



Hewlett Packard
Enterprise

HPE MSA 2070/2072 Maintenance and Service Guide

Abstract

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

Notices

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Customer self repair

Hewlett Packard Enterprise products are designed with many Customer Self Repair (CSR) parts to minimize repair time and allow for greater flexibility in performing defective parts replacement. If during the diagnosis period Hewlett Packard Enterprise (or Hewlett Packard Enterprise service providers or service partners) identifies that the repair can be accomplished by the use of a CSR part, Hewlett Packard Enterprise will ship that part directly to you for replacement. There are two categories of CSR parts:

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

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

For more information about the Hewlett Packard Enterprise CSR program, contact your local service provider.

Parts only warranty service

Your Hewlett Packard Enterprise Limited Warranty may include a parts only warranty service. Under the terms of parts only warranty service, Hewlett Packard Enterprise will provide replacement parts free of charge.

For parts only warranty service, CSR part replacement is mandatory. If you request Hewlett Packard Enterprise to replace these parts, you will be charged for the travel and labor costs of this service.



Removal and replacement procedures

Required tools

The following items are required for some replacement procedures:

- T-25 Torx screwdriver
- Phillips #2 screwdriver

Returning a failed component

In materials shipped with the replacement, Hewlett Packard Enterprise specifies whether the failed component must be returned. Follow the provided instructions.

Managing the storage system

- The Storage Management Utility (SMU) and the Command Line Interface (CLI) can be used to manage the enclosure. See the *HPE MSA 2070/2072 CLI Reference Guide* and the *HPE MSA 2070/2072 Storage Management Guide* for detailed instructions on using those interfaces.
- For the latest MSA product documentation, see the HPE Support Center: <https://www.hpe.com/support/MSA207xDocs>.

Safety considerations

Before performing service procedures, review all the safety information.

Electrostatic discharge

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

To prevent electrostatic damage:

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



- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

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

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

Symbols on equipment

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




This symbol in conjunction with any of the following symbols indicates the presence of a potential hazard. The potential for injury exists if warnings are not observed. Consult your documentation for specific details.

該符號與以下任意符號組合使用，指示存在潛在的危險。如果不遵守警告，可能會造成人身傷害。詳細信息請參閱相關文檔。



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.

此符號表明存在危險電路或觸電的危險。所有維修工作應由具有相關資格的人員來完成。

警告：為了減少觸電造成人身傷害的危險，請不要打開此外殼。所有維護、升級和維修工作都應由具有相關資格的人員來完成。



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 risk of injury from electric shock hazards, do not open this enclosure.

此符號表明存在觸電的危險。在這一區域內沒有用戶可以現場維修的部件。一定不要打開。警告：為了減少觸電造成人身傷害的危險，請不要打開此外殼。





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.

RJ-45 插孔上的該符號指示網絡接口連接。
警告：為了減少觸電、火災或設備損壞的危險，不要將電話或電信連接設備插入此插孔。



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.

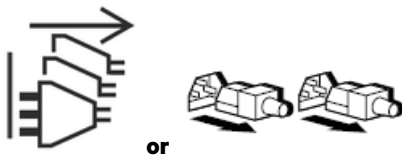
此符號表明表面或組件過熱。如果觸摸此表面，可能會造成人身傷害。警告：為了減少因組件過熱而造成人身傷害的危險，應等到表面降溫後再觸摸。



This symbol indicates the presence of a moving fan blade. If the spinning blades are contacted, the potential for injury exists.

WARNING: Hazardous moving parts. Keep away from moving fan blades. To reduce the risk of injury from moving parts, allow them to come to a stop before touching.

此符號表明存在運動風扇葉片的危險。如果觸摸旋轉葉片，可能會造成人身傷害。警告：危險的運動部件。請遠離運動風扇刀片。為減少被高溫組件燙傷的危險，應在表面冷卻之後再接觸。



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.

電源或系統上的這些符號表明設備由多個電源供電。
警告：為了減少觸電造成人身傷害的危險，應拔下所有電源線插頭，完全斷開系統的電源。



Weight in kg.

Weight in lb.

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



WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

此符號表明組件的重量超出了建議值，一個人無法安全取放。
警告：為了減少人身傷害或設備損壞的危險，應遵守當地有關人工取放物品的職業保健與安全規定及準則。



A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. To prevent damage, observe antistatic precautions.

手指或其它導體所釋放的靜電可能損壞主板或其它對靜電敏感的設備。為防止發生損壞，請遵守防靜電預防措施。



These symbols appearing together indicate that the product may have a high touch current and that a reliable earth ground must be in place before connecting the equipment.



WARNING: Risk of electric shock due to high touch current. Connect to earth before connecting to supply.



This symbol indicates the presence of a laser device in the product that may exceed Class 1 limits. See the product documentation for more information.

此符號表明在可能會超出 1 類限制的產品中存在激光設備。有關詳細信息，請參閱產品文檔。





This symbol indicates the presence of moving parts inside the product that may present a pinch point if improperly contacted.



WARNING: Hazardous moving parts. Do not insert any tools or any part of your body into the product while it is operating or in any openings.



This symbol indicates the presence of coin-cell battery.



WARNING:

- **INGESTION HAZARD:** This product contains a button cell or coin battery.
- **DEATH** or serious injury can occur if ingested.
- A swallowed button cell or coin battery can cause Internal Chemical Burns in as little as 2 hours.
- **KEEP** new and used batteries **OUT OF REACH** of **CHILDREN**.
- Seek immediate medical attention if a battery is suspected to be swallowed or inserted inside any part of the body.

Rack warnings and cautions



WARNING: Before configuring your rack solution, be sure to check the rack manufacturer weight limits and specifications. Failure to do so can result in physical injury or damage to the equipment and the facility. See the *HPE MSA 2070/2072 Quickspecs* for more information.



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

- The rack has anti-tip measures in place. Such measures include floor-bolting, anti-tip feet, ballast, or a combination as specified by the rack manufacturer and applicable codes.
- The leveling jacks (feet) are extended to the floor.
- The full weight of the rack rests on the leveling jacks (feet).
- The stabilizing feet are attached to the rack if it is a single-rack installation.
- The racks are coupled together in multiple rack installations.



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

-
- ⚠ CAUTION:** Before installing the storage system in a rack, be sure to properly scope the limitations of the rack. Before proceeding with the installation, consider the following:
- You must fully understand the static and dynamic load carrying capacity of the rack and be sure that it can accommodate the weight of the storage system.
 - Be sure that sufficient clearance exists for cabling, installation and removal of the storage system, and movement of the rack doors.
-

System warnings and cautions

-
- ⚠ WARNING:** To reduce the risk of personal injury, electric shock, or damage to the equipment, disconnect the power cord to remove power from the storage system. Pressing the Power On/Standby button does not shut off system power completely. Portions of the power supply and some internal circuitry remain active until AC or DC power is removed.
-
- ⚠ WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.
-
- ⚠ CAUTION:** Protect the storage system from power fluctuations and temporary interruptions with a regulating UPS. This device protects the hardware from damage caused by power surges and voltage spikes and keeps the storage system in operation during a power failure.
-
- ⚠ CAUTION:** To prevent damage to electrical components, properly ground the storage system before beginning any installation, removal, or replacement procedure. Improper grounding can cause **electrostatic discharge**.
-
- ⚠ CAUTION:** To avoid data loss, Hewlett Packard Enterprise recommends that you **back up all storage system data** before installing or removing a hardware option, or performing a storage system maintenance or troubleshooting procedure.
-
- ⚠ CAUTION:** Do not operate the storage system for long periods with the faulty component completely removed. Partially removing the faulty component to disconnect electrical connections is acceptable.
-
- ⚠ CAUTION:** Leave failed modules in the enclosure until you are ready to install the replacement module. Removing a module from an operational enclosure significantly changes air flow within the enclosure. Openings must be populated for the enclosure to cool properly.
-
- ⚠ CAUTION:** Parts can be damaged by electrostatic discharge. Keep parts in electrostatic containers until needed and ensure you are properly grounded when touching static-sensitive components.
-

Cabling replacement parts

If you are replacing an assembly that includes a cable, you are not required to replace the current cable with the new cable from the assembly. If the current cable is still functioning properly, you can keep the current cable in place.



Preparation procedures

Storage system data backup

To avoid data loss, make sure to back up all storage system data before installing or removing a hardware option, performing a system maintenance, or a troubleshooting procedure.

Removing and replacing a drive blank

About this task

Remove the component as indicated.

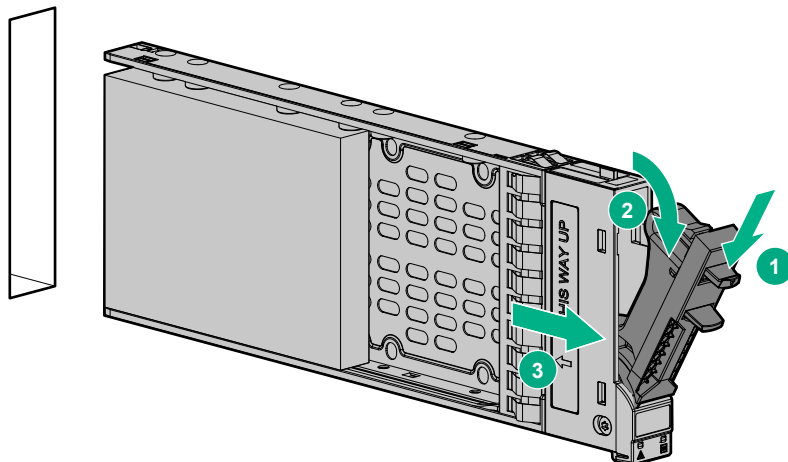


Figure 1: Removing an SFF drive blank

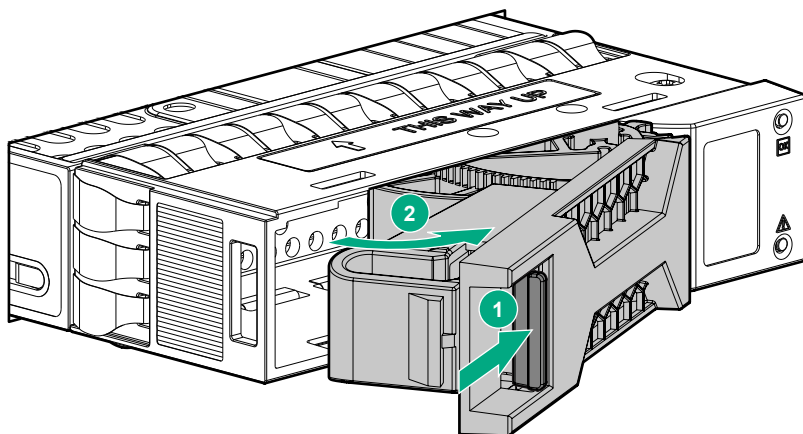


Figure 2: Removing an LFF drive blank

To replace the component, squeeze the release latch and slide the drive blank into the bay until it clicks into place.



Removing and replacing drives

Before you begin

- Before proceeding with drive replacement, check the following:
 - Using the LEDs, confirm that the drive to be replaced is faulty.
-
- ⚠ CAUTION:** Removing the incorrect drive could result in data going offline.
-
- If multiple drives have failed and need replacing, replace one drive at a time. Confirm that the drive is faulty before replacement, and the drive is in the correct state after replacement.
- Leave failed modules in the enclosure until you are ready to install the replacement module. Removing a module from an operational enclosure significantly changes air flow within the enclosure. Openings must be populated for the enclosure to cool properly.
 - Use care when handling drives. Drives are sensitive electromechanical devices that can be permanently damaged through improper handling. Keep drives in their original, protective packaging until installation.
 - The replacement drive module must be of the same type, and possess capacity equal to or greater than the one being replaced.
 - For additional information on replacing drives, see the Hewlett Packard Enterprise website documentation listed under Resources.
 - For additional information on returning failed drives, see [Returning a failed component](#).

Verifying drive status

About this task

Before and after replacing a drive, determine its status.

Procedure

- Check notifications, array system event logs, product-specific logs, and management utilities for drive health and location information.
- Check enclosure status LEDs and drive LEDs. See [Disk drive LEDs](#).

Removing the drive

About this task

⚠ CAUTION: Prolonged use of the array, while one or more drives slots are not covered by either a drive or drive blank module, can result in damage to the system from overheating.

⚠ IMPORTANT: Replacement drives may be hot-replaced in an operational enclosure.

Procedure

1. If you have a bezel, remove it to access drives.
2. Press the drive latch.





IMPORTANT: For drives with rotating media, wait approximately 30 seconds or until the media stops rotating before removing the drive from the enclosure.

3. Pivot the release lever to the full open position.
4. Pull the drive out from the enclosure.

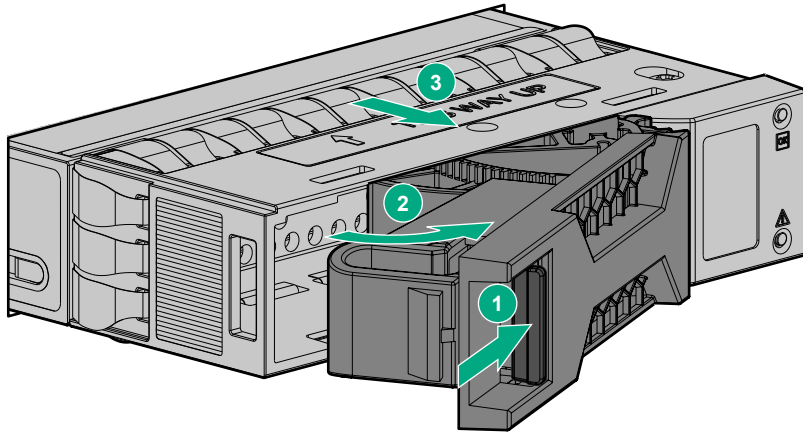


Figure 3: LFF drive

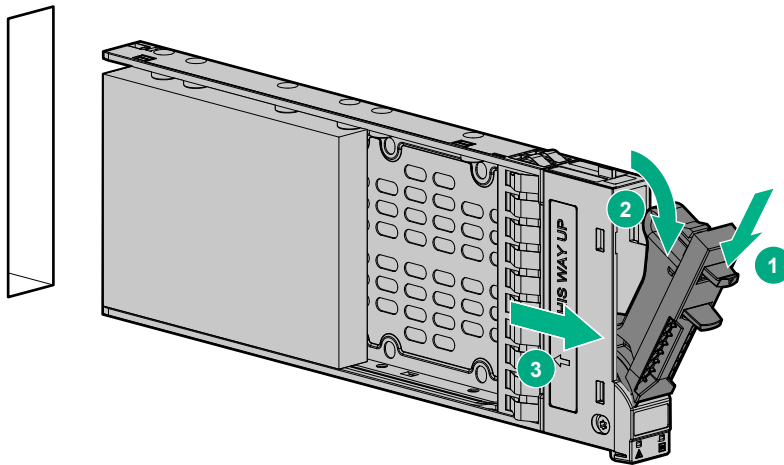


Figure 4: SFF drive

Installing the drive

Prerequisites



CAUTION: Wait approximately 60 seconds after removing the failed drive before installing the replacement drive. This amount of time allows the enclosure to recognize that a drive was removed. Removal of a drive prepares the enclosure to recognize a replacement drive when it is installed.

Procedure

1. On the replacement drive, prepare the drive by pressing the drive latch (1) and pivoting the release lever (2) to the full open position.



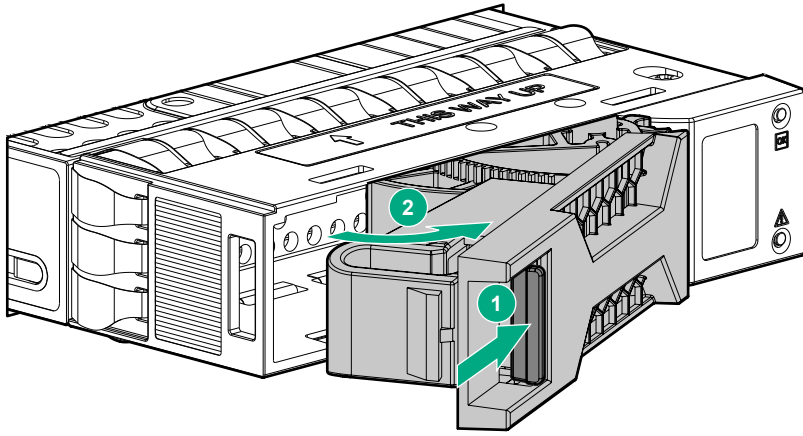


Figure 5: Opening the lever on an LFF drive

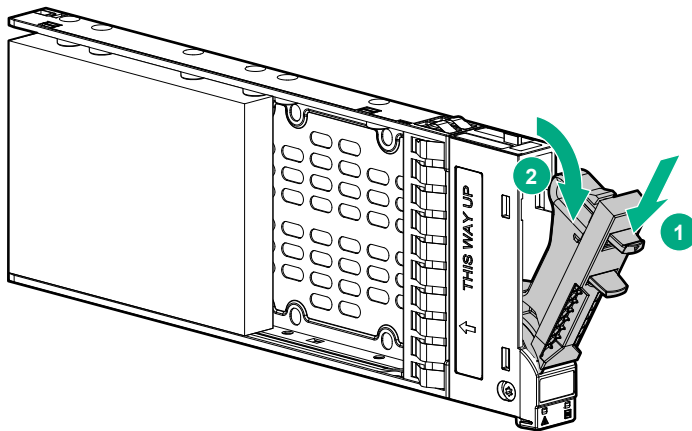


Figure 6: Opening the lever on an SFF drive

2. Insert the replacement drive into the drive enclosure (1), sliding the drive into the drive enclosure as far as it will go. As the drive meets the backplane, the release lever (2) automatically begins to rotate closed.
3. Press firmly on the release lever to ensure that the drive is fully seated.



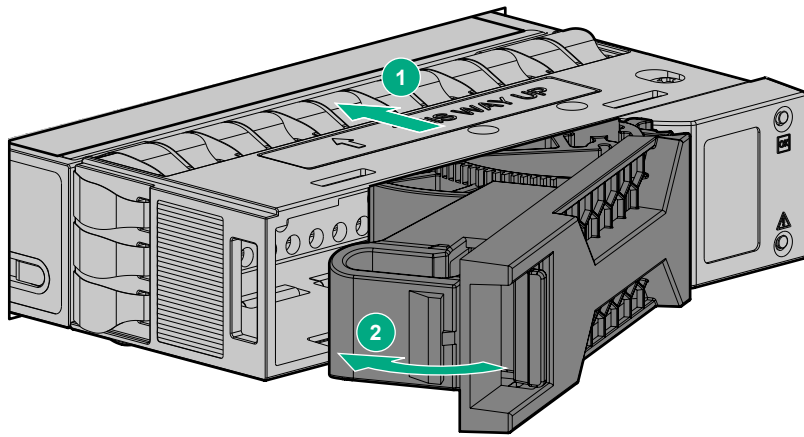


Figure 7: LFF drive

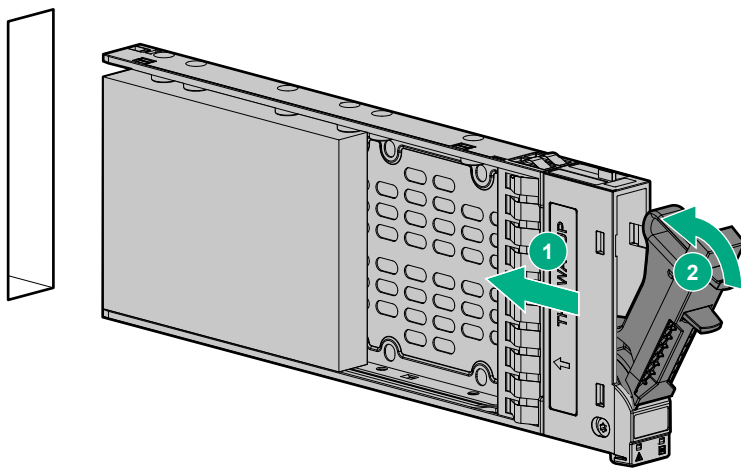


Figure 8: SFF drive

4. Reattach bezel if previously installed:
 - a. Insert tab on right side of bezel into slot on enclosure.
 - b. Press left side of bezel until it locks into place.
5. Wait approximately 30 seconds for the system to discover the drive.
6. Go to the SMU or CLI and confirm that the drive is available for use.

NOTE: In an FDE-secured system, any drive that does not already have disk group information is automatically secured using the system lock keys. See *HPE MSA 2070/2072 Storage Management Guide* and *HPE MSA 2070/2072 CLI Reference Guide* for instructions on including or repurposing Self-Encrypting Drives (SEDs) that have existing disk group metadata.



Verifying drive status

Procedure

Follow the instructions in [Verifying drive status](#).

Working with failed drives, spares, and replacement drives

About this task

When dynamic sparing is enabled and a drive fails in a fault-tolerant disk group, if compatible drives are available, the storage system automatically uses the drives to reconstruct the disk group. As disk group reconstruction does not require I/O to be stopped, the disk group can continue to be used while the reconstruct utility runs. If dynamic sparing is not enabled, you must manually set a compatible drive as a spare for the rebuild to start.

When a failed drive is rebuilt onto a spare, the spare becomes the new drive in the disk group, and the original drive that failed is unused and is no longer part of the disk group.

To make the replacement drive available for use as a spare, perform the following actions:

Procedure

1. In the SMU, verify the status of the drive slot in which the replacement drive is installed is available (AVAIL). All new drives should be Available. If the status is a different value, see the user guides or guided troubleshooting listed under [Websites](#), and determine the appropriate action.
2. When the replacement drive is online with a status of available (AVAIL), verify that your firmware is up to date. If you need to update the firmware to the latest version, see [Updating firmware](#).
3. Configure the drive to be a spare.
 - To add a spare using the SMU:
 - a. In the **MAINTENANCE > Storage** topic, select **ADD SPARE DISKS**.
 - b. In the Add Spares dialog, select the disk.
 - c. Click **ADD SPARE DISKS**. The system updates the global spares and a confirmation panel displays.
 - d. To close the confirmation panel, click **OK**.
 - To add a spare using the CLI, use the `add spares` command.

Example showing how to designate disk 1.2 as a global spare:

```
# add spares 1.2
```

NOTE: Spare drives and replacement process may differ with advanced RAID levels. For example, spare drives are not applicable to MSA-DP+ disk-groups.

See the *HPE MSA 2070/2072 Storage Management Guide* if the process is not reporting as expected, and you are using advanced RAID Levels.

For information about disk group reconstruction and using the SMU, see the Hewlett Packard Enterprise documentation website listed under [Websites](#).



Updating the drive firmware

About this task

After installing the drive, verify that it is running the latest firmware.

Procedure

1. Go to the MSA Drive Firmware download website: <https://www.hpe.com/storage/MSADriveFirmware>.
2. If newer firmware is available, download the firmware to your local system and install the latest version on the drive.

For more information on firmware updates, see the applicable *HPE MSA 2070/2072 Storage Management Guide*, *HPE MSA 2070/2072 CLI Reference Guide*, or product user guide listed under **Websites**.

Removing and replacing the controller module

Before you begin

Observe the following:

CAUTION:

- Removing a module from an operational enclosure significantly changes air flow within the enclosure. Openings must be populated for the enclosure to cool properly. Leave modules in the enclosure until a replacement is available.
- Parts can be damaged by electrostatic discharge; use proper antistatic protection. Keep parts in electrostatic containers until needed and ensure you are properly grounded when touching static-sensitive components.

IMPORTANT: When replacing both controllers in an operational enclosure, do as follows:

1. Replace one controller as detailed in these instructions.
2. Wait 30 minutes. This pause ensures that the controller and its ownership of the disk-groups have enough time to fully stabilize.
3. To ensure that the system is stable, check the system status and event logs.
4. Replace the other controller as detailed in these instructions.

NOTE: If the Partner-Firmware-Upgrade (PFU) feature is enabled (this is enabled by default) then the system will update the firmware automatically, and both controllers will have the same firmware version. If the PFU is not enabled, update the firmware on the controller via the Smart Component.

Replacing both controllers at the same time may result in data loss.

NOTE: Controller and I/O modules are inverted between top and bottom slots. Align the controller correctly for the slot. Latches will be positioned in the middle.

NOTE: To reduce the impact on system performance, perform all maintenance tasks during periods of low system activity or during a system maintenance window.

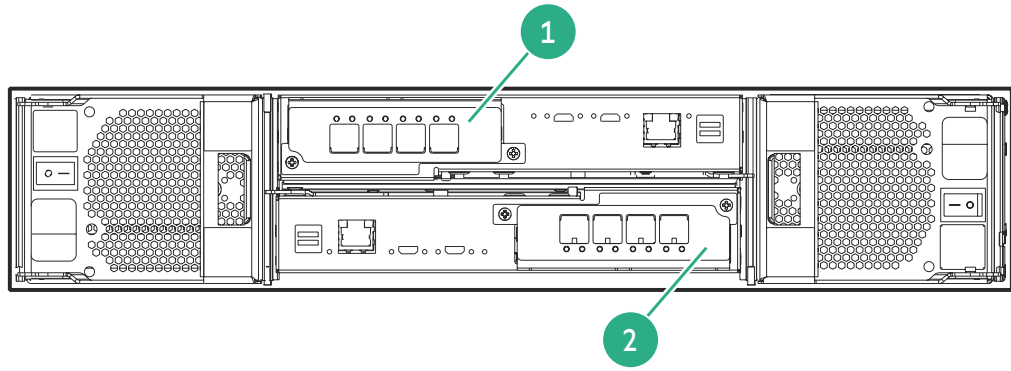


Figure 9: Controller module location

1. Controller module A

2. Controller module B

NOTE: Illustrations in this document show generic representations of modules and enclosures; procedures are the same for all controller modules.

For additional information on returning a failed controller module, see **Returning a failed component**.

Verifying module failure

Procedure

Before replacing the module, look at the event log, system management utilities, and device LEDs, to confirm that the module has failed.

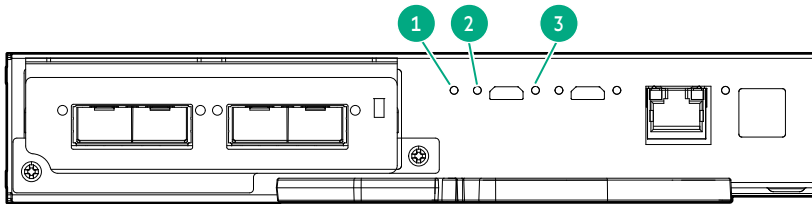


Table 1: Controller LED descriptions

1	FRU OK	Green	The controller is operating normally.
		Blinking Green	System is booting.
		Off	The controller module is not OK, or is powered off.
2	Fault	Off	The controller is operating normally.

Table Continued



		Amber	A fault has been detected or a service action is required.
		Blinking	Hardware controller power-up or a cache-flush or restore error.
3	OK to Remove	Off	The controller module is not prepared for removal.
		White	The controller module is prepared for removal.

Recording configuration settings

About this task

As a best practice, record system settings before replacing a controller module.

Procedure

Note key settings using the HPE Storage Management Utility. See the HPE MSA 2070/2072 Storage Management Guide at <https://www.hpe.com/support/MSA207xSMG> to determine how to obtain these settings.

NTP settings:

System information (name, contact, location, and description):

Management port IP addresses:

User information:

Email notification settings:

SNMP notification settings:

syslog notification settings:

Scheduled tasks:

Specific host (IDs, names, and mappings):

Updating partner firmware

About this task

In a dual-controller configuration, the **Partner Firmware Update** option ensures that both controllers have the same running firmware version. Hewlett Packard Enterprise recommends leaving this setting enabled at all times.



Procedure

To change the current **Partner Firmware Update** setting, enter the following command using the CLI:

```
# set advanced-settings partner-firmware-upgrade enabled
```

Removing the controller module

About this task

⚠ IMPORTANT:

Replacement controllers may be hot-replaced in an operational enclosure.

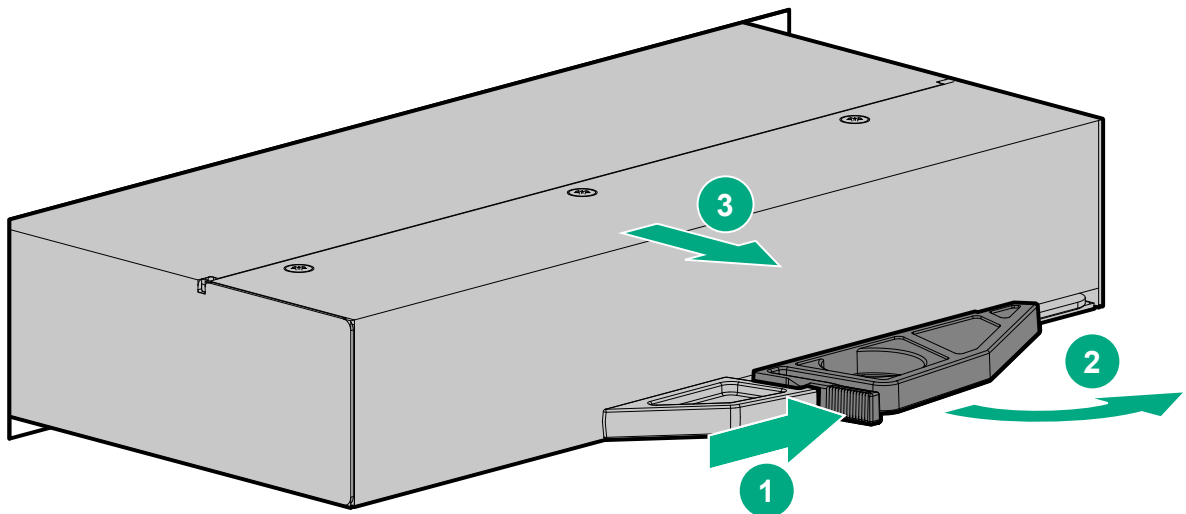
Procedure

1. Shut down the faulty controller:

Use the `shutdown` command in the CLI:

```
# shutdown <A|B>
```

2. Disconnect cables connected to the module. Label each cable to facilitate reconnection.
3. Disengage the latch lock (1) and rotate the latch handle (2) to disengage the module from the internal connector.
4. Pull the module straight out of the enclosure (3).



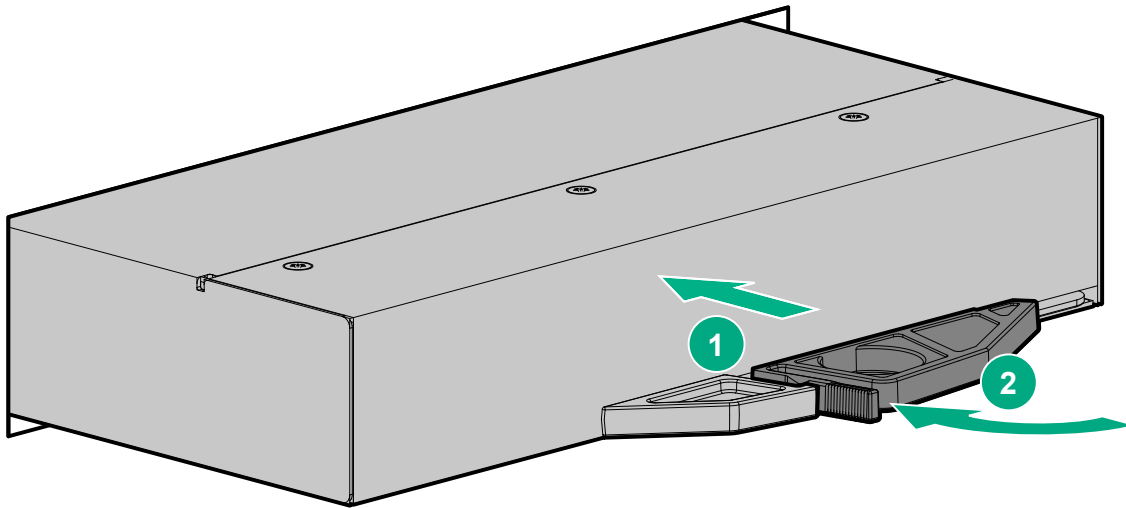
NOTE: The illustration is for reference only. The image may not match your controller.

Installing the controller module

Procedure

1. With the latch in the open position, slide the module into the enclosure as far as it will go (1). To facilitate insertion, using the latch handle (2), fully engage the controller module with the internal connector.
2. Verify that the latch lock is secure.





NOTE: The illustration is for reference only. The image may not match your controller.

3. Reconnect the cables.

After installing a controller in an operational, dual-controller system, the new controller automatically begins initializing. If the firmware versions differ between the two controllers, the Partner Firmware Update feature, if enabled, will update the controller firmware so that both controllers are running the same firmware version.

4. In operational systems, if additional hardware components, such as a second controller, need replacing or installing, wait 30 minutes before proceeding with those procedures. This time frame ensures that the controllers and their ownership of disk-groups are fully stabilized.

Verifying proper operation

About this task

Examine the module status as indicated in [LED descriptions](#) .

If the replacement controller does not boot up as expected or if the **Fault** LED is amber, the module is not online. Check the event log for errors, and then restart the controller to put the module online. To restart a controller, do the following:

Procedure

Use the `restart` command in the CLI:

```
# restart sc <A|B>
```

Verifying configuration settings

Procedure

1. After replacing a controller, verify that your system configuration settings are set properly. Compare the values recorded in [Recording configuration settings](#) with the current values.
2. If necessary, change the settings to their previous values.

For more information, see the *HPE MSA 2070/2072 Storage Management Guide*.



Updating the controller firmware

About this task

After installing a new controller, verify that the latest firmware is installed on all controllers in the enclosure.

To validate the firmware version using the CLI:

Procedure

1. Enter the following command:

```
CLI>show redundancy-mode
```

2. Verify both Controller A and Controller B status is "Operational".

3. Enter the following command:

```
CLI>show versions
```

4. Verify that both controller firmware bundles are the same and are the latest version. You can find the latest firmware version on the HPE MSA Storage Firmware & Release Notes page at <https://www.hpe.com/storage/msafirmware>.


Removing and replacing the I/O module

Before you begin

Observe the following precautions:

CAUTION:

- Removing a module from an operational enclosure significantly changes air flow within the enclosure. Openings must be populated for the enclosure to cool properly. Leave modules in the enclosure until a replacement is available.
- Parts can be damaged by electrostatic discharge; use proper antistatic protection. Keep parts in electrostatic containers until needed and ensure you are properly grounded when touching static-sensitive components.

 **IMPORTANT:** Replacing both I/O modules at the same time will result in a loss of access to data on the array.

NOTE: Controller and I/O modules are inverted between top and bottom slots. Align the controller correctly for the slot. Latches will be positioned in the middle.



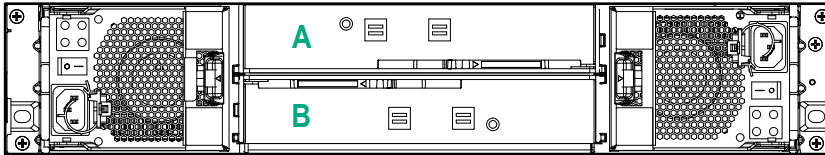
! **IMPORTANT:** When replacing both I/O modules in an operational enclosure, do as follows:

1. Label and remove the backend SAS cables for the I/O module being replaced.
2. Replace one I/O module as detailed in these instructions.
3. Reconnect the backend SAS cables for the I/O module that was replaced.
4. Wait 10 minutes. This pause ensures that the I/O module has enough time to fully stabilize.
5. To ensure that the system is stable, check the system status and event logs.
6. Replace the other I/O module as detailed in these instructions.

Mixing firmware versions in the same enclosure is not supported. After replacing an I/O module be sure to verify that the latest firmware is installed on all I/O modules in the enclosure. See <https://www.hpe.com/storage/MSAFirmware>.

Replacing both I/O modules at the same time may result in a loss of access to all the data on the array.

The following illustration shows I/O module locations (A and B):



For additional information on returning a failed I/O module, see [Returning a failed component](#).

Verifying module failure

Procedure

Before replacing the I/O module, check the event log, SMU or CLI, and device LEDs, to confirm that the I/O module has failed. See [MSA 2070/2072 drive enclosure - rear panel LEDs](#)

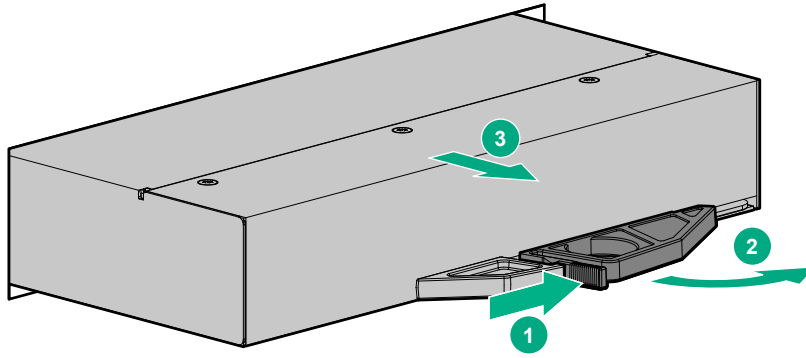
Removing the failed module

About this task

-
- !** **IMPORTANT:** I/O modules can be hot-replaced without powering down the system.
-
- !** **IMPORTANT:** Replacing the module should be performed during a time of low I/O.
-

Procedure

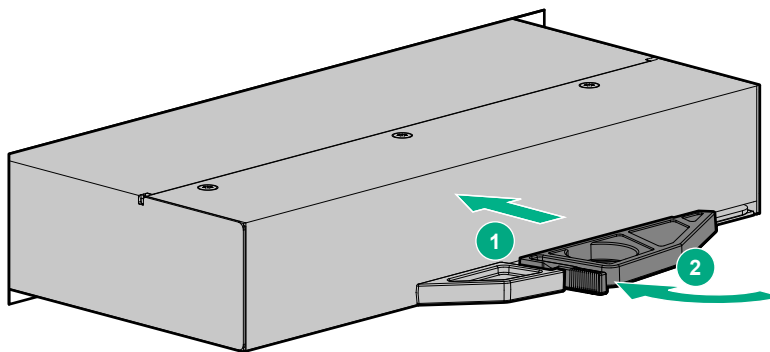
1. Disconnect cables connected to the I/O module. Label each cable to facilitate reconnecting.
2. Disengage the latch lock (1) and rotate the latch handle (2) to disengage the module from the internal connector.
3. Pull the I/O module straight out of the enclosure (3).



Installing the replacement module

Procedure

1. With the latch in the open position, slide the I/O module into the enclosure as far as it will go (1). To facilitate insertion, using the latch handle (2), fully engage the I/O module with the internal connector.



2. Verify that the latch lock is secure.
3. Reconnect the cables.

Verifying proper operation

Procedure

1. After replacing the I/O module, check the module status. For LED descriptions, see [Verifying module failure](#).
2. If the Fault LED is amber, the I/O module has not come online. Remove and reinstall the module. If the problem is not resolved, refer to the *HPE MSA Storage Troubleshooting Guide*.

Updating the I/O module firmware

About this task

- !** **IMPORTANT:** If the Partner Firmware Upgrade feature is enabled, the I/O module firmware should update automatically. If it is disabled and the firmware is not aligned to the bundle, then the firmware bundle version will state **Invalid** and the firmware bundle should be re-applied.



Procedure

After installing a new I/O module, verify that the latest firmware is installed on all I/O modules in the enclosure. See <https://www.hpe.com/storage/MSAFirmware>

For more information on firmware updates, see the *HPE MSA 2070/2072 Storage Management Guide*.

Removing and replacing the transceiver

Before you begin

Observe the following:

CAUTION:

- Transceivers that have been dropped may be damaged. Problems resulting from a dropped transceiver include intermittent errors and no port link. Mishandling fiber-optic cables can degrade performance. Do not fold, pinch, or step on fiber-optic cables. Do not bend fiber-optic cables tighter than a 2-inch radius.
- Parts can be damaged by electrostatic discharge; use proper antistatic protection. Keep parts in electrostatic containers until needed and ensure you are properly grounded when touching static-sensitive components.

NOTE: Check the Quick Specs to see the supported transceivers for your Hewlett Packard Enterprise product. Although transceiver models differ in appearance, the replacement procedures are the same.

For additional information on returning failed transceivers, see [Returning a failed component](#).

Verifying transceiver failure

About this task

Transceivers are part of the datapath that includes multiple components, such as the transceiver, a cable, another transceiver, and an HBA (host bus adapter). When a fault is reported, it can be caused by any component of the datapath.

Procedure

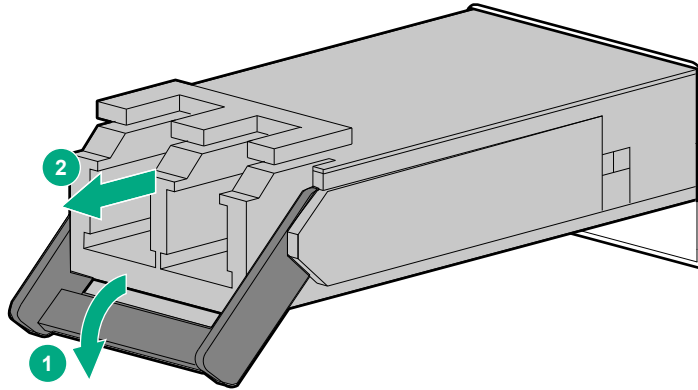
Verify that the fault is due to a transceiver failure, rather than another component of the datapath.

Removing the failed transceiver

Procedure

1. Disconnect the cable from the transceiver.
2. Depending on the transceiver model, rotate down or lift the small handle on the transceiver and gently pull on the handle to remove the transceiver from the slot.

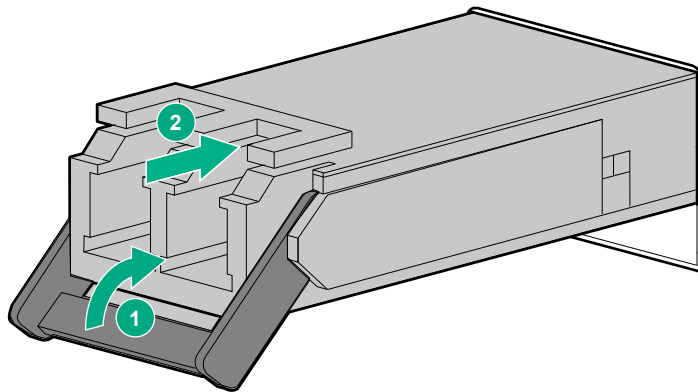




Installing the transceiver

Procedure

1. Slide the transceiver into the slot until it locks in place.
2. Lift up or push down the small handle to secure the transceiver.



3. Remove the dust cover from the transceiver port.
4. Reconnect the cable to the transceiver.



Verifying proper operation

Procedure

View the Link Status and Activity LEDs on the array controller.

Removing and replacing the power and cooling module

Before you begin

-
- ❗ **IMPORTANT:** If you are replacing AC power and cooling modules with DC power and cooling modules, power down the system and replace both supplies. Running the system with both AC and DC power supplies at the same time is not supported.

 - ❗ **IMPORTANT:** During replacement, do not configure any MSA 2070/2072 systems using a combination of old and new power supplies.

First, validate the part numbers of the existing power supply and the replacement power supply to ensure correct compatibility.

If the two power supplies are not compatible in an enclosure or a set of connected enclosures, the error message `Power supply is not supported` is shown and the enclosure will operate in a degraded state.
-

Observe the following safety precautions:

- Use the following commands to verify that the correct replacement power supply has been received:
 - Using the *MSA 2070/2072 System CLI*:
`show frus` command
 - Using the *MSA 2070/2072 SMU (Storage Management Utility)*
Select **Maintenance** > **About** > **Hardware Information**.
 - Open the enclosure details and validate the existing working power supply part number and description. Compare these details to the replacement power supply.
-

- ⚠ **CAUTION:**
 - Removing a module from an operational enclosure significantly changes air flow within the enclosure. Openings must be populated for the enclosure to cool properly. Leave modules in the enclosure until a replacement is available.
 - Parts can be damaged by electrostatic discharge; use proper antistatic protection. Keep parts in electrostatic containers until needed and ensure you are properly grounded when touching static-sensitive components.
-

For information on power and cooling module locations, see [Controller enclosure - rear panel layout](#).

For additional information on returning failed power cooling modules, see [Returning a failed component](#).

Verifying module failure

Before replacing the module, look at the event log, SMU or CLI, and device LEDs to confirm that the module has failed. See [MSA 2070/2072 power and cooling modules - rear panel layout](#).

NOTE: LEDs are inverted on the right power supply.

Removing the failed module

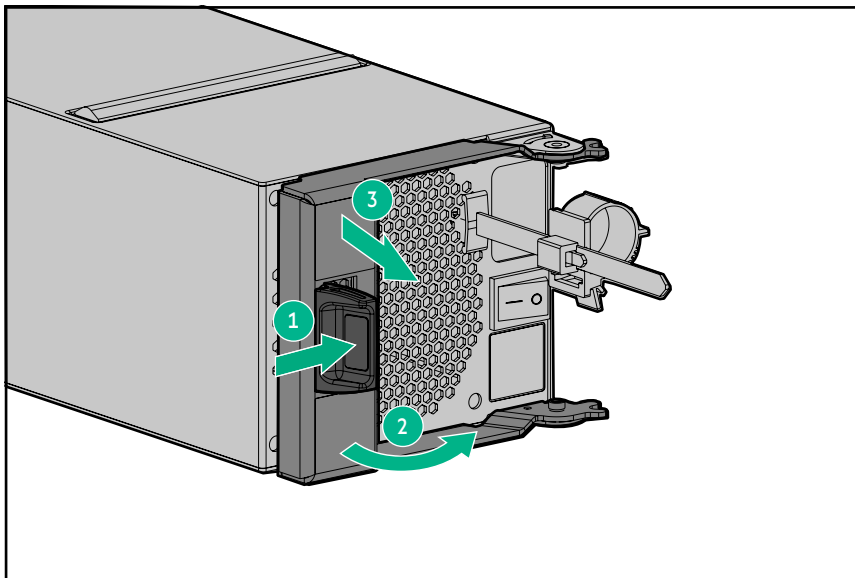
Procedure

1. To remove an AC power and cooling module, see [Removing an AC power and cooling module](#).
2. To remove a DC power and cooling module, see [Removing a DC power and cooling module](#).

Removing an AC power and cooling module

Procedure

1. Turn off the module power switch.
2. Disconnect the power cord from the module:
 - a. Release the tab securing the power cord retaining clip to the zip tie.
 - b. Pull the retaining clip and power cord out from the module until free of the zip tie.
3. Disengage the latch lock and pull the latch (1).
4. Rotate the latch outward to disconnect the module from the internal connector (2).
5. Pull the module straight out of the enclosure (3).



Removing a DC power and cooling module

Prerequisites

Requires a #2 Phillips screwdriver.

NOTE: Do not disconnect the power to the functioning DC PCM during the removal procedure.



About this task

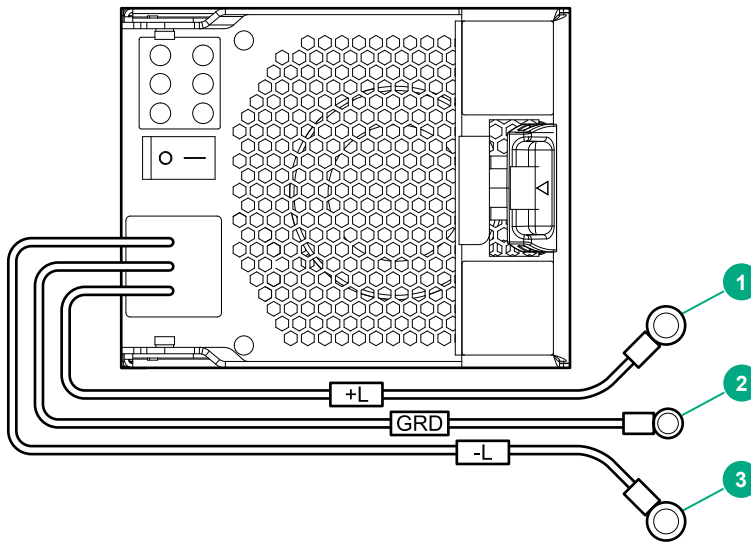


Figure 10: DC Power and Cooling Module

-
- 1 Positive connector
 - 2 Ground connector
 - 3 Negative connector
-

Procedure

1. Turn off the power switch of the DC PCM you are replacing.



WARNING: To reduce the risk of electric shock and burns, please disconnect the power feeding the failed DC PCM to be replaced from the upstream power source.

2. Disconnect each cable wire component of the DC power cable from the DC power source.
3. Remove the DC PCM cable connect cover to provide access to the positive (+) and negative (-) connectors.
4. Remove the green wire from the ground connector, using a #2 Phillips screwdriver to remove the screw and lock washer from the ground connection hole.
5. Remove the red wire from the (-) connector, using a #2 Phillips screwdriver to remove the screw with square washer from the (-) connection hole.
6. Remove the black wire from the (+) connector, using a #2 Phillips screwdriver to remove the screw with square washer from the (+) connection hole.
7. Pull the release latch to disconnect the module from the internal connector.
8. Pull the module straight out of the enclosure.

Installing the replacement module

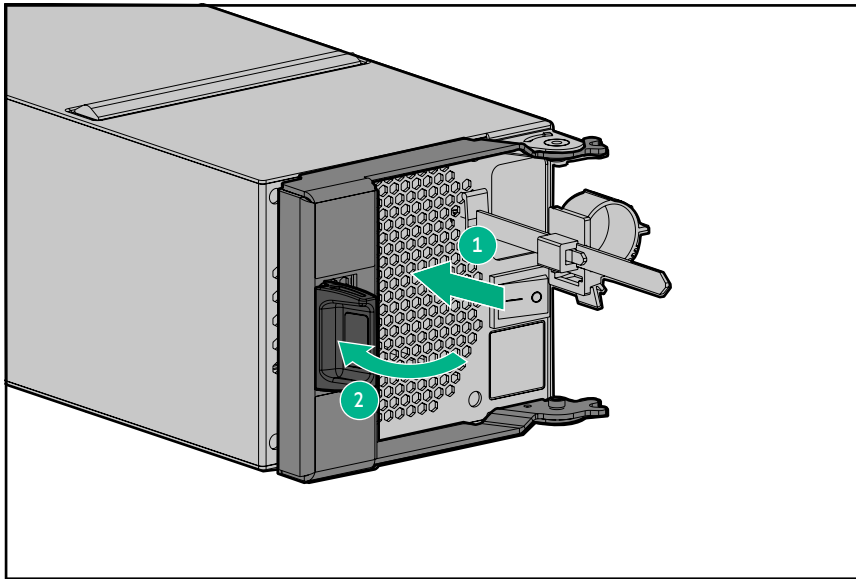
Procedure

1. To install an AC power and cooling module, see [Installing an AC power and cooling module](#).
2. To install a DC power and cooling module, see [Installing a DC power and cooling module](#).

Installing an AC power and cooling module

Procedure

1. With the latch in the open position, slide the module into the enclosure as far as it will go (1).
2. Engage the latch lock to secure the module (2).



3. Reconnect the power cord to the power supply:
 - a. Open the power cord retaining clip and thread the power cord through the clip.
 - b. Snap the tab into place to secure the power cord.
 - c. Slide the retaining clip onto the zip tie that is connected to the power supply module.
 - d. Plug in the power cord and push the retaining clip onto the zip tie until tight.
4. Connect the power cord to the AC power source and turn on the switch.

Installing a DC power and cooling module

Prerequisites

Requires a #2 Phillips screwdriver



About this task

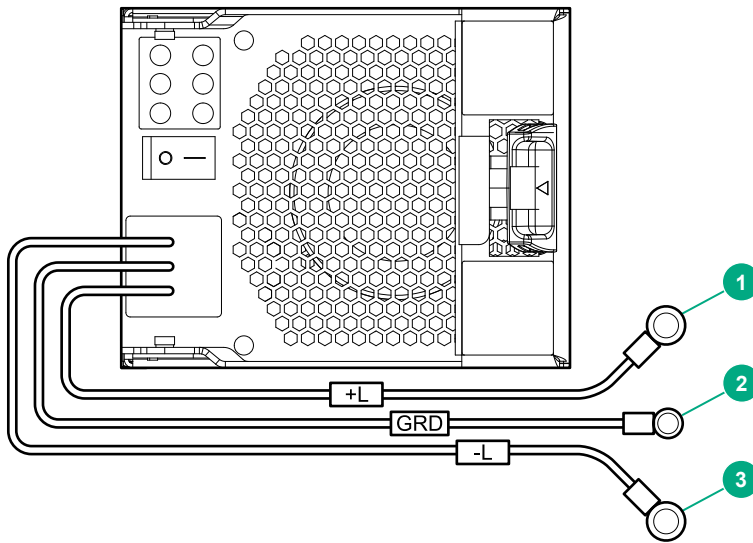


Figure 11: DC Power and Cooling Module

-
- 1 Positive connector
 - 2 Ground connector
 - 3 Negative connector
-

⚠ CAUTION: Connecting to a DC power source outside the designated -48V DC nominal range (-35V DC to -72V DC) may damage the enclosure.

Access the enclosure rear panel when making power cable connections.

Procedure

1. Use the power cables from the failed PCM, for each DC PCM that will connect to a DC power source.
2. Verify that the power switch on PCM that you are replacing is in the Off position.
3. Remove the DC PCM cable connect cover to provide access to the positive (+) and negative (-) connectors.
4. Attach the black wire to the (+) connector on the PCM.
 - a. Using a #2 Phillips screwdriver, remove the screw with square washer from the (+) connection hole.
 - b. Align the black wire lug over the (+) connection hole.
 - c. Reinstall the screw with square washer to secure the lug connector in place, applying a torque between 1.7 N-m (15 in-lb) and 2.3 N-m (20 in-lb).
5. Attach the red wire to the (-) connector on the PCM.
 - a. Using a #2 Phillips screwdriver, remove the screw with square washer from the (-) connection hole.
 - b. Align the red wire lug over the (-) connection hole.

- c. Reinstall the screw with washer to secure the lug connector in place, applying a torque between 1.7 N-m (15 in-lb) and 2.3 N-m (20 in-lb).
 - d. Reattach the cable connect cover to the DC PCM.
6. Attach the green wire to the ground connector on the PCM.
 - a. Using a #2 Phillips screwdriver, remove the screw and lock washer from the ground connection hole.
 - b. Align the green wire lug over the ground connection hole.
 - c. Reinstall the screw with lock washer to secure the lug connector in place, applying a torque between 1.7 N-m (15 in-lb) and 2.3 N-m (20 in-lb).
7. To complete the DC connection, secure the other end of each cable wire component of the DC power cable to the target DC power source.

Check the three individual DC cable wire colors before connecting each cable wire lug to its proper location on the DC power source. The black cable attaches to the positive connection. The red cable attaches to the negative connection. The green cable attaches to the ground connection.

Verifying proper operation

Procedure

1. Examine module status as indicated in **Verifying module failure**.
2. View the LEDs and verify that the cooling fans are spinning.
3. If the Fault/Service Required LED is amber, the module has not come online. Remove and reinstall the module. If the problem is not resolved, refer to the *HPE MSA Storage Troubleshooting Guide*.
4. Verify that the two power supplies installed into the same enclosure are compatible. See **Before you begin**.

The error `Power supply is not supported` is shown when two incompatible power supplies are installed into the same enclosure. If this error message is received, contact HPE support to replace one of the incompatible power supplies.

Removing and replacing the chassis

Before you begin

Observe the following:

CAUTION: Parts can be damaged by electrostatic discharge; use proper antistatic protection. Keep parts in electrostatic containers until needed and ensure you are properly grounded when touching static-sensitive components.

IMPORTANT: If the system has licensed features, record the licensing serial number prior to replacing the chassis. Once a new chassis has been installed, you will need to request a new license using the new licensing serial number.

IMPORTANT: The chassis must be powered off during removal and replacement.

Complete the following tasks before beginning these procedures:



- Schedule a maintenance window that will include time for shutdown, 60 minutes of replacement work, and restart.
- Verify that there is a recent backup of the system.
- Record system settings.
- Label all cables.
- Prepare a large, stable work surface.

Prepare for the replacement

About this task

! **IMPORTANT:** Use caution when handling Fibre Channel cables:

- Touching the end of a Fibre Channel cable either damages the cable or causes performance problems, including intermittent difficulties accessing the storage.
 - When a Fibre Channel cable or port is not connected, install protective covers on the ends of the cable or in the device port.
-

Procedure

1. Back up all storage system data.
 2. If the controller enclosure or drive enclosure chassis is operational, do the following to shut down the storage system:
 - a. Stop all I/O to the storage system that includes the chassis being replaced.
 - b. Shut down all array controllers in the system by entering the following CLI command:

```
# shutdown both
```

After the controllers shut down, the white **OK to Remove** LED on the controller illuminates.
-
- NOTE:** There is no **OK to Remove** LED on expansion modules.
-
3. Turn off the power supply module switches.
 4. Make sure that the cables are clearly labeled and then disconnect the cables, including the power cords, from the modules.

Replace the chassis

Procedure


1. **Power down the storage system.**
2. **Remove drive and drive blank modules from the failed chassis.**
3. **Remove the chassis from the rack.**
4. **Install the replacement chassis in the rack.**
5. **Move power supply modules to the replacement chassis.**
6. **Move controller or I/O modules to the replacement chassis.**

7. **Install drive or drive blank modules in the replacement chassis.**

8. **Complete the installation process.**

9. **Verify operation.**

Power down the storage system

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

Before powering down the system for any upgrade or maintenance procedures, perform a backup of critical storage system data.

To power down the storage system:

- Stop all I/O to the storage system whose chassis is being replaced.
This method starts a controlled shutdown of applications and the OS before the storage system enters standby mode.
- Shut down all array controllers in the system by entering the following CLI command:

```
# shutdown both
```

After the controllers are shut down, the white **OK to remove** LED on the controller illuminates.

NOTE: There is no **OK to remove** LED on expansion modules.

Toggle the power switch to the off (O) position on the controller enclosures and all connected expansion enclosures.

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

Remove drive and drive blank modules from the failed chassis

About this task

CAUTION:

- These procedures require that all drives and drive blank modules be removed from the failed chassis and then installed in the replacement chassis.
- Because drives are heavy, Hewlett Packard Enterprise recommends removing drives prior to moving the chassis. If this is not possible, two or more people are required to lift the chassis.
- Remove the drives after confirming that all internal movement has halted.


See **Removing and replacing drives**.

Removing the chassis from the rack

Prerequisites

Requires a T-25 Torx screwdriver.

About this task

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





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

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



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

- The rack is bolted to the floor using the concrete anchor kit.
 - The leveling feet extend to the floor.
 - The full weight of the rack rests on the leveling feet.
 - The racks are coupled together in multiple rack installations.
 - Only one component is extended at a time. If more than one component is extended, a rack might become unstable.
-

Procedure

- 1.** Remove all power:
 - a.** Disconnect each power cord from the power source.
 - b.** Disconnect each power cord from the storage system.
- 2.** Disconnect all peripheral cables from the storage system.
- 3.** If installed, remove the bezel and hubcaps to access the retaining screws.
- 4.** Remove the enclosure screws securing the front and rear of the chassis to the rails.



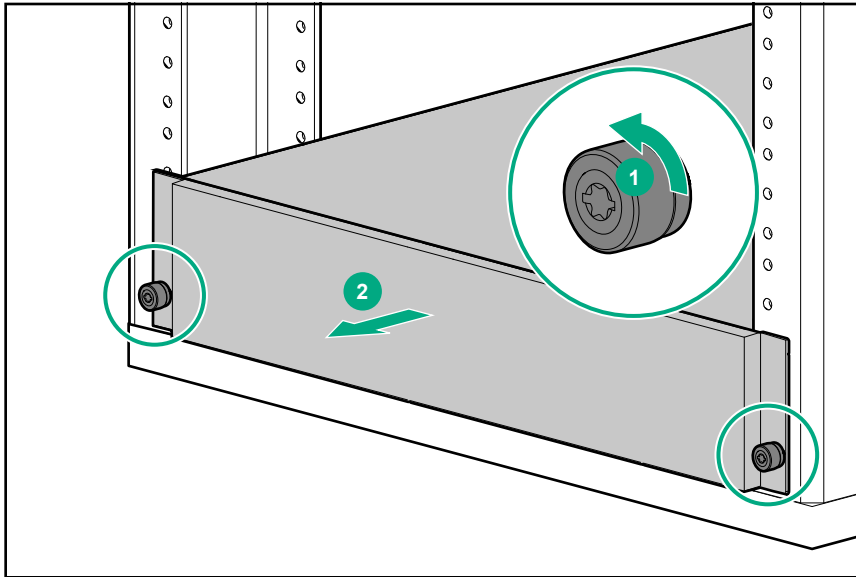


Figure 12: Front of chassis

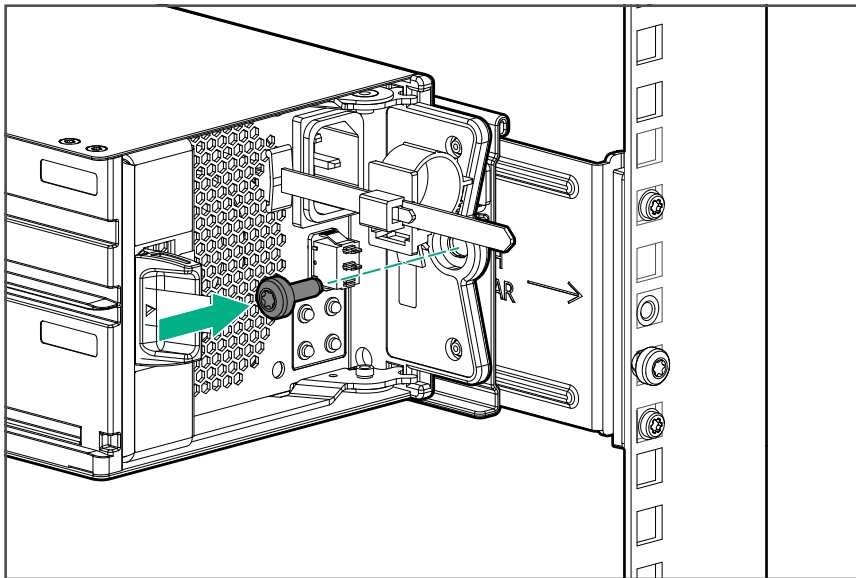


Figure 13: Rear of chassis

5. Place the storage system on a flat, level surface.

Install the replacement chassis in the rack

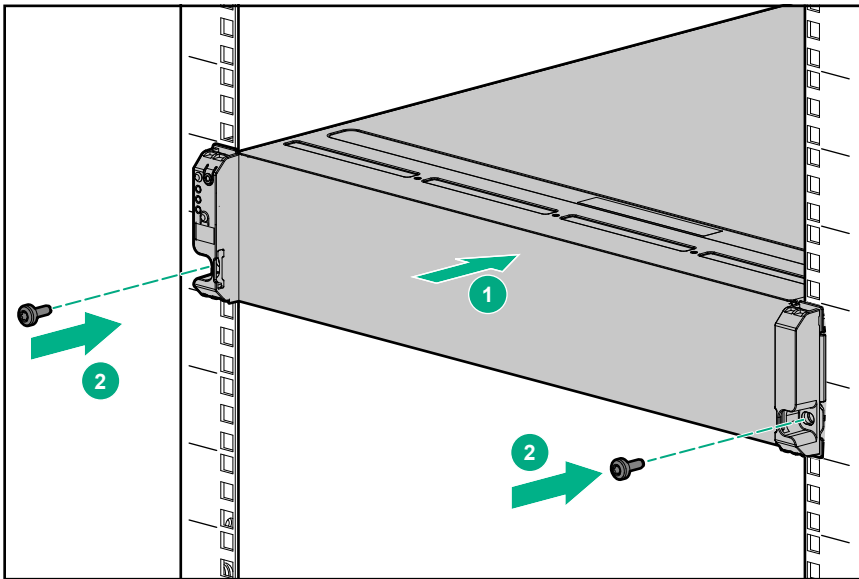
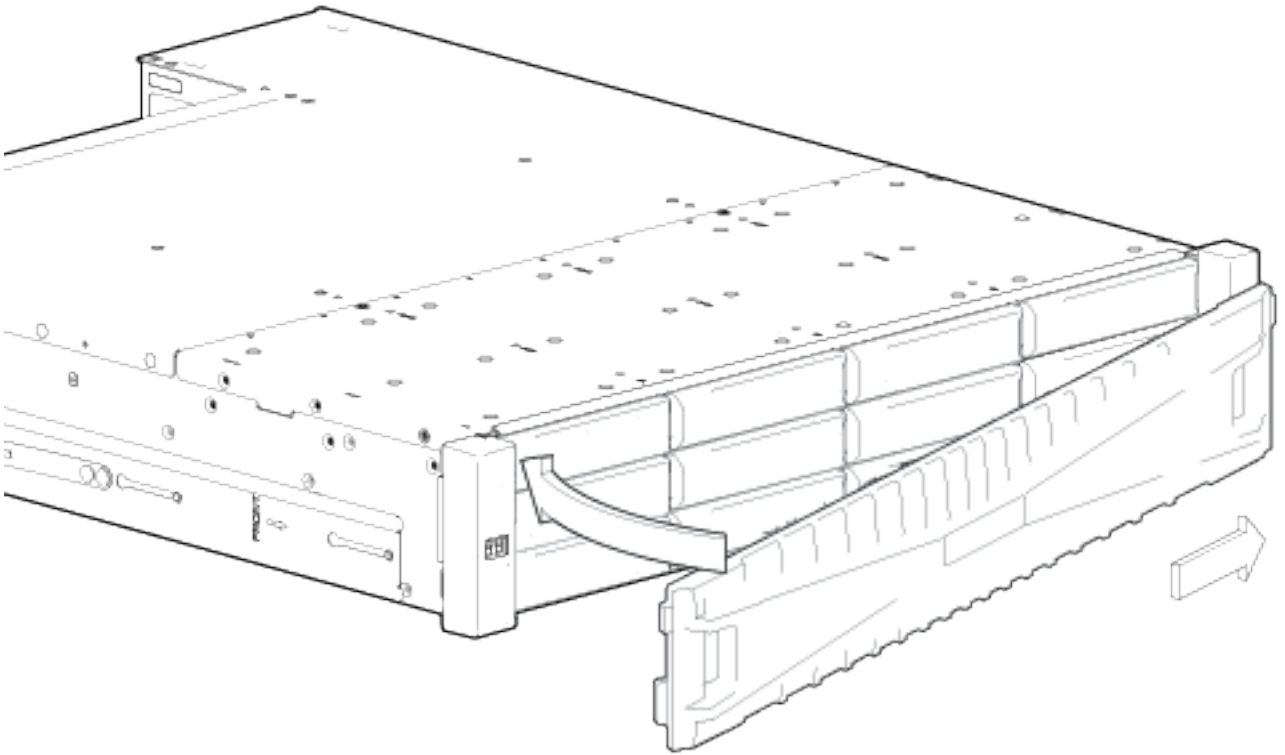
About this task

NOTE: At least two people are needed to lift the chassis into the rack.

Procedure

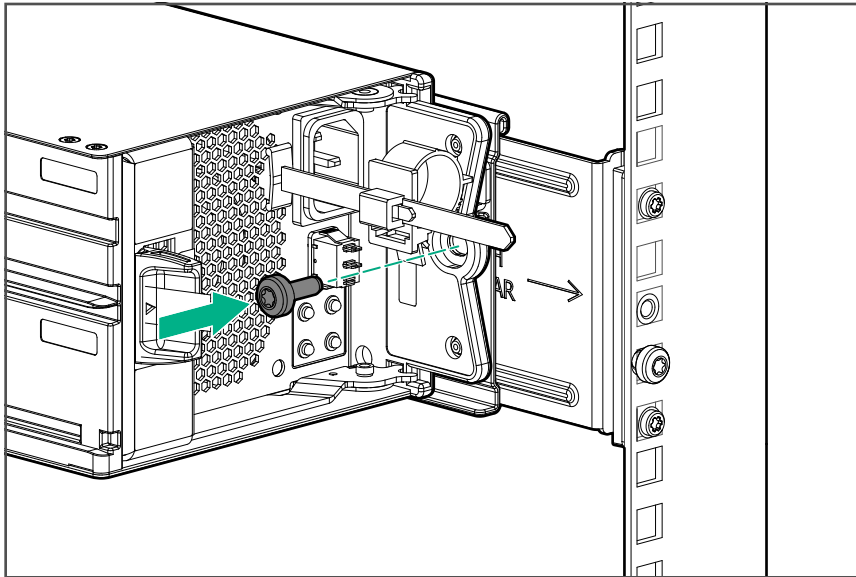
1. Lift the chassis and align it with the installed rack rails, ensuring that the enclosure remains level, and slide the chassis onto the rack rails.
2. If installed, remove the bezel and hubcaps to access the retaining screws. Install the front enclosure screws, then replace the hubcaps and the bezel.





3. Install the controller enclosure screws in the rear to secure the enclosure to the rack and rails, as shown in the following illustration:





Move power supply modules to the replacement chassis

Procedure

1. Remove the power supply modules from the chassis being replaced. See [Removing and replacing the power and cooling module](#).
2. Install power supply modules in the replacement chassis.

Move controller or I/O modules to the replacement chassis

About this task

! **IMPORTANT:** Modules must be reinstalled in the same bays from which they were removed. Installing a module in a bay other than the one from which it was removed may result in loss of access to the storage.

💡 **TIP:** Consider labeling the controllers before removing them so they go into the same locations in the replacement chassis.

Procedure

1. Remove the modules from the chassis being replaced. See [Removing and replacing the controller module](#) and [Removing and replacing the I/O module](#).
2. Install the modules in the replacement chassis.

Install drive or drive blank modules in the replacement chassis

About this task

⚠ **CAUTION:** Prolonged use of the array, while one or more drives slots are not covered by either a drive or drive blank module, can result in damage to the system from overheating.



! **IMPORTANT:** Reinstall each drive or drive blank module in the same bay number from which it was removed.

See **Removing and replacing drives** and **Removing and replacing a drive blank**.

Complete the installation process

Procedure

1. Reconnect data cables to the original cabling configuration. As needed, connect cables:
 - Between the first and all cascaded drive enclosures.
 - Between the controller enclosure and the host.
2. Reconnect power cords to the replaced enclosure.
3. Turn on power supply module switches of all expansion enclosures. Wait 2 minutes then turn on power supply modules of the controller enclosure.
4. **Verify storage systems status.**
5. **Verify firmware version.**
6. If necessary, restart system devices in the following sequence, allowing time for each device to complete its Power On Self-Tests (POST) before proceeding:
 - a. Switches
 - b. Hosts
7. Verify host access to all data on the storage systems.

Verify storage systems status

View LEDs on the front of the chassis and on each module. For detailed LED information, see the user guide for your model controller enclosure or drive enclosure.

! **IMPORTANT:** After a chassis replacement, at power on, the system will detect a new configuration and quarantine the disk-groups which will put all volumes offline.

1. Allow the system to fully start up.
2. Validate all the drives are present, then restart both storage controllers to dequarantine the disk-groups and bring the volumes online.

-
- Drive modules: Verify that the Fault LED is not lit.
 - Power supply modules: Verify that none of the Fan Fail, PCM Fail, AC Fail, or DC Fail LEDs are on.
 - Controller modules and I/O modules: Verify that the OK LED is on, indicating that the module has completed initializing and is online.
 - Chassis front panel: Verify that the Fault LED is off.
 - Perform a rescan to force a fresh discovery of all drive enclosures connected to the controller enclosure. This step clears the internal SAS layout information and reassigns enclosure IDs based on the cabling sequence, ensuring that the enclosures are numbered correctly.

To perform a rescan using the CLI: `#rescan`.

Verify firmware version

About this task

After installing any new component, verify that it is running the latest firmware.

Procedure

1. You can find the latest firmware version on the HPE MSA Storage Firmware & Release Notes page at <https://www.hpe.com/storage/MSAFirmware>.
2. If newer firmware is available, download the firmware to your local system and install the latest version on the storage system. See [Updating the controller firmware](#).

For more information on firmware updates, see the *HPE MSA 2070/2072 Storage Management Guide* or *HPE MSA 2070/2072 CLI Reference Guide* listed under [Websites](#).



Component identification

Front panel components

24-drive controller enclosure or expansion enclosure

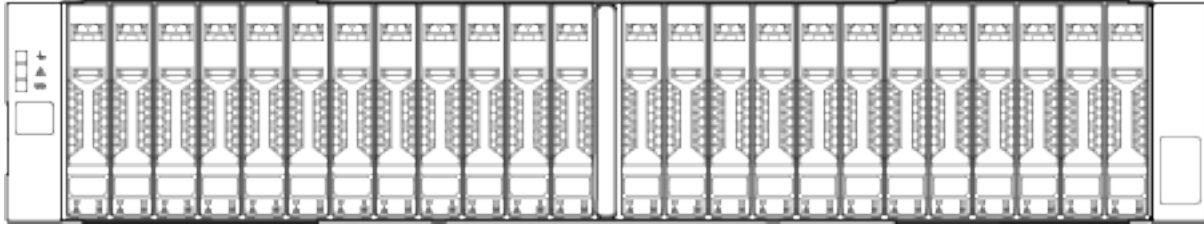
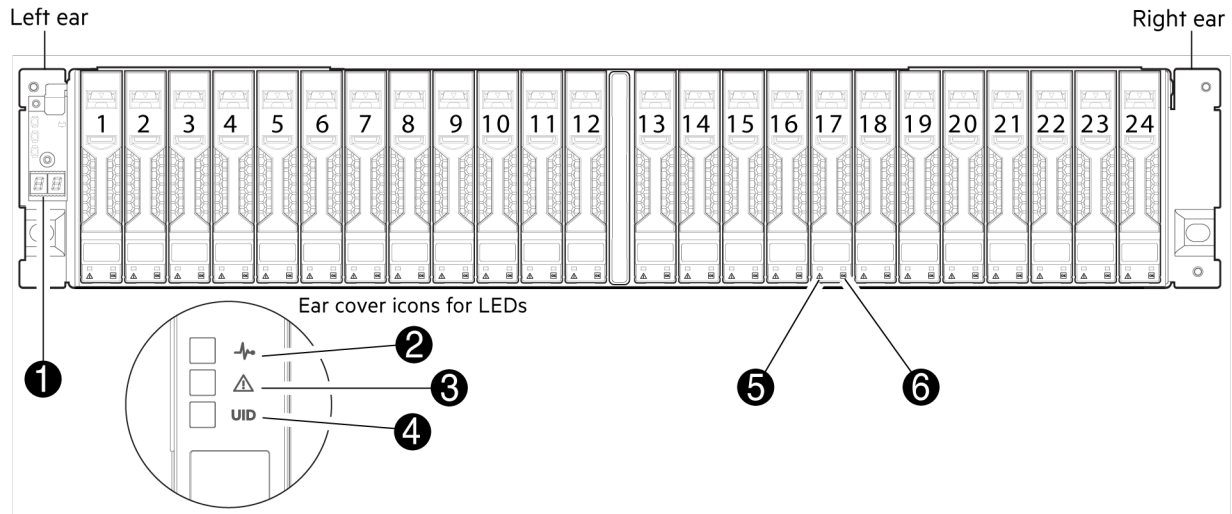


Figure 14: 24-drive enclosure shown with hubcaps only (no bezel)



Notes:

Integers on disks indicate drive slot numbering sequence.

The enlarged detail view at left shows LED icons from the left ear cover that correspond to the chassis LEDs.

Figure 15: 24-drive controller or expansion enclosure: front panel with hubcaps removed

Item	Description	Definition
1	Enclosure ID	Green — On The enclosure ID value is shown using 7-segment display. Enables you to correlate the enclosure with logical views presented by management software. Sequential enclosure ID numbering of controller enclosures begins with the integer 1. The enclosure ID for an attached drive enclosure is nonzero.

Table Continued



2	System Power	Green — The enclosure is powered on with at least one power supply operating normally. Off — Both power supplies are off; the system is powered off.
3	Module Fault	Amber — Fault condition exists. The event has been identified, but the problem needs attention. Off — No fault condition exists.
4	Unit Identification (UID)	Blue — Blinking The enclosure is identified. Off — Identity LED is not illuminated.
5	Disk drive Fault/UID	See Disk drive LEDs
6	Disk drive Online/Activity	See Disk drive LEDs

12-drive controller enclosure or expansion enclosure

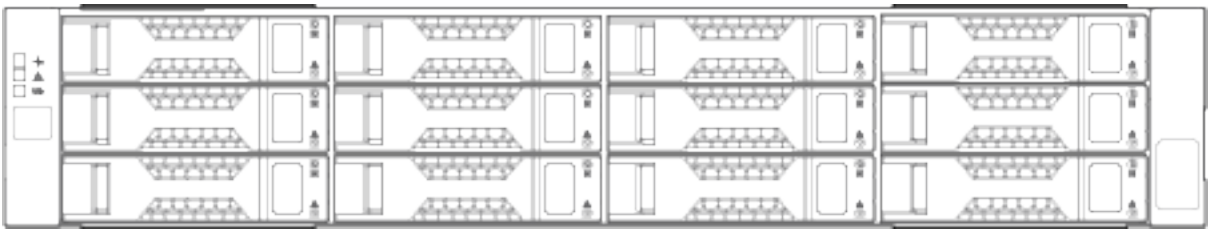
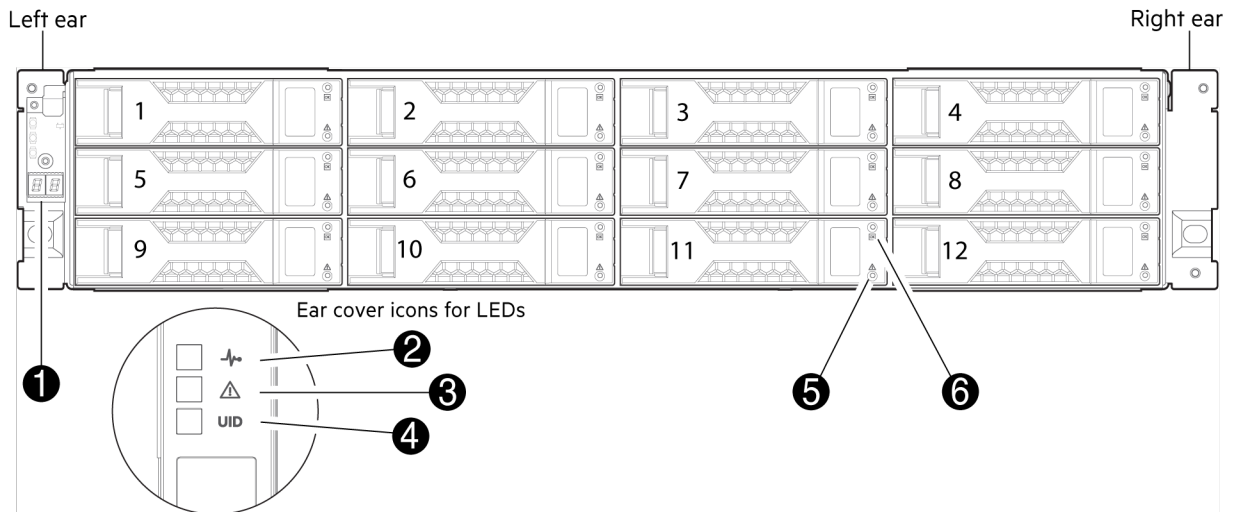


Figure 16: 12-drive enclosure shown with hubcaps only (no bezel)



Notes:

Integers on disks indicate drive slot numbering sequence.

The enlarged detail view at left shows LED icons from the left ear that correspond to the chassis LEDs.

Figure 17: 12-drive controller or expansion enclosure: front panel



Item	Description	Definition
1	Enclosure ID	Green — On The enclosure ID value is shown using 7-segment display. Enables you to correlate the enclosure with logical views presented by management software. Sequential enclosure ID numbering of controller enclosures begins with the integer 1. The enclosure ID for an attached drive enclosure is nonzero.
2	System Power	Green — The enclosure is powered on with at least one power supply operating normally. Off — Both power supplies are off; the system is powered off.
3	Module Fault	Amber — Fault condition exists. The event has been identified, but the problem needs attention. Off — No fault condition exists.
4	Unit Identification (UID)	Blue — Blinking The enclosure is identified. Off — Identity LED is not illuminated.
5	Disk drive Fault/UID	See Disk drive LEDs
6	Disk drive Online/Activity	See Disk drive LEDs

Rear panel components

Controller enclosure - rear panel layout

The diagram and table below display and identify important component items comprising the rear panel layout of a representative controller enclosure (4-port Fibre Channel host interface protocol is shown in the example). For a given host interface protocol, the rear panel view of an LFF controller enclosure and SFF controller enclosure are identical.



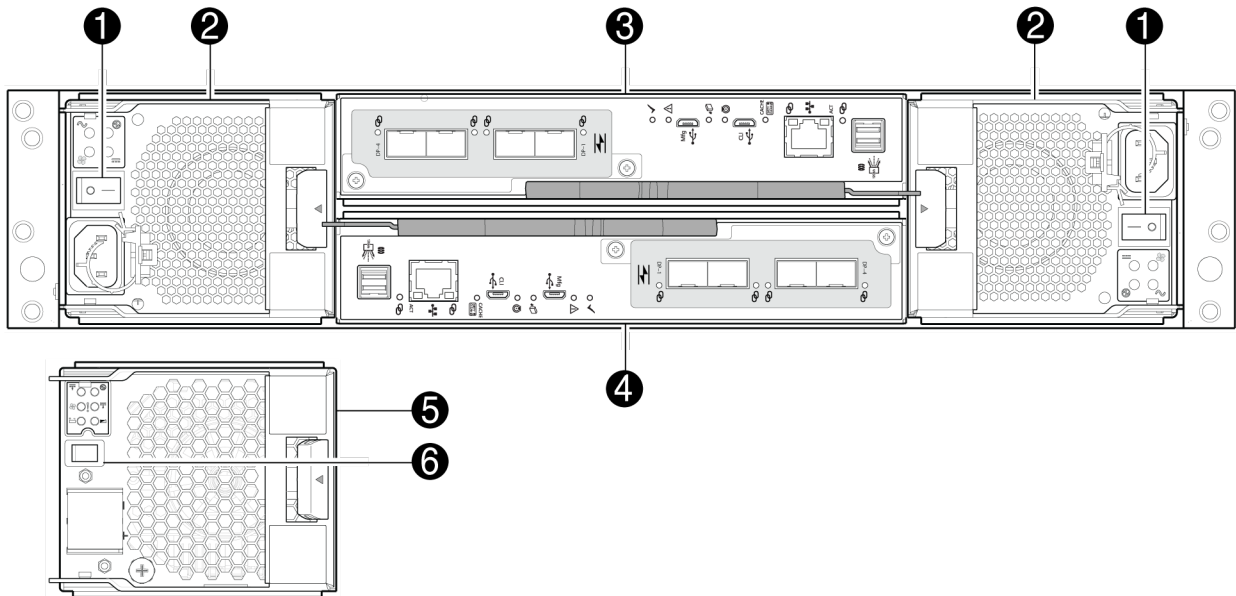


Figure 18: Controller enclosure: rear panel

Item	Description
1	AC power switch
2	AC power and cooling module (PCM)
3	Controller module A (see face plate details)
4	Controller module B (inverted)
5	DC power and cooling module (2)–(DC module only)
6	DC power switch

NOTE: The PCMs and controller modules are rotated 180° from their counterparts to align with their respective midplane connectors, as shown in the figure above.



MSA 2070/2072 controller module - rear panel components

The figure below shows four host interface ports configured with 16Gb FC SFP transceivers.

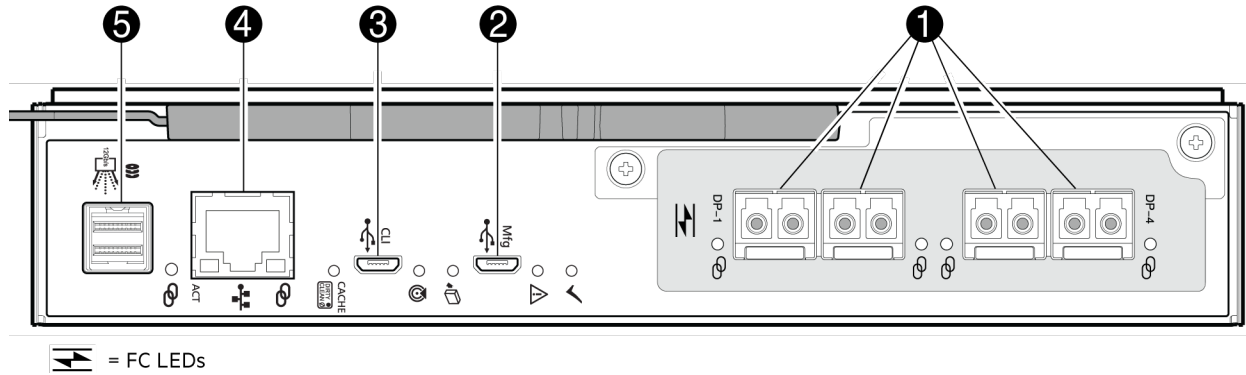


Figure 19: MSA 2070/2072 controller module face plate (16Gb FC)

The figure below shows four host interface ports configured with iSCSI SFP transceivers.

NOTE: NOTE This example figure shows 10GbE iSCSI host interface ports. 25GbE host interface ports are also supported.

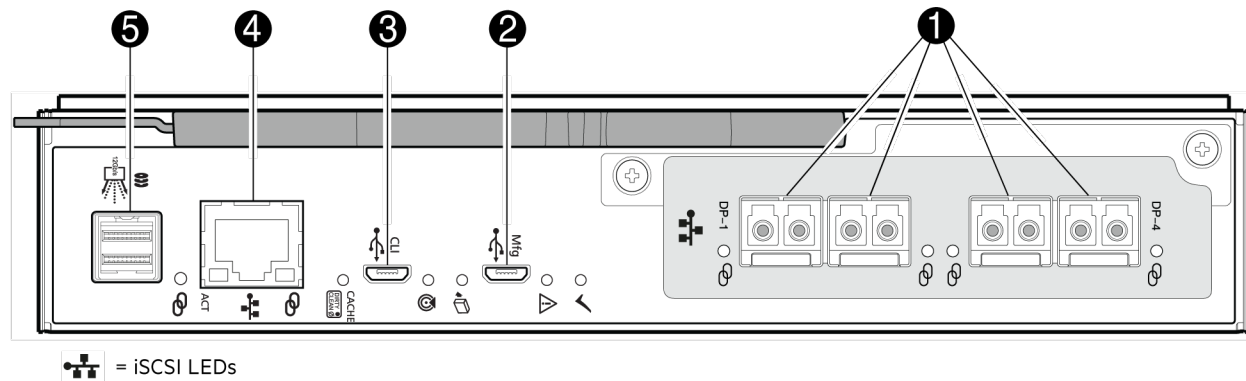


Figure 20: MSA 2070/2072 controller module face plate (10GbE iSCSI)

The figure below shows four host interface ports configured with 10GBase-T iSCSI connectors.

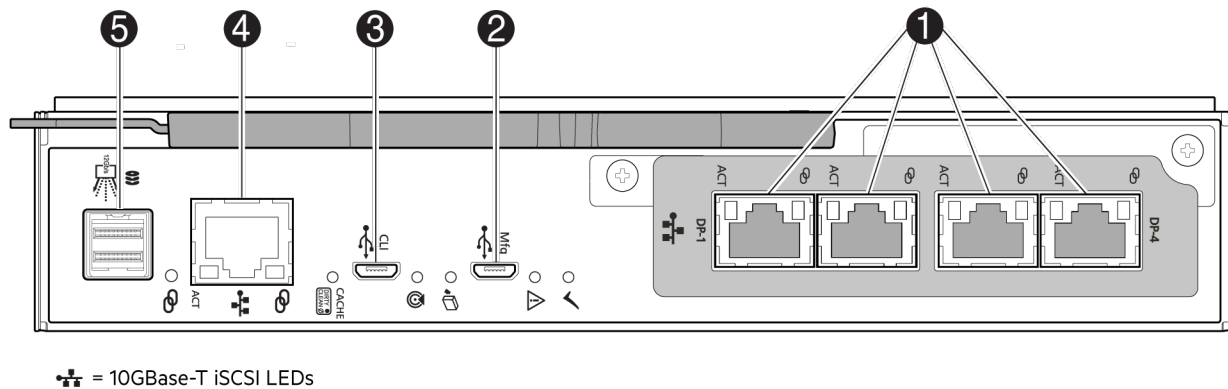


Figure 21: MSA 2070/2072 controller module face plate (10GBase-T iSCSI)



The figure below shows four host interface ports configured with 12Gb/s mini-SAS HD (SFF-8644) connectors.

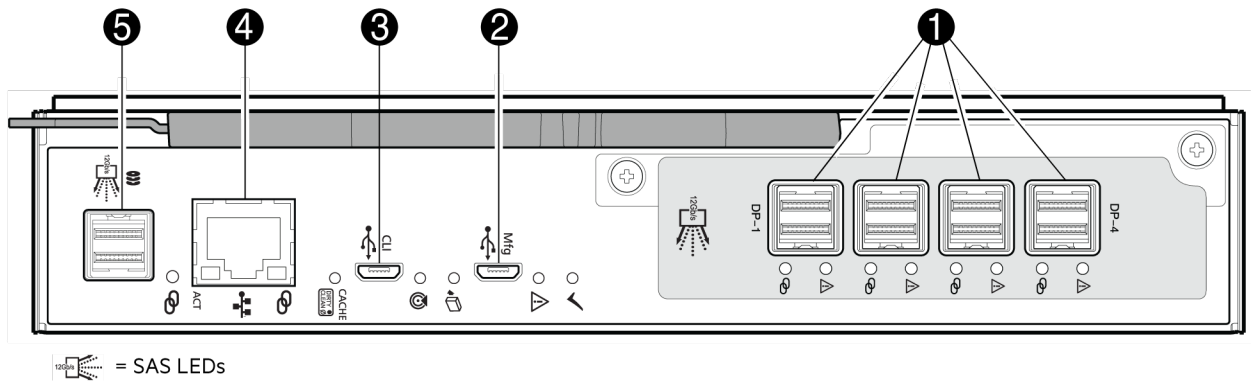


Figure 22: MSA 2070 controller module face plate (12Gb mini-SAS HD)

Item	Description
1	Host ports: host connection or replication
2	Manufacturing port (service only)
3	CLI Micro USB port
4	Network Management Port (RJ45)
5	SAS expansion port (SFF-8644)

Disk enclosures

Disk enclosure expansion modules attach to controller modules via the mini-SAS HD expansion port, allowing addition of disks to the storage system. Controller enclosures support attachment of 12Gb disk enclosures using 2U12 and 2U24 form factors. The 2U12 chassis supports 12 LFF 3.5" disks and the 2U24 chassis supports 24 SFF 2.5" disks. The rear panel view of a disk enclosure representing both the 2U12 and the 2U24 is shown in the following figure.



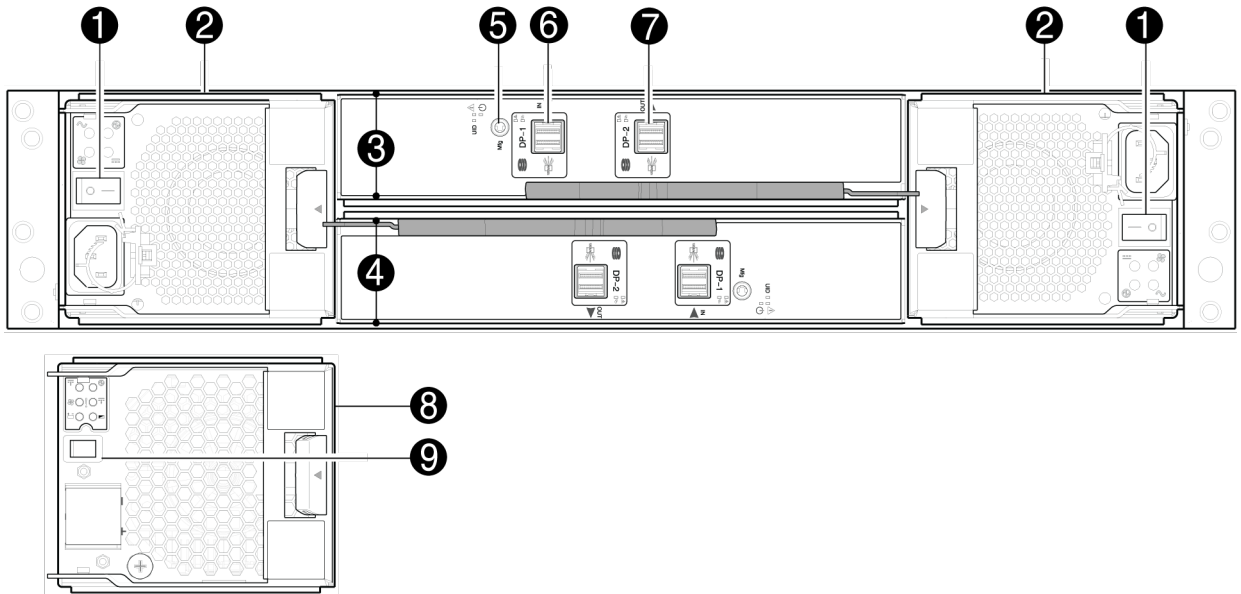


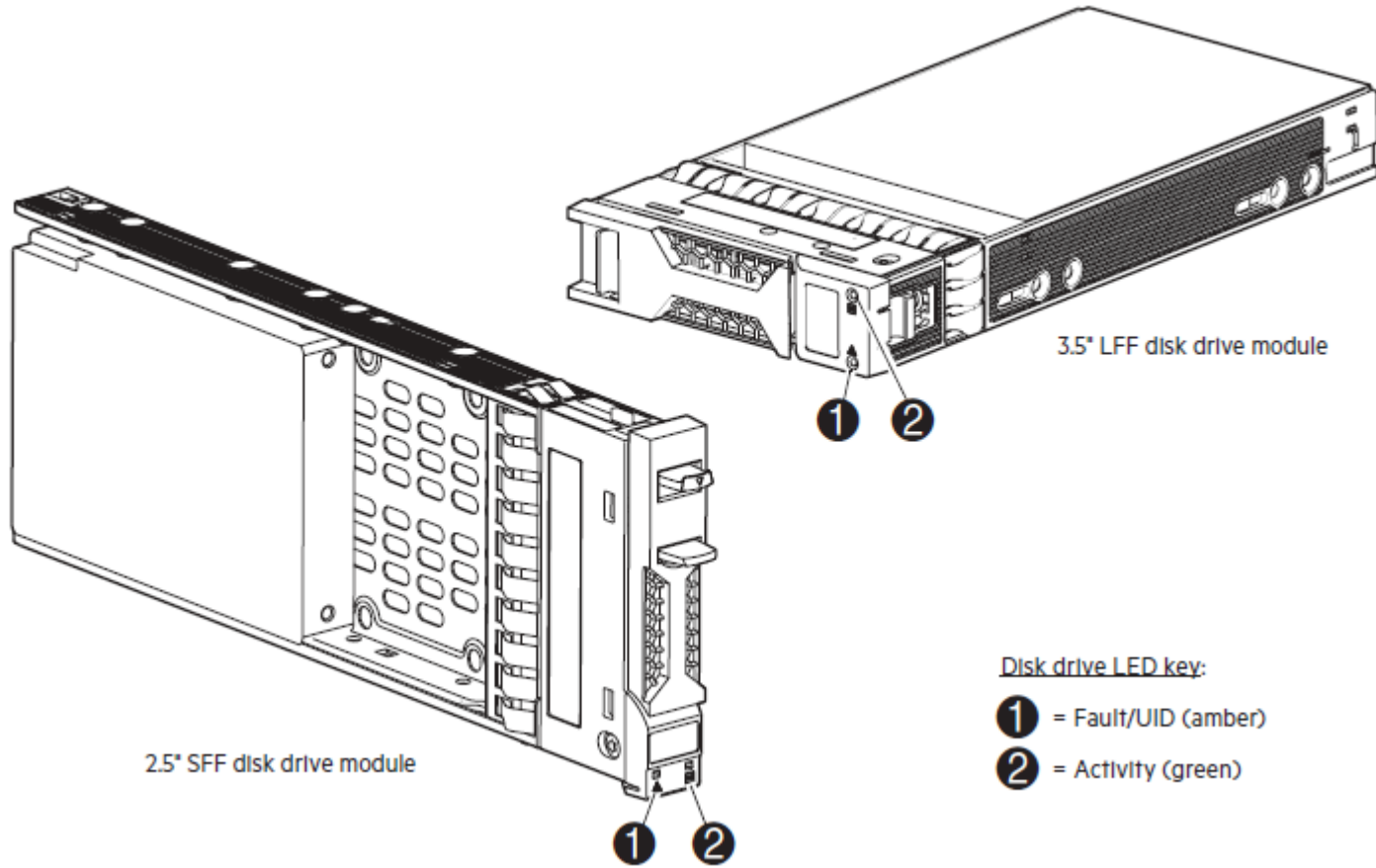
Figure 23: Disk enclosure supporting either LFF or SFF disks

Item	Description
1	AC power switch
2	AC power and cooling module (PCM)
3	Expansion module A
4	Expansion module B (inverted)
5	Service port
6	Data port, in
7	Data port, out
8	DC power and cooling module (2)-(DC module only)
9	DC power switch



Disk drive LEDs

Figure 24: LEDs: Disk drive combinations — enclosure front panel



Activity LED (Green)	Fault LED (Amber)	Status/condition*
Off	Off	Either: <ul style="list-style-type: none"> Power is off (drive/enclosure) - if a supported drive is fully seated Not present or drive not recognized - if the drive slot is absent or the drive is not supported.
Flicker with activity	Blinking: 3s on/1s off	Identity
Blink with activity	On	One Drive Link (PHY lane) down
Off	On	Fault (leftover/failed/locked-out both Drive Link (PHY lanes) down
Off: Blink with activity	Off	Available

Table Continued



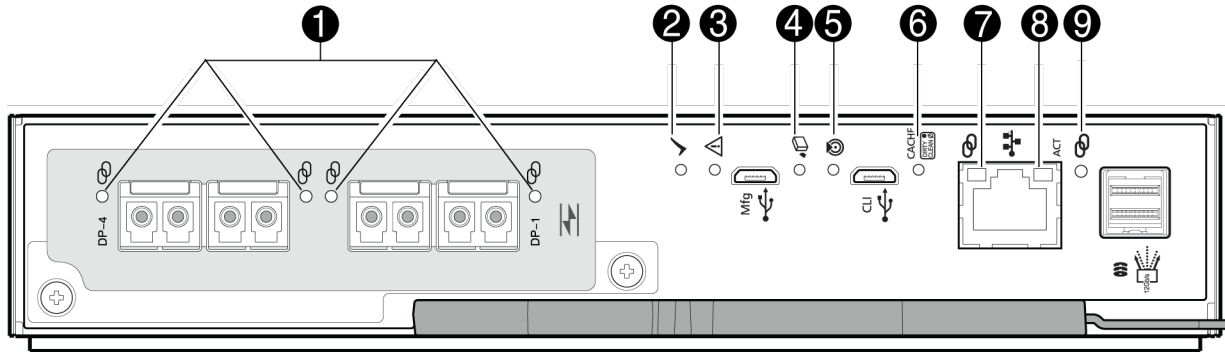
Activity LED (Green)	Fault LED (Amber)	Status/condition*
Blink with activity	Off	Either: <ul style="list-style-type: none"> Storage system: Initializing Storage system: Fault tolerant <p>Use the SMU or the CLI to determine the state.</p>
Off: Blink with activity	Off	Storage system: Quarantined
Off: Blink with activity	Blink: (1s on/1s off) for the reconstructing drive only	Storage system: Reconstructing

NOTE: Do not remove the disk drive.

*If multiple conditions occur simultaneously, the LED state will behave as indicated by the condition listed earliest in the table, as rows are read from top to bottom.

Rear panel LEDs

MSA 2070/2072 controller module - rear panel LEDs




 = FC LEDs

Figure 25: MSA 2070/2072 FC controller module - rear panel LEDs

LED	Description	Definition
1	Host 16Gb FC ¹	Off — No link detected.
	Link Status/Link Activity	Green — The port is connected and the link is up. Blinking green — The link has I/O activity.
2	OK	Green — The controller is operating normally.
		Blinking green — The system is booting.
		Off — The controller module is not OK, or is powered off.
3	Fault	Off — The controller is operating normally.
		Amber — A fault has been detected or a service action is required.
		Blinking - Hardware-controlled power-up or a cache-flush or restore error.
4	OK to Remove	Off — The controller module is not prepared for removal.
		White — The controller module is prepared for removal.
5	Identify	Blue — The controller module is being identified.
6	Cache Status ²	Green — Cache is dirty (contains unwritten data) and operation is normal. The unwritten information can be log or debug data that remains in the cache, so a green Cache Status LED does not, by itself, indicate that any user data is at risk or that any action is necessary.
		Off — In a working controller, cache is clean (contains no unwritten data). This is an occasional condition that occurs while the system is booting.
		Blinking green — A nonvolatile memory flush or cache self-refresh is in progress, indicating cache activity.
7	Network Port Link Speed ³	Off — Link is up at 10/100base-T negotiated speeds.
		Amber — Link is up and negotiated at 1000base-T.
8	Network Port Link Active ³	Off — The Ethernet link is not established, or the link is down.
		Green — The Ethernet link is up (applies to negotiated link speeds).

Table Continued



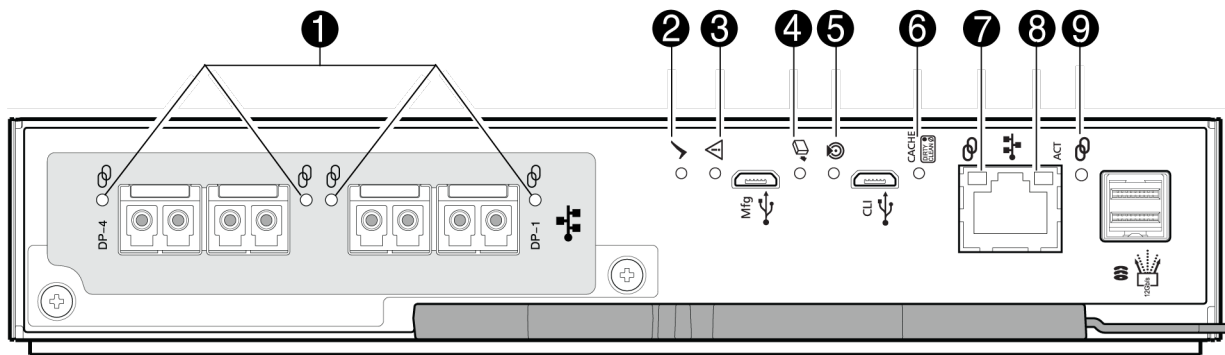
LED	Description	Definition
9	Expansion Port Link Status	Off — The port is empty or the link is down. Green — The port is connected and the link is up. Blinks with activity. Amber — Partial link up (one or more lanes down). Blinks with activity.

¹See the QuickSpecs for qualified FC SFPs and fiber optic cable options.

²The Cache Status LED supports power on behavior and operational (cache status) behavior.

³When the port is down, both LEDs are off.

MSA 2070/2072 iSCSI controller module - rear panel LEDs



 = iSCSI LEDs

Figure 26: MSA 2070/2072 iSCSI controller module - rear panel LEDs

LED	Description	Definition
1	Host iSCSI ¹ Link Status/Link Activity	Off — No link detected. Green — The port is connected and the link is up. Blinking green — The link has I/O activity.
2	OK	Green — The controller is operating normally. Blinking Green — System is booting. Off — The controller module is not OK, or is powered off.
3	Fault	Off — The controller is operating normally. Amber — A fault has been detected or a service action is required. Blinking — Hardware-controlled power-up or a cache-flush or restore error.

Table Continued

LED	Description	Definition
4	OK to Remove	Off — The controller module is not prepared for removal. White — The controller module is prepared for removal.
5	Identify	Blue — The controller module is being identified.
6	Cache Status ²	Green — Cache is dirty (contains unwritten data) and operation is normal. The unwritten information can be log or debug data that remains in the cache, so a green Cache Status LED does not, by itself, indicate that any user data is at risk or that any action is necessary. Off — In a working controller, cache is clean (contains no unwritten data). This is an occasional condition that occurs while the system is booting. Blinking green — A nonvolatile memory flush or cache self-refresh is in progress, indicating cache activity.
7	Network Port Link Speed ³	Off — Link is up at 10/100base-T negotiated speeds. Amber — Link is up and negotiated at 1000base-T.
8	Network Port Link Active ³	Off — The Ethernet link is not established, or the link is down. Green — The Ethernet link is up (applies to negotiated link speeds).
9	Expansion Port Link Status	Off — The port is empty or the link is down. Green — The port is connected and the link is up. Blinks with activity. Amber — Partial link up (one or more lanes down). Blinks with activity.

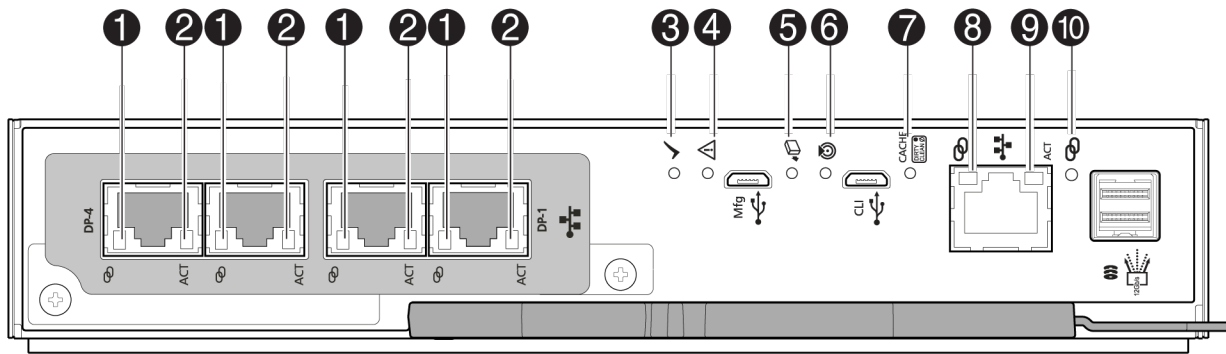
¹See the QuickSpecs for qualified iSCSI SFP options and DAC or AOC cable options.

²The Cache Status LED supports power on behavior and operational (cache status) behavior.

³When the port is down, both LEDs are off.



MSA 2070/2072 10GBase-T iSCSI controller module - rear panel LEDs



✚ = 10GBase-T iSCSI LEDs

Figure 27: MSA 2070/2072 10GBase-T iSCSI controller module - rear panel LEDs

LED	Description	Definition
1	Host 10GBase-T iSCSI ¹ Link Speed	Off — The link is not established, or the link is down. Green — The link is up at 10G negotiated speed. Amber — The link is up at 1G negotiated speed.
2	Host 10GBase-T iSCSI ¹ Link Status/Link Activity	Off — No link detected. Green — The port is connected and the link is up. Blinking green — The link has I/O or replication activity.
3	OK	Green — The controller is operating normally. Blinking green — The system is booting. Off — The controller module is not OK, or is powered off.
4	Fault	Off — The controller is operating normally. Amber — A fault has been detected or a service action is required. Blinking - Hardware-controlled power-up or a cache-flush or restore error.

Table Continued

LED	Description	Definition
5	OK to Remove	Off — The controller module is not prepared for removal. White — The controller module is prepared for removal.
6	Identify	Blue — The controller module is being identified.
7	Cache Status ²	Green — Cache is dirty (contains unwritten data) and operation is normal. The unwritten information can be log or debug data that remains in the cache, so a green Cache Status LED does not, by itself, indicate that any user data is at risk or that any action is necessary. Off — In a working controller, cache is clean (contains no unwritten data). This is an occasional condition that occurs while the system is booting. Blinking green — A nonvolatile memory flush or cache self-refresh is in progress, indicating cache activity.
8	Network Port Link Speed ³	Off — Link is up at 10/100base-T negotiated speeds. Amber — Link is up and negotiated at 1000base-T.
9	Network Port Link Active ³	Off — The Ethernet link is not established, or the link is down. Green — The Ethernet link is up (applies to negotiated link speeds).
10	Expansion Port Link Status	Off — The port is empty or the link is down. Green — The port is connected and the link is up. Blinks with activity. Amber — Partial link up (one or more lanes down). Blinks with activity.

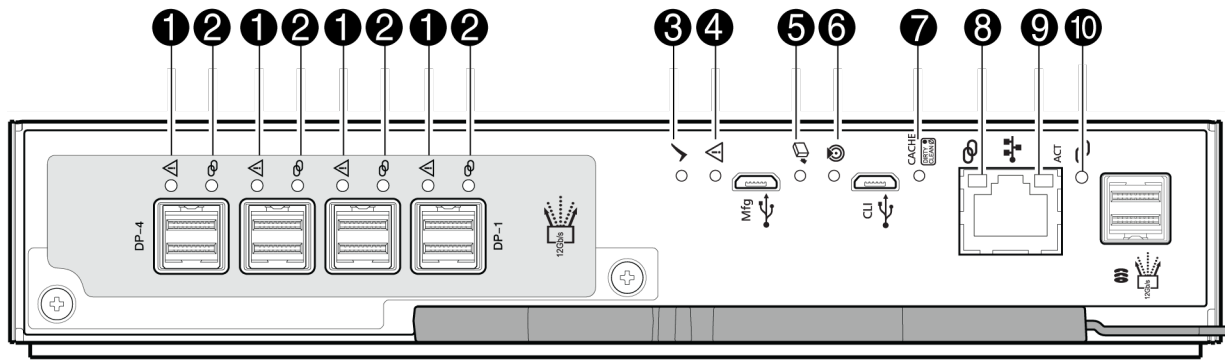
¹See the QuickSpecs for qualified 10GBase-T iSCSI connector and cable options.

²The Cache Status LED supports power on behavior and operational (cache status) behavior.

³When the port is down, both LEDs are off.



MSA 2070/2072 SAS controller module - rear panel LEDs




 = SAS LEDs

Figure 28: LEDs: MSA 2070/2072 SAS controller module

LED	Description	Definition
1	Host 12Gb SAS ¹ Link Status/Link Activity	Off — No link detected. Amber — The port is connected with partial link up (one or more lanes are down, or operating at a lower link speed inconsistent with other lanes). Blinking amber — The link has I/O activity.
2	Host 12Gb SAS ¹ Link Status/Link Activity	Off — No link detected. Green — The port is connected and the link is up with all four SAS lanes active/operating at the same negotiated speed. Blinking green — The link has I/O activity.
3	OK	Green — The controller is operating normally. Blinking green — The system is booting. Off — The controller module is not OK, or is powered off.
4	Fault	Off — The controller is operating normally. Amber — A fault has been detected or a service action is required. Blinking - Hardware-controlled power-up or a cache-flush or restore error.

Table Continued

LED	Description	Definition
5	OK to Remove	Off — The controller module is not prepared for removal. White — The controller module is prepared for removal.
6	Identify	Blue — The controller module is being identified.
7	Cache Status ²	Green — Cache is dirty (contains unwritten data) and operation is normal. The unwritten information can be log or debug data that remains in the cache, so a green Cache Status LED does not, by itself, indicate that any user data is at risk or that any action is necessary. Off — In a working controller, cache is clean (contains no unwritten data). This is an occasional condition that occurs while the system is booting. Blinking green — A nonvolatile memory flush or cache self-refresh is in progress, indicating cache activity.
8	Network Port Link Speed ³	Off — Link is up at 10/100base-T negotiated speeds. Amber — Link is up and negotiated at 1000base-T.
9	Network Port Link Active ³	Off — The Ethernet link is not established, or the link is down. Green — The Ethernet link is up (applies to negotiated link speeds).
10	Expansion Port Link Status	Off — The port is empty or the link is down. Green — The port is connected and the link is up. Blinks with activity. Amber — Partial link up (one or more lanes down). Blinks with activity.

¹See the QuickSpecs for qualified SFF-8644 cable options.

²The Cache Status LED supports power on behavior and operational (cache status) behavior.

³When the port is down, both LEDs are off.



Cache Status LED details

Power on/off behavior

During power on, discrete sequencing for power on display states of internal components is reflected by blinking patterns displayed by the Cache Status LED as shown in the table.

Table 2: Cache Status LED - power on behavior

Item	Display states reported by Cache Status LED during power on sequence							
Display state	0	1	2	3	4	5	6	7
Component	VP	ASIC	SAS BE	SC	Host	Boot	Normal	Reset
Blink pattern	On 1/Off 7	On 2/Off 6	On 3/Off 5	On 4/Off 4	On 5/Off 3	On 6/Off 2	Solid/On	Steady

NOTE: Component acronyms used for Cache Status LED states:

- VP = Voltage Plane (stage 0)
- ASIC = Application-specific Integrated Circuit (stage 1)
- SAS BE = Enclosure's backend SAS system interface (stage 2)
- SC = Storage controller: processor located in controller module (stage 3)

After the enclosure has completed the power on sequence, the Cache Status LED displays Solid/On (Normal), before assuming the operating state for cache purposes. For more information on Cache Status behaviour, see the *HPE MSA 2070/2072 Installation Guide*.

MSA 2070/2072 power and cooling modules - rear panel layout

MSA 2070/2072 Storage enclosures support either two redundant AC power and cooling modules (PCMs) or two redundant DC PCMs as described below.

NOTE: Cross reference the enlarged LED icon labels with the callout numbers when reading table entries.



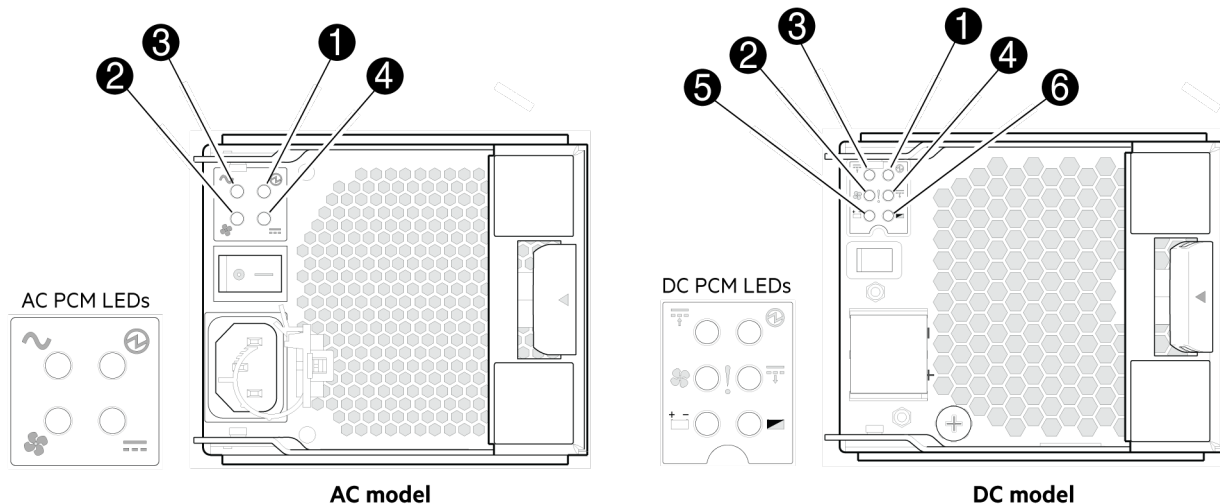


Figure 29: LEDs: MSA 2070/2072 power and cooling module (AC or DC model)

LED	Description	Definition
1	PCM OK	Green—Power is on and input voltage is normal. Off—Power is off or input voltage is below the minimum threshold.
2	Fan Fail	Off—The PCM is operating normally. Amber — A fault has been detected or a service action is required.
3	AC Input Fail (AC PCM); or DC input Fail (DC PCM)	Off—PCM is operating normally. Amber—A fault has been detected or a service action is required.
4	PCM Fail	Off — The expansion module is operating normally. Amber — A fault has been detected or a service action is required.
5	Battery Good	Battery not installed / non-operative.
6	Battery Fault	Battery not installed / non-operative.

Under normal conditions, the PCM OK LEDs on redundant PCMs within the enclosure, will be illuminated solid green. When a fault occurs, the colors of the LEDs will display as shown below.



Table 3: PCM LED states

PCM OK (Green)	Fan Fail (Amber)	AC or DC Fail (Amber)	PCM Fail (Amber)	LED behavior status
Off	Off	Off	Off	No AC or DC power on any PCM.
Off	Off	On	On	No AC or DC power on this PCM only.
On	Off	Off	Off	AC or DC power is present; PCM is operating normally.
On	Off	Off	On	PCM fan speed is outside acceptable limits.
Off	On	Off	Off	PCM fan has failed.
Off	On	On	On	PCM fault (over temperature, over voltage, over current).
Off	Blinking	Blinking	Blinking	PCM firmware download is in progress.
Blinking	Off	Off	Off	Power is on, and in stand-by mode within the enclosure.

NOTE: Battery condition LED states for the DC PCM are not provided because the battery is not installed or used by this configuration.

MSA 2070/2072 drive enclosure - rear panel LEDs

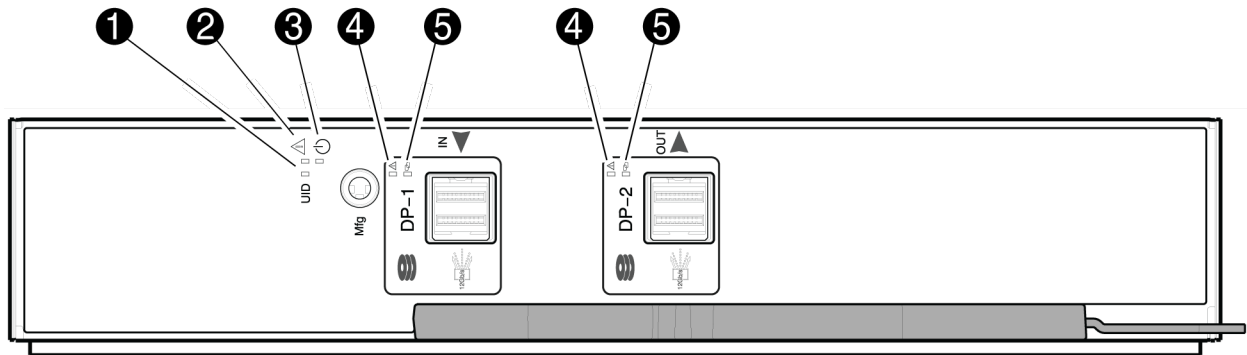


Figure 30: LEDs: MSA 2070/2072 drive enclosure rear panel



Table 4:

LED	Description	Definition
1	Identify	Blue — The expansion module is being identified. Blinking blue — 1 second on, 1 second off to identify the expansion module.
2	Fault	Off — The expansion module is operating normally. Amber — A fault has been detected or a service action is required. Blinking amber — 1 second on, 1 second off for a non-critical fault.
3	OK	Green — The expansion module is operating normally. Blinking green — The system is booting. Off — The expansion module is powered off.
4	SAS Port Status (Fault)	Table below shows expansion LED behavior states.
5	SAS Port Status (Activity)	Table below shows expansion LED behavior states.

Table 5: LEDs: MSA 2070/2072 expansion activity states

Condition	OK (Green)	Fault (Amber)
No cable present	Off	Off
Cable present: all links up/no activity	On	Off
Cable present: all links up/with aggregate port activity	Blinking	Off
Non-critical fault: a fault that does not cause the connection to cease operation (e.g., not all links are established; over temperature)	Blinking	Blinking 1s on/1s off
Critical Fault: any fault causing operation of the cable to cease or fail to start (e.g., over current trip)	Off	On



Specifications

For environmental, mechanical and power supply specifications for your product, refer to the *HPE MSA 2070/2072 Quickspecs*.



Troubleshooting resources

The *HPE MSA 1060/2060/2062 Troubleshooting Guide* provides procedures for resolving common problems and comprehensive courses of action for fault isolation and identification, issue resolution, and software maintenance.



Support and other resources

Accessing Hewlett Packard Enterprise Support

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

Information to collect

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

HPE product registration

To gain the full benefits of the Hewlett Packard Enterprise Support Center and your purchased support services, add your contracts and products to your account on the HPESC.

- When you add your contracts and products, you receive enhanced personalization, workspace alerts, insights through the dashboards, and easier management of your environment.
- You will also receive recommendations and tailored product knowledge to self-solve any issues, as well as streamlined case creation for faster time to resolution when you must create a case.

To learn how to add your contracts and products, see <https://www.hpe.com/info/add-products-contracts>.

Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.
- To download product updates:

Hewlett Packard Enterprise Support Center

<https://www.hpe.com/support/hpesc>



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- To subscribe to eNewsletters and alerts:

<https://www.hpe.com/support/e-updates>

- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center **More Information on Access to Support Materials** page:

<https://www.hpe.com/support/AccessToSupportMaterials>

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

Remote support

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

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

HPE Get Connected

<https://www.hpe.com/services/getconnected>

HPE Tech Care Service

<https://www.hpe.com/services/techcare>

HPE Complete Care Service

<https://www.hpe.com/services/completecure>

Warranty information

To view the warranty information for your product, see the [warranty check tool](#).

Regulatory information

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

<https://www.hpe.com/support/Safety-Compliance-EnterpriseProducts>

Additional regulatory information

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

<https://www.hpe.com/info/reach>

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

<https://www.hpe.com/info/ecodata>



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

<https://www.hpe.com/info/environment>

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Websites

General websites

Single Point of Connectivity Knowledge (SPOCK) Storage compatibility matrix

<https://www.hpe.com/storage/spock>

Technical papers and analyst reports

<https://www.hpe.com/us/en/resource-library>

For additional websites, see **[Support and other resources](#)**.