HP StorageWorks Modular Smart Array 50 Storage Enclosure Maintenance and Service Guide

April 2005 (First Edition)
Part Number 379395-001

April 2005 (First Edition)

Part Number 379395-001

Audience assumptions

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

Contents

Illustrated parts catalog

In this section

Customer self repair

What is customer self repair?

HP's customer self-repair program offers you the fastest service under either warranty or contract. It enables HP to ship replacement parts directly to you so that you can replace them. Using this program, you can replace parts at your own convenience.

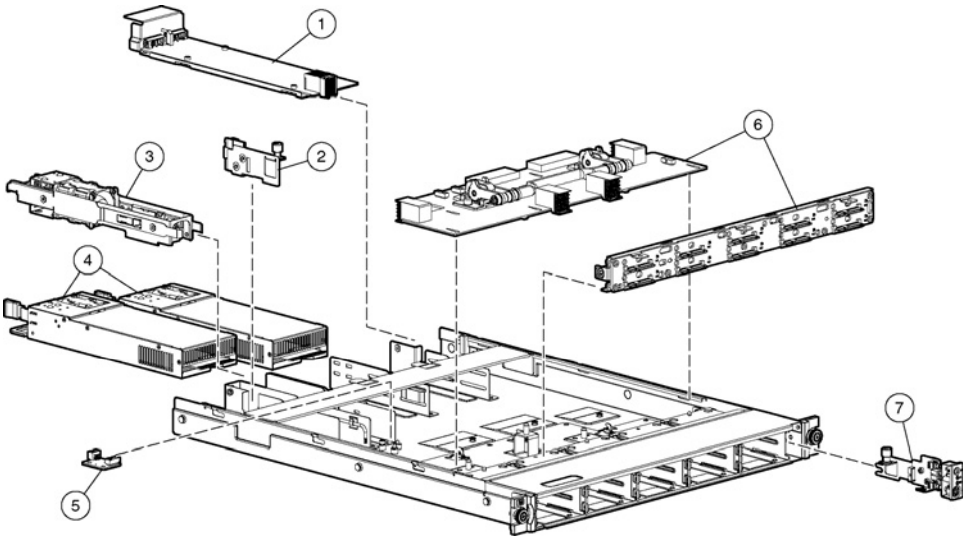
A convenient, easy-to-use program:

- An HP support specialist will diagnose and assess whether a replacement part is required to address a system problem. The specialist will also determine whether you can replace the part.
- Replacement parts are express-shipped. Most in-stock parts are shipped the very same day you contact HP. You may be required to send the defective part back to HP, unless otherwise instructed.
- Available for most HP products currently under warranty or contract. For information on the warranty service, refer to the HP website (http://h18004.www1.hp.com/products/servers/platforms/warranty/index.html).

For more information about HP's customer self-repair program, contact your local service provider. For the North American program, refer to the HP website (http://www.hp.com/go/selfrepair).

Customer replaceable parts are identified in the following tables.

System components



Item	Description	Spare part number	Customer replaceable?
1	I/O module	377231-001	Yes
2	Rear panel LED board with cable (cable*)	377235-001	Yes
3	Fan	377233-001	Yes
4	AC power supply	377230-001	Yes
5	Fan board with cable and screw (cable and screw*)	377233-001	Yes
6	Midplane and backplane	377232-001	Yes
7	Power button/LED board with cable (cable*)	377236-001	Yes
8	2-m (6.56-ft) SAS cable with 3-GB connector*	391564-001	Yes
9	4-m (13.12-ft) SAS cable with 3-GB connector*	391565-001	Yes

* Not shown

Removal and replacement procedures

In this section

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.

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 may 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.**

Power down the storage enclosure

⚠ **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.

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

1. Power down any attached servers. Refer to the server documentation.
2. Press the Power On/Standby button on the storage enclosure. Wait for the system power LED to go from green to amber.
3. Disconnect the power cords.

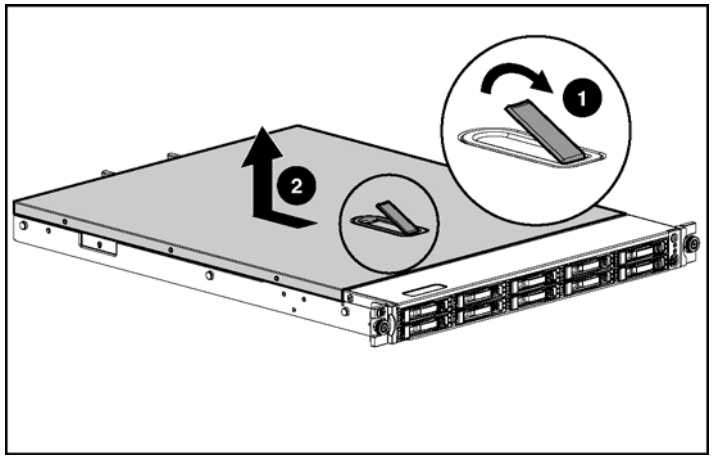
The system is now without power.

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 storage enclosure (on page 8).
2. Remove the access panel.

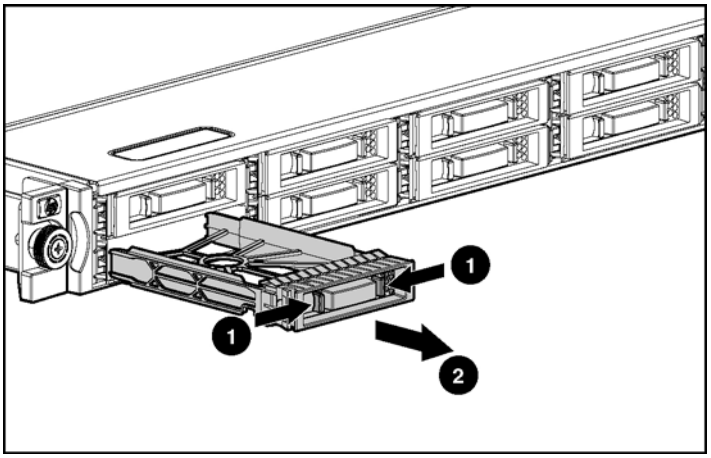


To replace the component, reverse the removal procedure.

Hard drive blank

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

To remove the component:



To replace the blank, slide the blank into the bay until it locks into place.

Hot-plug SAS or SATA hard drive

You can replace hard drives without powering down the system. However, before replacing a degraded drive:

- Open HP SIM and inspect the Error Counter window for each physical drive in the same array to confirm that no other drives have any errors. (For details, refer to the HP SIM documentation on the Management CD.)
- Be sure that the array has a current, valid backup.
- Use replacement drives that have a capacity at least as great as that of the smallest drive in the array. The controller immediately fails drives that have insufficient capacity.

To minimize the likelihood of fatal system errors, take these precautions when removing failed drives:

- Do not remove a degraded drive if any other drive in the array is offline (the Online LED is off). In this situation, no other drive in the array can be removed without data loss.

  Exceptions:

  – When RAID 1+0 is used, drives are mirrored in pairs. Several drives can be in a failed condition simultaneously (and they can all be replaced simultaneously) without data loss, as long as no two failed drives belong to the same mirrored pair.

  – When RAID ADG is used, two drives can fail simultaneously (and be replaced simultaneously) without data loss.

  – If the offline drive is a spare, the degraded drive can be replaced.

- Do not remove a second drive from an array until the first failed or missing drive has been replaced **and** the rebuild process is complete. (The rebuild is complete when the Online LED on the front of the drive stops blinking.)

  These cases are the exceptions:

  – In RAID ADG configurations, any two drives in the array can be replaced simultaneously.

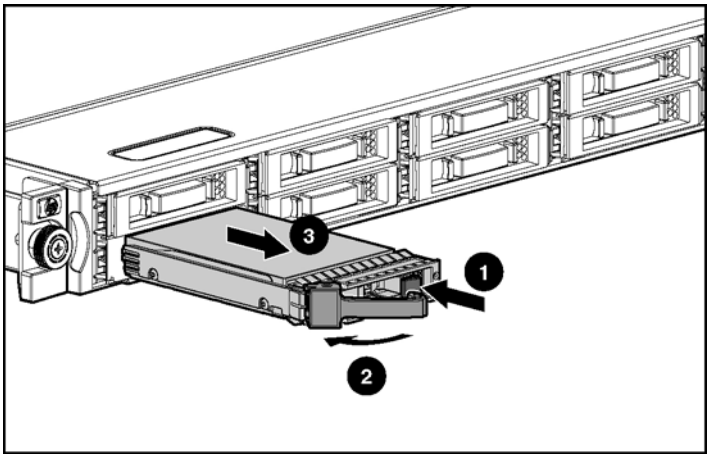
  – In RAID 1+0 configurations, any drives that are not mirrored to other removed or failed drives can be simultaneously replaced offline without data loss.

To remove the component:

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

1. Determine the status of the hard drive from the hot-plug hard drive LEDs.
2. Back up all data on the hard drive.

3. Remove the hard drive.



To replace the component:

1. Slide the drive into the cage until it clicks, locking the drive into place.
2. Close the lever.

   IMPORTANT: When the drive is inserted, the drive LEDs flash for 2 seconds to indicate that the drive is seated properly and receiving power.

3. As the drive begins to spin, be sure that the drive LEDs illuminate one at a time and then turn off together to indicate that the system has recognized the new drive.

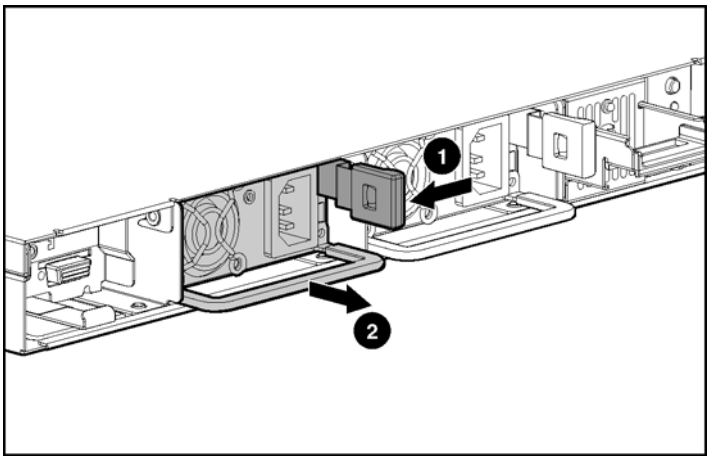
   In fault-tolerant configurations, allow the replacement drive to be reconstructed automatically with data from the other drives. While reconstruction is in progress, the online LED flashes.

Hot-plug power supply

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

To remove the component:

1. Disconnect the power cord from the power supply.
2. Remove the power supply.

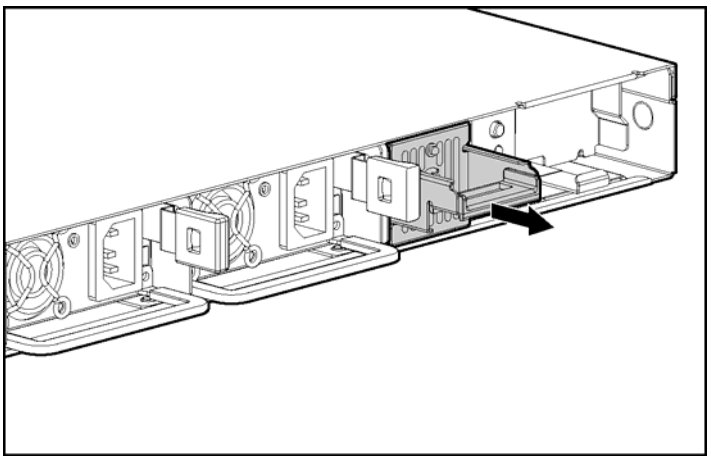


To replace the component, reverse the removal procedure.

Hot-plug fan

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

To remove the component:



To replace the component, reverse the removal procedure.

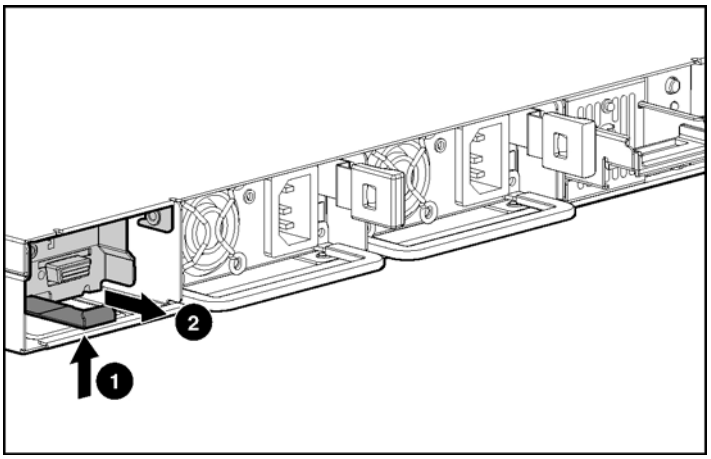
I/O module

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

To remove the component:

1. Power down the storage enclosure (on page 8).
2. Disconnect any SAS cables connected to the I/O module.

3. Remove the I/O module.



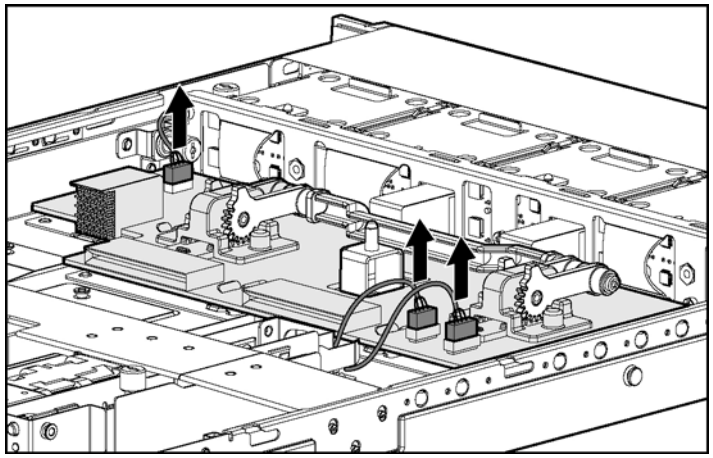
To replace the component, reverse the removal procedure.

Midplane and backplane

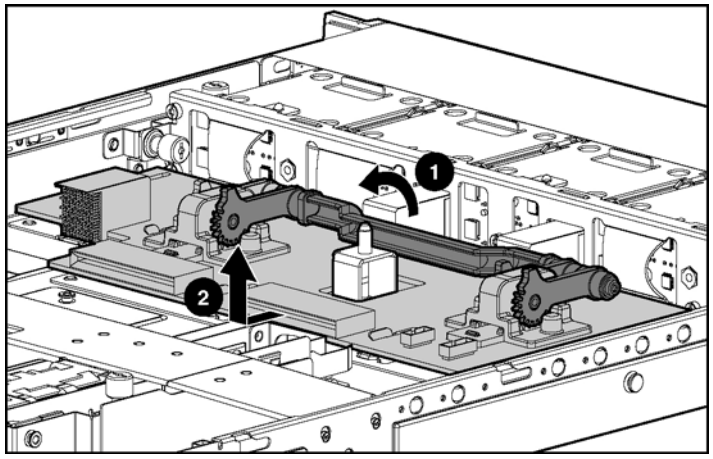
To remove the components:

1. Power down the storage enclosure (on page 8).
2. Remove the fan assembly ("Hot-plug fan" on page 13).
3. Remove all hot-plug power supplies ("Hot-plug power supply" on page 12).
4. Remove the I/O module ("I/O module" on page 14).
5. Remove all hard drives ("Hot-plug SAS or SATA hard drive" on page 10).
6. Remove all hard drive blanks ("Hard drive blank" on page 10).
7. Remove the access panel ("Access panel" on page 9).

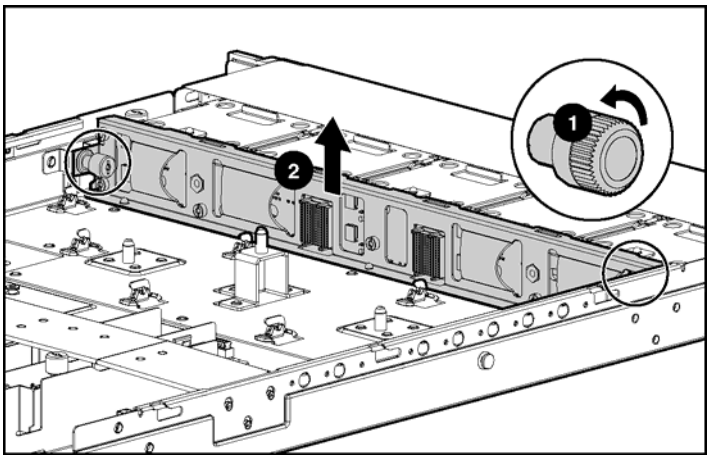
8. Disconnect all cables connected to the midplane.



9. Remove the midplane.



10. Remove the backplane. Use the T-15 Torx screwdriver (on page 29).



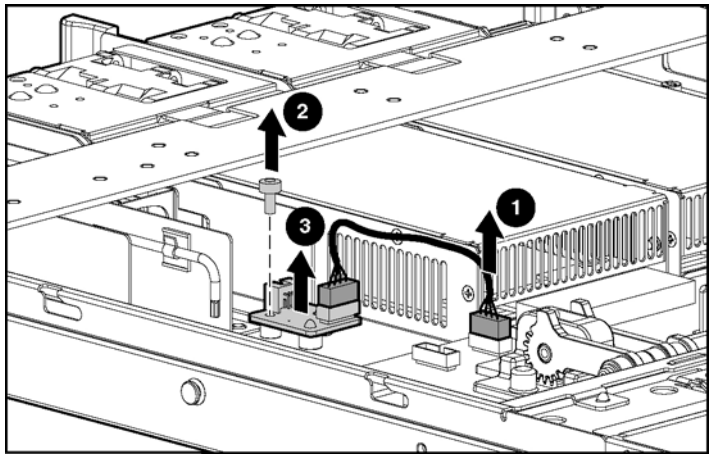
To replace the components, reverse the removal procedure.

Fan board

To remove the component:

1. Power down the storage enclosure (on page 8).
2. Remove the access panel ("Access panel" on page 9).

3. Remove the fan board. Use the T-15 Torx screwdriver (on page 29).



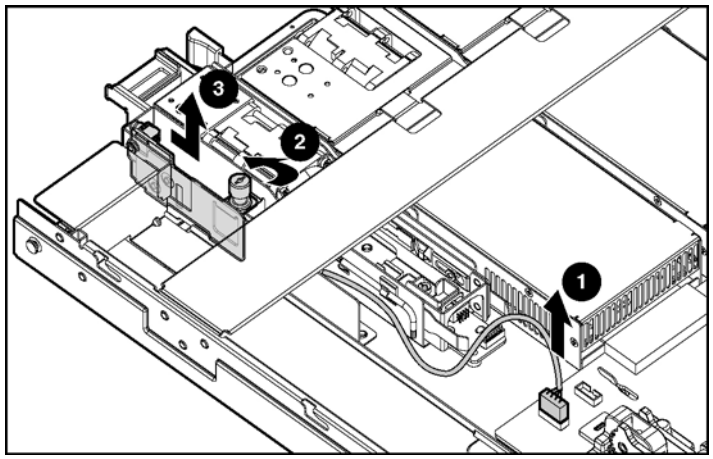
To replace the component, reverse the removal procedure.

Rear panel LED board

To remove the component:

1. Power down the storage enclosure (on page 8).
2. Remove the access panel ("Access panel" on page 9).

3. Remove the rear panel LED board. Use the T-15 Torx screwdriver (on page 29).



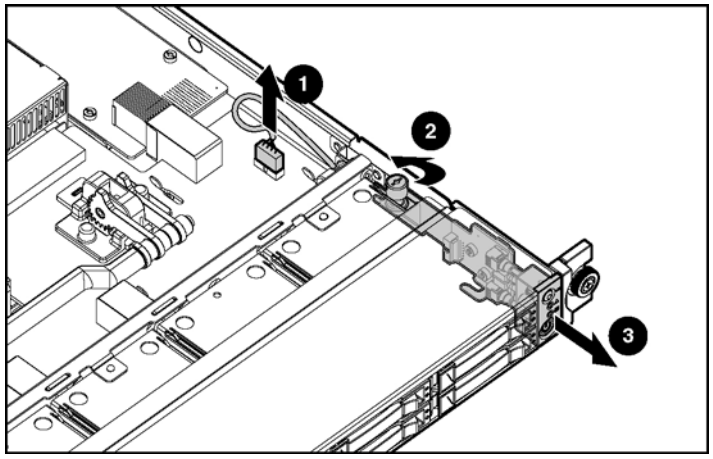
To replace the component, reverse the removal procedure.

Power button/LED board

To remove the component:

1. Power down the storage enclosure (on page 8).
2. Remove the access panel ("Access panel" on page 9).

3. Remove the power button/LED board. Use the T-15 Torx screwdriver (on page 29).



To replace the component, reverse the removal procedure.

Diagnostic tools

In this section

Integrated Management Log

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

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

- From within HP SIM
- From within Survey Utility
- From within operating system-specific IML viewers
  - For NetWare: IML Viewer
  - For Windows®: IML Viewer
  - For Linux: IML Viewer Application
- From within HP Insight Diagnostics

For more information, refer to the Management CD in the HP ProLiant Essentials Foundation Pack.

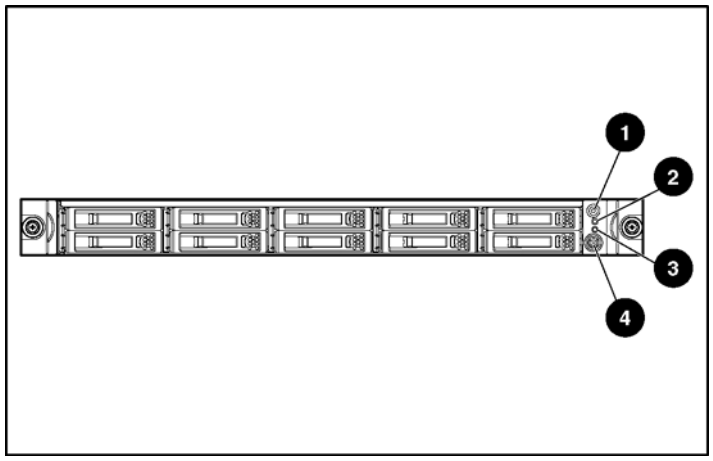
Array Diagnostic Utility

ADU is tool that collects information about array controllers and generates a list of detected problems. ADU can be accessed from the SmartStart CD or downloaded from the HP website (http://www.hp.com).

Component identification

In this section

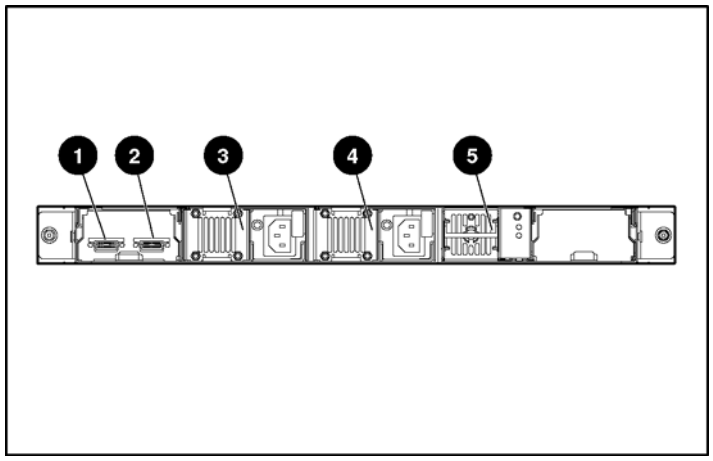
Front panel LEDs and buttons



Item	Description	Status
1	UID button/LED	Blue = Identified Blue flashing = Active remote management Off = No active remote management

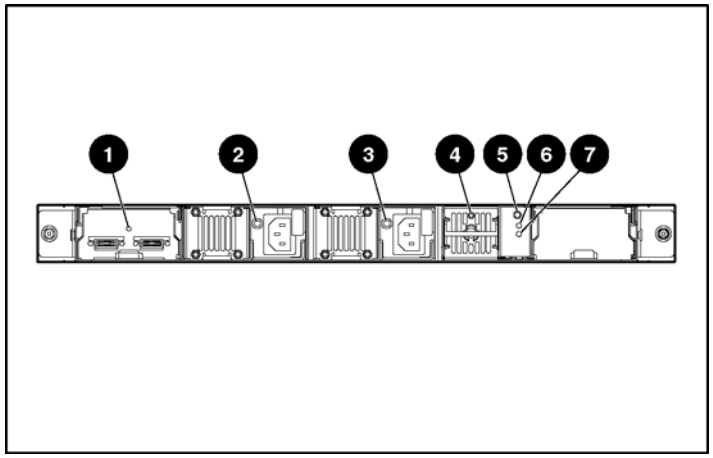
Item	Description	Status
2	Fault LED	Off = No fault condition Amber = Fault condition
3	Heartbeat LED	Green = System activity Off = No system activity
4	Power On/Standby button/LED	Green = On Amber = Standby (auxiliary power present) Off = Off

Rear panel components



Item	Description
1	SAS In connector
2	SAS Out connector
3	Power supply 1
4	Power supply 2
5	System fan

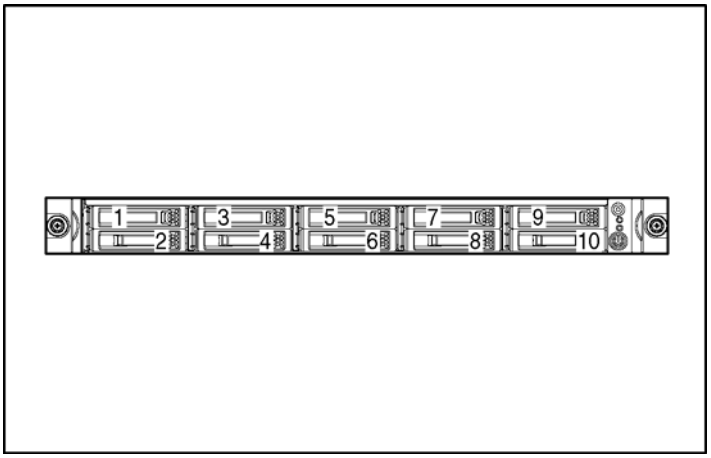
Rear panel LEDs and buttons



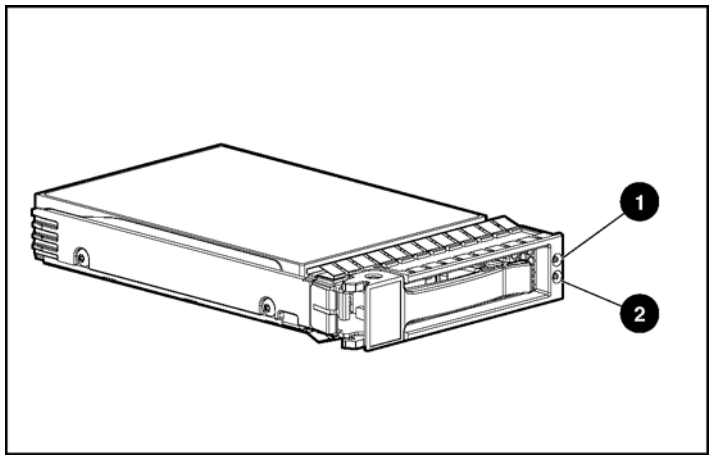
Item	Description	Status
1	I/O module fault LED	Green = No fault condition Amber = Fault condition
2	Power supply 1 LED	Green = Power available Amber = Fault condition Off = Power supply unseated from connector or failed
3	Power supply 2 LED	Green = Power available Amber = Fault condition Off = Power supply unseated from connector or failed
4	System fan LED	Green = Normal operation Amber = Fault condition Off = Fan unseated from connector or failed

Item	Description	Status
5	UID button/LED	Blue = Identified Blue flashing = Active remote management Off = No active remote management
6	Fault LED	Off = No fault condition Amber = Fault condition
7	Heartbeat LED	Green = System activity Off = No system activity

SAS and SATA drive numbers



SAS and SATA hard drive LEDs



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

SAS and SATA hard drive LED combinations

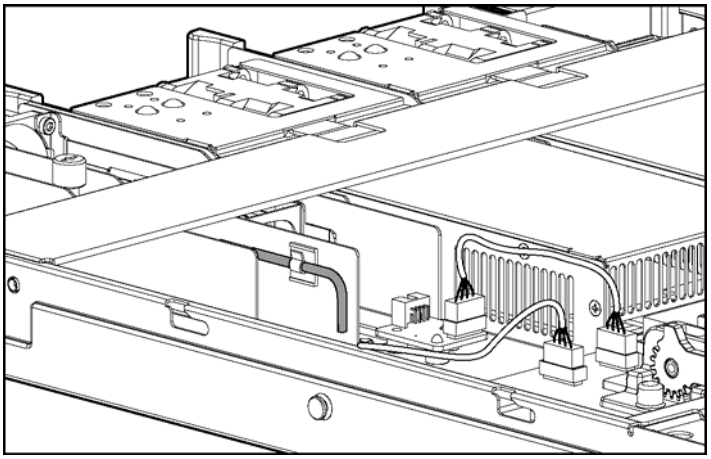
NOTE: Predictive failure alerts can occur only when the storage enclosure is connected to a Smart Array controller.

Online/Activity LED (green)	Fault/UID LED (amber/blue)	Interpretation
On, off, or flashing	Alternating amber and blue	The drive has failed, or a predictive failure alert has been received for this drive; it also has been selected by a management application.
On, off, or flashing	Steadily blue	The drive is operating normally, and it has been selected by a management application.
On	Amber, flashing regularly (1 Hz)	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
On	Off	The drive is online, but it is not active currently.

Online/Activity LED (green)	Fault/UID LED (amber/blue)	Interpretation
Flashing regularly (1 Hz)	Amber, flashing regularly (1 Hz)	**Do not remove the drive. Removing a drive may terminate the current operation and cause data loss.** The drive is part of an array that is undergoing capacity expansion or stripe migration, but a predictive failure alert has been received for this drive. To minimize the risk of data loss, do not replace the drive until the expansion or migration is complete.
Flashing regularly (1 Hz)	Off	**Do not remove the drive. Removing a drive may terminate the current operation and cause data loss.** The drive is rebuilding, or it is part of an array that is undergoing capacity expansion or stripe migration.
Flashing irregularly	Amber, flashing regularly (1 Hz)	The drive is active, but a predictive failure alert has been received for this drive. Replace the drive as soon as possible.
Flashing irregularly	Off	The drive is active, and it is operating normally.
Off	Steadily amber	A critical fault condition has been identified for this drive, and the controller has placed it offline. Replace the drive as soon as possible.
Off	Amber, flashing regularly (1 Hz)	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
Off	Off	The drive is offline, a spare, or not configured as part of an array.

T-15 Torx screwdriver

The storage enclosure includes a T-15 Torx screwdriver that ships inside the chassis. Use the screwdriver to loosen screws or thumbscrews, as needed, during service procedures.



Specifications

In this section

Environmental specifications

Specification	Value
Temperature range*	
Operating	10°C to 35°C (50°F to 95°F)
Shipping	-30°C to 50°C (-22°F to 122°F)
Storage	-40°C to 70°C (-40°F to 158°F)
Maximum wet bulb temperature	28°C (82.4°F)
Relative humidity (noncondensing)**	
Operating	10% to 90%
Non-operating	5% to 95%

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

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

Storage enclosure specifications

Specification	Value
Height	4.1 cm (1.61 in)
Depth	60.96 cm (24.00 in)

Specification	Value
Width	42.62 cm (16.78 in)
Weight (maximum)	16.78 kg (37 lb)
Weight (no drives installed)	12.7 kg (27.5 lb)

Acronyms and abbreviations

ACU

Array Configuration Utility

ADG

Advanced Data Guarding (also known as RAID 6)

ADU

Array Diagnostics Utility

CSA

Canadian Standards Association

HBA

host bus adapter

IEC

International Electrotechnical Commission

IEEE

Institute of Electrical and Electronics Engineers

IML

Integrated Management Log

ISEE

Instant Support Enterprise Edition

MSA

Modular Smart Array

MSA50

Modular Smart Array 50

NEC

National Electrical Code

NEMA

National Electrical Manufacturers Association

NFPA

National Fire Protection Association

ORCA

Option ROM Configuration for Arrays

OSEM

Open Services Event Manager

PSP

ProLiant Support Pack

RAID

redundant array of inexpensive (or independent) disks

RBSU

ROM-Based Setup Utility

SAS

serial attached SCSI

SATA

serial ATA

SCSI

small computer system interface

SFF

small form-factor

SIM

Systems Insight Manager

TMRA

recommended ambient operating temperature

UID

unit identification

WEBES

Web-Based Enterprise Service

Index

S

T

U

W