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

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

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

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

The Agentless Management Service is available in the SPP, which can be downloaded from the HP website (http://www.hp.com/go/spp/download). The Active Health System log can be downloaded manually from iLO4 or HP Intelligent Provisioning and sent to HP.

For more information, see the following documents:

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

HP ProLiant Pre-boot Health Summary

If the server will not start up, you can use iLO4 to display diagnostic information on an external monitor. This feature is supported on servers that support external video and have a UID button or an SUV connector.

When power is available to the server but the server is not powered on, iLO runs on auxiliary power and can take control of the server video adapter to display the HP ProLiant Pre-boot Health Summary.
For additional information, see the following documents:

- **HP iLO 4 User Guide** — See the HP website ([http://www.hp.com/go/ilo/docs](http://www.hp.com/go/ilo/docs)).
- **HP ProLiant Gen9 Troubleshooting Guide, Volume I: Troubleshooting** — See "Troubleshooting Resources (on page 119)."

### Integrated Management Log

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

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

- From within HP SIM
- From within HP UEFI System Utilities (on page 122)
- From within the Embedded UEFI shell
- From within operating system-specific IML viewers:
  - For Windows: IML Viewer
  - For Linux: IML Viewer Application
- From within the iLO4 web interface
- From within HP Insight Diagnostics (on page 124)

### HP UEFI System Utilities

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

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

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

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

### Using HP UEFI System Utilities

To use the System Utilities, use the following keys.

<table>
<thead>
<tr>
<th>Action</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access System Utilities</td>
<td>F9 during server POST</td>
</tr>
<tr>
<td>Action</td>
<td>Key</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Navigate menus</td>
<td>Up and Down arrows</td>
</tr>
<tr>
<td>Select items</td>
<td>Enter</td>
</tr>
<tr>
<td>Save selections</td>
<td>F10</td>
</tr>
<tr>
<td>Access Help for a highlighted configuration option*</td>
<td>F1</td>
</tr>
</tbody>
</table>

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

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

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

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

### Embedded Diagnostics option

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

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

### Re-entering the server serial number and product ID

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

1. During the server startup sequence, press the **F9** key to access UEFI System Utilities.
2. Select the **System Configuration > BIOS/Platform Configuration (RBSU) > Advanced Options > Advanced System ROM Options > Serial Number**, and then press the **Enter** key.
3. Enter the serial number and press the **Enter** key. The following message appears:
   
   The serial number should only be modified by qualified service personnel. This value should always match the serial number located on the chassis.

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

7. Enter the product ID and press the **Enter** key.
8. Press the **F10** key to confirm exiting System Utilities. The server automatically reboots.
HP Insight Diagnostics

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

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

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

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

HP Insight Diagnostics survey functionality

HP Insight Diagnostics (on page 124) provides survey functionality that gathers critical hardware and software information on ProLiant servers.

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

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

Survey functionality is installed with every Intelligent Provisioning-assisted HP Insight Diagnostics installation, or it can be installed through the SPP.

HP Insight Remote Support

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

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

USB support

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

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

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

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

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

**External USB functionality**

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

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

**HP Smart Storage Administrator**

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

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

Some HP SSA features include the following:

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

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

ASR is a feature that causes the system to restart when a catastrophic operating system error occurs, such as a blue screen, ABEND (does not apply to HP ProLiant DL980 Servers), or panic. A system fail-safe timer, the ASR timer, starts when the System Management driver, also known as the Health Driver, is loaded. When the operating system is functioning properly, the system periodically resets the timer. However, when the operating system fails, the timer expires and restarts the server.

ASR increases server availability by restarting the server within a specified time after a system hang. At the same time, the HP SIM console notifies you by sending a message to a designated pager number that ASR has restarted the system. You can disable ASR from the System Management Homepage or through RBSU.
Component identification

Front panel components

- LFF chassis

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LFF hot-plug drives</td>
</tr>
<tr>
<td>2</td>
<td>USB 2.0 connector</td>
</tr>
</tbody>
</table>

- SFF chassis

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SFF hot-plug drives</td>
</tr>
<tr>
<td>2</td>
<td>USB 2.0 connector</td>
</tr>
</tbody>
</table>
# Front panel LEDs and buttons

- **Front panel LEDs and buttons in the LFF chassis**

![LFF chassis diagram]

- **Front panel LEDs and buttons in the SFF chassis**

![SFF chassis diagram]

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
</table>
| 1    | Health LED¹ | Solid green = Normal  
Flash green (1 Hz/cycle per sec) = iLO is rebooting  
Flashing amber = System degraded²  
Flashing red (1 Hz/cycle per sec) = System critical² |
| 2    | NIC status LED² | Solid green = Link to network  
Flashing green (1 Hz/cycle per sec) = Network active  
Off = No network activity |
| 3    | Front drive health/thermal LED³ | Solid green = Drives supported by the SAS expander are functional.³  
Solid amber = Failure or predictive failure of one or more drives supported by the SAS expander.³  
Flashing amber (1 Hz/cycle per sec) = The temperature sensor in one or more front drives is about to reach the thermal threshold. Immediately slide the drive cage back into the chassis and keep it there until the LED turns green.³  
Off = No power present† |
| 4    | Power On/Standby button and system power LED† | Solid green = System on  
Flash green (1 Hz/cycle per sec) = Performing power on sequence  
Solid amber = System in standby  
Off = No power present† |
### Component identification

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>UID button/LED</td>
<td>Solid blue = Activated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flashing blue:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 1 Hz/cycle per sec = Remote management or firmware upgrade in progress</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 4 Hz/cycle per sec = iLO manual reboot sequence initiated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 8 Hz/cycle per sec = iLO manual reboot sequence in progress</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off = Deactivated</td>
</tr>
</tbody>
</table>

When all four LEDs described in this table flash simultaneously, a power fault has occurred. For more information, see “Front panel LED power fault codes ("Power fault LEDs" on page 129).”

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

This LED behavior applies to all front drives, as well as to the rear drives connected to the front drive cage 2 backplane.

This LED behavior depends on the iLO 08-HD Max sensor reading. For more information, see “Front drive thermal LED (on page 129).”

Facility power is not present, power cord is not attached, no power supplies are installed, power supply failure has occurred, or the front I/O cable is disconnected.

### Power fault LEDs

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

<table>
<thead>
<tr>
<th>Subsystem</th>
<th>LED behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>System board</td>
<td>1 flash</td>
</tr>
<tr>
<td>Processor</td>
<td>2 flashes</td>
</tr>
<tr>
<td>Memory</td>
<td>3 flashes</td>
</tr>
<tr>
<td>Riser board PCIe slots</td>
<td>4 flashes</td>
</tr>
<tr>
<td>FlexibleLOM</td>
<td>5 flashes</td>
</tr>
<tr>
<td>Removable HP Flexible Smart Array controller/Smart SAS HBA controller</td>
<td>6 flashes</td>
</tr>
<tr>
<td>System board PCIe slots</td>
<td>7 flashes</td>
</tr>
<tr>
<td>Power backplane or storage backplane</td>
<td>8 flashes</td>
</tr>
<tr>
<td>Power supply</td>
<td>9 flashes</td>
</tr>
</tbody>
</table>

### Front drive thermal LED

The thermal warning function of the front drive health/thermal LED depends on the iLO 08-HD Max sensor reading. This function is disabled under these conditions:

- There are no drives in the front drive cages 1 and 2.
- The temperature sensor in one or more front drives has failed.

Under these conditions, iLO shows the 08-HD Max sensor reading as N/A. To view temperature sensor data, log in to iLO 4 web interface and navigate to the Information → System Information → Temperatures page.

If the 08-HD Max sensor reading shows N/A, observe the following when extending the front drive cage:

- Do not keep the drive cage out of the chassis for more than 140 sec.
- Keep the drive cage inside the chassis for at least 300 sec before extending it out again.
### Rear panel components

- Rear panel components with four-bay LFF hot-plug rear drive cage option

![Diagram of rear panel components with four-bay LFF hot-plug rear drive cage option]

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PCIe3 x16 (16, 8, 4, 1) slot 7 for low-profile, standup expansion board&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>2</td>
<td>PCIe3 x8 (8, 4, 1) slot 6 for low-profile, standup expansion board&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>3</td>
<td>PCIe3 x16 (16, 8, 4, 1) slot 5 for low-profile, standup expansion board&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>4</td>
<td>PCIe3 x16 (16, 8, 4, 1) slot 2 for low-profile, standup expansion board or riser cage options&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>5</td>
<td>PCIe3 x8 (8, 4, 1) slot 1 for low-profile, standup expansion board&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>6</td>
<td>FlexibleLOM slot</td>
</tr>
<tr>
<td>7</td>
<td>Hotplug power supply 1</td>
</tr>
<tr>
<td>8</td>
<td>Hotplug power supply bay 2</td>
</tr>
<tr>
<td>9</td>
<td>USB 3.0 connectors</td>
</tr>
<tr>
<td>10</td>
<td>NIC 1/shared iLO connector</td>
</tr>
<tr>
<td>11</td>
<td>NIC connector 2</td>
</tr>
<tr>
<td>12</td>
<td>Video connector</td>
</tr>
<tr>
<td>13</td>
<td>Dedicated iLO management connector (optional)</td>
</tr>
</tbody>
</table>

<sup>1</sup>PCIe connectors 1-4 are associated with processor 1.
<sup>2</sup>PCIe connectors 5-7 are associated with processor 2.

- Rear panel components with two-bay SFF hot-plug rear drive cage and two-slot PCI riser cage option

![Diagram of rear panel components with two-bay SFF hot-plug rear drive cage and two-slot PCI riser cage option]

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PCIe3 x16 (16, 8, 4, 1) slot 7 for low-profile, standup expansion board&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>2</td>
<td>PCIe3 x8 (8, 4, 1) slot 6 for low-profile, standup expansion board&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
</tbody>
</table>
### Component Identification

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>PCIe3 x16 (16, 8, 4, 1) slot 5 for low-profile, standup expansion board</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>PCIe3 x8 (8, 4, 1) riser slot 3 for full-height, half-length expansion board</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>PCIe3 x8 (8, 4, 1) riser slot 4, full-height, half-length expansion board</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>PCIe3 x16 (16, 8, 4, 1) slot 2 for low-profile, standup expansion board or riser cage options</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>PCIe3 x8 (8, 4, 1) slot 1 for low-profile, standup expansion board</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Flexible iLOM slot</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Hot-plug power supply 1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Hot-plug power supply bay 2</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>USB 3.0 connectors</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>NIC 1/shared iLO connector</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>NIC connector 2</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Video connector</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Dedicated iLO management connector (optional)</td>
<td></td>
</tr>
</tbody>
</table>

*PCie connectors 1-4 are associated with processor 1.  
*PCie connectors 5-7 are associated with processor 2.

### Rear Panel LEDs

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
</table>
| 1    | Dedicated iLO activity LED | Solid green = Link to network  
Flashing green = Network active  
Off = No network activity |
| 2    | Dedicated iLO link LED | Green = Network link  
Off = No network link |
| 3    | NIC activity LED | Solid green = Link to network  
Flashing green = Network active  
Off = No network activity |
| 4    | NIC link LED | Green = Network link  
Off = No network link |
**System board components**

The components shown in this section are associated with the HP ProLiant XL420 Gen9 Server system board.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>UID LED</td>
</tr>
<tr>
<td></td>
<td>Solid blue = Activated</td>
</tr>
<tr>
<td></td>
<td>Flashing blue:</td>
</tr>
<tr>
<td></td>
<td>• 1 Hz/cycle per sec = Remote management or firmware upgrade in progress</td>
</tr>
<tr>
<td></td>
<td>• 4 Hz/cycle per sec = iLO manual reboot sequence initiated</td>
</tr>
<tr>
<td></td>
<td>• 8 Hz/cycle per sec = iLO manual reboot sequence in progress</td>
</tr>
<tr>
<td></td>
<td>Off = Deactivated</td>
</tr>
<tr>
<td>6</td>
<td>Power supply LED</td>
</tr>
<tr>
<td></td>
<td>Solid green = Normal</td>
</tr>
<tr>
<td></td>
<td>Off = One or more of the following conditions exists:</td>
</tr>
<tr>
<td></td>
<td>• Power is unavailable</td>
</tr>
<tr>
<td></td>
<td>• Power supply failed</td>
</tr>
<tr>
<td></td>
<td>• Power supply is in standby mode</td>
</tr>
<tr>
<td></td>
<td>• Power supply error</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FlexibleLOM slot</td>
</tr>
<tr>
<td>2</td>
<td>PCIe3 x8 (8,4,1) slot 1 for low-profile, standup expansion board</td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>3</td>
<td>PCIe3 x16 (16, 8, 4, 1) slot 2 for low-profile, standup expansion board or riser cage options</td>
</tr>
<tr>
<td>4</td>
<td>microSD slot</td>
</tr>
<tr>
<td>5</td>
<td>TPM connector</td>
</tr>
<tr>
<td>6</td>
<td>HP Flexible Smart Array Controller slot</td>
</tr>
<tr>
<td>7</td>
<td>Dedicated iLO management module connector</td>
</tr>
<tr>
<td>8</td>
<td>PCIe3 x16 (16, 8, 4, 1) slot 5 for low-profile, standup expansion board&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>9</td>
<td>PCIe3 x8 (8, 4, 1) slot 6 for low-profile, standup expansion board&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>10</td>
<td>PCIe3 x16 (16, 8, 4, 1) slot 7 for low-profile, standup expansion board&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>11</td>
<td>NMI header</td>
</tr>
<tr>
<td>12</td>
<td>Storage backup power connectors for expansion slots 3–7</td>
</tr>
<tr>
<td>13</td>
<td>Front I/O connector</td>
</tr>
<tr>
<td>14</td>
<td>Processor 2 DIMM slots</td>
</tr>
<tr>
<td>15</td>
<td>Processor 1 DIMM slots</td>
</tr>
<tr>
<td>16</td>
<td>System battery</td>
</tr>
<tr>
<td>17</td>
<td>Fan signal connector</td>
</tr>
<tr>
<td>18</td>
<td>HP Smart Storage Battery connector</td>
</tr>
<tr>
<td>19</td>
<td>Rear SFF drive backplane detection connector</td>
</tr>
<tr>
<td>20</td>
<td>Fan power connector</td>
</tr>
<tr>
<td>21</td>
<td>Front drive cage 2 backplane power connector</td>
</tr>
<tr>
<td>22</td>
<td>Front drive cage 1 backplane power connector</td>
</tr>
<tr>
<td>23</td>
<td>Storage backup power connector for expansion slots 1–2</td>
</tr>
<tr>
<td>24</td>
<td>SATA 6Gb/s connector 4</td>
</tr>
<tr>
<td>25</td>
<td>SATA 6Gb/s connector 5</td>
</tr>
<tr>
<td>26</td>
<td>Power pass-through board connector</td>
</tr>
<tr>
<td>27</td>
<td>Internal USB 3.0 connector</td>
</tr>
<tr>
<td>28</td>
<td>SATA x4 connector 1</td>
</tr>
<tr>
<td>29</td>
<td>Rear drive cage backplane power connector</td>
</tr>
<tr>
<td>30</td>
<td>Front USB 2.0 connector</td>
</tr>
<tr>
<td>X</td>
<td>System maintenance switch</td>
</tr>
</tbody>
</table>

<sup>1</sup> PCIe connectors 1–4 are associated with processor 1.  
<sup>2</sup> PCIe connectors 5–7 are associated with processor 2.
DIMM slot locations

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

The arrow points to the front of the server.

System maintenance switch

<table>
<thead>
<tr>
<th>Position</th>
<th>Default</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>Off</td>
<td>Off = iLO4 security is enabled. On = iLO4 security is disabled.</td>
</tr>
<tr>
<td>S2</td>
<td>Off</td>
<td>Off = System configuration can be changed. On = System configuration is locked.</td>
</tr>
<tr>
<td>S3</td>
<td>Off</td>
<td>Reserved</td>
</tr>
<tr>
<td>S4</td>
<td>Off</td>
<td>Reserved</td>
</tr>
<tr>
<td>S5</td>
<td>Off</td>
<td>Off = Power-on password is enabled. On = Power-on password is disabled.</td>
</tr>
<tr>
<td>S6</td>
<td>Off</td>
<td>Off = No function. On = ROM reads system configuration as invalid.</td>
</tr>
<tr>
<td>S7</td>
<td>Off</td>
<td>Off = Set default boot mode to UEFI. On = Set default boot mode to legacy.</td>
</tr>
<tr>
<td>S8</td>
<td>—</td>
<td>Reserved</td>
</tr>
<tr>
<td>S9</td>
<td>—</td>
<td>Reserved</td>
</tr>
<tr>
<td>S10</td>
<td>—</td>
<td>Reserved</td>
</tr>
<tr>
<td>S11</td>
<td>—</td>
<td>Reserved</td>
</tr>
<tr>
<td>S12</td>
<td>—</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

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

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

⚠️ **CAUTION:** Clearing CMOS and/or NVRAM deletes configuration information. Be sure to properly configure the server or data loss could occur.
**IMPORTANT:** Before using the S7 switch to change to Legacy BIOS Boot Mode, be sure the HP Dynamic Smart Array B140i Controller is disabled. Do not use the B140i controller when the server is in Legacy BIOS Boot Mode.

**NMI functionality**

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

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

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

- Use the iLO Virtual NMI feature.
- Short the NMI header ("System board components" on page 132).

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

**Drive numbering**

- **24-bay LFF hot-plug front drive numbering**

![24-bay LFF hot-plug front drive numbering](image)

- **48-bay SFF hot-plug front drive numbering**

![48-bay SFF hot-plug front drive numbering](image)
Drive LEDs

LFF and SFF drives have different sets of LEDs to reflect the drive status.

SFF drive LED definitions

HP SmartDrives are the latest HP drive technology, and they are supported beginning with ProLiant Gen8 servers and server blades. The HP SmartDrive is not supported on earlier generation servers and server blades. Identify an HP SmartDrive by its carrier, shown in the following illustration.

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

<table>
<thead>
<tr>
<th>Item</th>
<th>LED</th>
<th>Status</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Locate</td>
<td>Solid blue</td>
<td>The drive is being identified by a host application.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flashing blue</td>
<td>The drive carrier firmware is being updated or requires an update.</td>
</tr>
<tr>
<td>2</td>
<td>Activity ring</td>
<td>Rotating green</td>
<td>Drive activity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>No drive activity</td>
</tr>
<tr>
<td>3</td>
<td>Do not remove</td>
<td>Solid white</td>
<td>Do not remove the drive. Removing the drive causes one or more of the logical drives to fail.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>Removing the drive does not cause a logical drive to fail.</td>
</tr>
<tr>
<td>4</td>
<td>Drive status</td>
<td>Solid green</td>
<td>The drive is a member of one or more logical drives.</td>
</tr>
</tbody>
</table>
### Component Identification

<table>
<thead>
<tr>
<th>Item</th>
<th>LED</th>
<th>Status</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Flashing green</td>
<td>The drive is rebuilding or performing a RAID migration, strip size migration, capacity expansion, or logical drive extension, or is erasing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flashing amber/green</td>
<td>The drive is a member of one or more logical drives and predicts the drive will fail.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flashing amber</td>
<td>The drive is not configured and predicts the drive will fail.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Solid amber</td>
<td>The drive has failed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>The drive is not configured by a RAID controller.</td>
</tr>
</tbody>
</table>

The blue Locate LED is behind the release lever and is visible when illuminated.

### LFF Drive LED Definitions

#### Online/Activity LED (green)

<table>
<thead>
<tr>
<th>Item</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fault/UID (amber/blue)</td>
</tr>
<tr>
<td>2</td>
<td>Online/Activity (green)</td>
</tr>
</tbody>
</table>

#### Fault/UID LED (amber/blue)

<table>
<thead>
<tr>
<th>Online/Activity LED (green)</th>
<th>Fault/UID LED (amber/blue)</th>
<th>Definition</th>
</tr>
</thead>
</table>
| On, off, or flashing        | Alternating amber and blue  | One or more of the following conditions exists:  
  - The drive has failed.  
  - A predictive failure alert has been received for this drive.  
  - The drive has been selected by a management application. |
| On, off, or flashing        | Solid blue                  | One or more of the following conditions exists:  
  - The drive is operating normally.  
  - The drive has been selected by a management application. |
| On                           | Amber, Flashing (1 Hz)      | A predictive failure alert has been received for this drive. Replace the drive as soon as possible. |
| On                           | Off                         | The drive is online but is not currently active. |
| Flashing (1 Hz)              | Amber, Flashing (1 Hz)      | Do not remove the drive. Removing the drive might terminate the current operation and cause data loss.  
  The drive is part of an array that is undergoing capacity expansion or stripe migration, but a predictive failure alert has been received for this drive. To minimize the risk of data loss, do not remove the drive until the expansion or migration is complete. |
<table>
<thead>
<tr>
<th><strong>Online/Activity LED (green)</strong></th>
<th><strong>Fault/UID LED (amber/blue)</strong></th>
<th><strong>Definition</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Flashing (1 Hz)</td>
<td>Off</td>
<td>Do not remove the drive. Removing the drive might terminate the current operation and cause data loss. The drive is rebuilding, erasing, or is part of an array that is undergoing capacity expansion or stripe migration.</td>
</tr>
<tr>
<td>Flashing (4 Hz)</td>
<td>Amber, Flashing (1 Hz)</td>
<td>The drive is active but a predictive failure alert has been received for this drive. Replace the drive as soon as possible.</td>
</tr>
<tr>
<td>Flashing (4 Hz)</td>
<td>Off</td>
<td>The drive is active and is operating normally.</td>
</tr>
<tr>
<td>Off</td>
<td>Solid amber</td>
<td>A critical fault condition has been identified for this drive and the controller has placed it offline. Replace the drive as soon as possible.</td>
</tr>
<tr>
<td>Off</td>
<td>Amber, Flashing (1 Hz)</td>
<td>A predictive failure alert has been received for this drive. Replace the drive as soon as possible.</td>
</tr>
<tr>
<td>Off</td>
<td>Off</td>
<td>The drive is offline, a spare, or not configured as part of an array.</td>
</tr>
</tbody>
</table>

**Fan locations**

![Fan locations diagram](image_url)
Cabling

Cabling overview

This section provides guidelines that help you make informed decisions about cabling the server and hardware options to optimize performance.

For information on cabling peripheral components, refer to the white paper on high-density deployment at the HP website (http://www.hp.com/products/servers/platforms).

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

Storage cabling

24-bay LFF hot-plug SAS/SATA front drive cabling

- Cabling for drive cage 1 and 2 LFF drives connected to the HP Flexible Smart Array P840ar Controller.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mini-SAS Y-cable to front drive cage 2</td>
</tr>
<tr>
<td>2</td>
<td>Power cable to front drive cage 2</td>
</tr>
<tr>
<td>3</td>
<td>Power cable to front drive cage 1</td>
</tr>
<tr>
<td>4</td>
<td>Mini-SAS Y-cable to front drive cage 1</td>
</tr>
</tbody>
</table>
Cabling for drive cage 1 LFF drives connected to the HP Flexible Smart Array P840ar Controller, and drive cage 2 LFF drives connected to a HP Smart Array P440 Controller.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mini-SAS Y-cable to front drive cage 2</td>
</tr>
<tr>
<td>2</td>
<td>Power cable to front drive cage 2</td>
</tr>
<tr>
<td>3</td>
<td>Power cable to front drive cage 1</td>
</tr>
<tr>
<td>4</td>
<td>Mini-SAS Y-cable to front drive cage 1</td>
</tr>
</tbody>
</table>

48-bay SFF hot-plug SAS/SATA front drive cabling

Cabling for drive cage 1 and 2 SFF drives connected to the HP Flexible Smart Array P840ar Controller.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mini-SAS Y-cable to front drive cage 2</td>
</tr>
<tr>
<td>2</td>
<td>Power cable to front drive cage 2</td>
</tr>
<tr>
<td>3</td>
<td>Power cable to front drive cage 1</td>
</tr>
<tr>
<td>4</td>
<td>Mini-SAS Y-cable to front drive cage 1</td>
</tr>
</tbody>
</table>
Cabling for drive cage 1 SFF drives connected to the HP Flexible Smart Array P840ar Controller, and drive cage 2 SFF drives connected to a HP Smart Array P440 Controller.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mini-SAS Y-cable to front drive cage 2</td>
</tr>
<tr>
<td>2</td>
<td>Power cable to front drive cage 2</td>
</tr>
<tr>
<td>3</td>
<td>Power cable to front drive cage 1</td>
</tr>
<tr>
<td>4</td>
<td>Mini-SAS Y-cable to front drive cage 1</td>
</tr>
</tbody>
</table>

**Four-bay LFF hot-plug rear drive cage cabling**

Cabling for rear LFF drives connected to the front drive cage 2 backplane.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power cable to rear drive cage</td>
</tr>
<tr>
<td>2</td>
<td>Mini-SAS cable to rear drive cage</td>
</tr>
</tbody>
</table>
Cabling for rear SFF drives connected to the onboard Mini-SAS connector.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mini-SAS cable to rear drive cage</td>
</tr>
<tr>
<td>2</td>
<td>Power cable to rear drive cage</td>
</tr>
</tbody>
</table>

Two-bay SFF hot-plug rear drive cage cabling

Cabling for rear SFF drives connected to the front drive cage 2 backplane

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power cable to rear drive cage and two-slot PCI riser board</td>
</tr>
<tr>
<td>2</td>
<td>Mini-SAS cable to rear drive cage</td>
</tr>
</tbody>
</table>
Cabling for rear SFF drives connected to the onboard Mini-SAS connector.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power cable to rear drive cage and 2-slot PCI riser board</td>
</tr>
<tr>
<td>2</td>
<td>Multi connector drive signal cable to rear drive cage</td>
</tr>
</tbody>
</table>

M.2 SSD cabling

M.2 SSD enablement board installed in the onboard PCIe3 x8 slot 1

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M.2 SSD 1 SATA cable</td>
</tr>
<tr>
<td>2</td>
<td>M.2 SSD 2 SATA cable</td>
</tr>
</tbody>
</table>
- M.2 SSD enablement board installed in the onboard PCIe3 x16 slot 2

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M.2 SSD 1 SATA cable</td>
</tr>
<tr>
<td>2</td>
<td>M.2 SSD 2 SATA cable</td>
</tr>
</tbody>
</table>

- M.2 SSD cabling from the PCI riser cage

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M.2 SSD 1 SATA cable</td>
</tr>
<tr>
<td>2</td>
<td>M.2 SSD 2 SATA cable</td>
</tr>
</tbody>
</table>

**FBWC module backup power cabling**

The FBWC solution is a separately purchased option. This server only supports FBWC module installation when an HP Smart Array P-Series controller is installed.

Depending on the controller option installed, the actual storage controller connectors might look different from what is shown in this section.
- FBWC module backup power cabling from a standup, HP Smart Array P44x Controller installed in the onboard PCIe3 x8 slot 1

- FBWC module backup power cabling from an HP Smart Array P841 Controller installed in the PCI riser cage
### HP Smart Storage Battery cabling

- **Item 1**: Fan power cable
- **Item 2**: Fan signal cable

![Diagram showing HP Smart Storage Battery cabling](image1)

### Fan cabling

![Diagram showing Fan cabling](image2)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fan power cable</td>
</tr>
<tr>
<td>2</td>
<td>Fan signal cable</td>
</tr>
</tbody>
</table>
**Ambient temperature sensor cabling**

This cable is present in SFF drive configurations only; the ambient temperature sensor function in LFF drive configurations is integrated in the front LFF drive backplane 1.

---

**Front panel cabling**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Front I/O cable</td>
</tr>
<tr>
<td>2</td>
<td>Front USB 2.0 cable</td>
</tr>
</tbody>
</table>
Specifications

Environmental specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature range*</td>
<td>—</td>
</tr>
<tr>
<td>Operating</td>
<td>10°C to 35°C (50°F to 95°F)</td>
</tr>
<tr>
<td>Nonoperating</td>
<td>-30°C to 60°C (-22°F to 140°F)</td>
</tr>
<tr>
<td>Relative humidity (noncondensing)</td>
<td>—</td>
</tr>
<tr>
<td>Operating</td>
<td>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.</td>
</tr>
<tr>
<td>Nonoperating</td>
<td>5% to 95% 38.7°C (101.7°F), maximum wet bulb temperature</td>
</tr>
</tbody>
</table>

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

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

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

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

Mechanical specifications

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>81.28 cm (32.00 in)</td>
</tr>
<tr>
<td>Depth</td>
<td>8.74 cm (3.44 in)</td>
</tr>
<tr>
<td>Width</td>
<td>44.78 cm (17.63 in)</td>
</tr>
<tr>
<td>Weight (approximate values)</td>
<td></td>
</tr>
<tr>
<td>24-bay LFF drive model (minimum)</td>
<td>23.15 kg (51.04 lb)</td>
</tr>
<tr>
<td>24-bay LFF drive model (maximum)</td>
<td>40.51 kg (89.32 lb)</td>
</tr>
<tr>
<td>48-bay SFF drive model (minimum)</td>
<td>21.16 kg (46.64 lb)</td>
</tr>
</tbody>
</table>
Power supply specifications

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

- HP 1400 W Flex Slot Platinum Plus Hot-plug Power Supply (PN 720620-B21)
- HP 800 W Flex Slot Platinum Hot-plug Power Supply (PN 720479-B21)
- HP 800 W Flex Titanium Hot-plug Power Supply (PN 720482-B21)
- HP 800 W Flex Slot -48 V DC Hot-plug Power Supply (PN 720480-B21)
- HP 800 W Flex Slot Universal Hot-plug Power Supply (PN 720484-B21)

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

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

⚠️ **IMPORTANT:** Mixing different types of power input modules in the same server might limit or disable some power supply features including support for power redundancy. To ensure access to all available features, all power input modules in the same server should have the same output and efficiency ratings.

Hot-plug power supply calculations

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

ABEND
abnormal end

ACU
Array Configuration Utility

AMP
Advanced Memory Protection

API
application program interface

ASHRAE
American Society of Heating, Refrigerating and Air-Conditioning Engineers

ASR
Automatic Server Recovery

BP
backplane

CAS
column address strobe

CSA
Canadian Standards Association

CSR
Customer Self Repair

DDR3
double data rate-3

DDR4
double data rate-4
FAT
file allocation table

FBWC
flash-backed write cache

HBA
host bus adapter

HP SIM
HP Systems Insight Manager

HP SSA
HP Smart Storage Administrator

HP SUM
HP Smart Update Manager

IEC
International Electrotechnical Commission

iLO
Integrated Lights-Out

IML
Integrated Management Log

ISO
International Organization for Standardization

JSON
JavaScript Object Notation

LFF
large form factor

LOM
Lights-Out Management

LRDIMM
load reduced dual in-line memory module
NMI
nonmaskable interrupt

NVDIMM
non-volatile dual in-line memory module

NVRAM
nonvolatile memory

PCIe
Peripheral Component Interconnect Express

PDU
power distribution unit

POST
Power-On Self Test

PSU
power supply unit

RBSU
ROM-Based Setup Utility

RDIMM
registered dual in-line memory module

RDP
Rapid Deployment Pack

REST
representational state transfer

RoHS
Restriction of Hazardous Substances

RPS
redundant power supply

SAS
serial attached SCSI
**SATA**
serial ATA

**SD**
Secure Digital

**SIM**
Systems Insight Manager

**SPP**
HP Service Pack for ProLiant

**SSD**
solid-state drive

**STD**
standard (DIMM voltage)

**TMRA**
recommended ambient operating temperature

**TPM**
Trusted Platform Module

**UEFI**
Unified Extensible Firmware Interface

**UID**
unit identification

**USB**
universal serial bus

**VC**
Virtual Connect

**VCA**
Version Control Agent

**VCRM**
Version Control Repository Manager
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