

HP StorageWorks 600 Modular Disk System User Guide

Abstract

This guide describes identification, operations, setup, configuration and utilities, troubleshooting, regulatory notices, specifications, and technical support. This guide is for an experienced service technician. HP assumes you are qualified in the servicing of computer equipment, trained in recognizing hazards in products, and are familiar with weight and stability precautions.



Part Number: 495105-007
August 2011
Edition: 7

© Copyright 2009, 2011 Hewlett-Packard Development Company, L.P.

The information contained herein is subject to change without notice. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

Microsoft and Windows are U.S. registered trademarks of Microsoft Corporation. Bluetooth is a trademark owned by its proprietor and used by Hewlett-Packard Company under license.

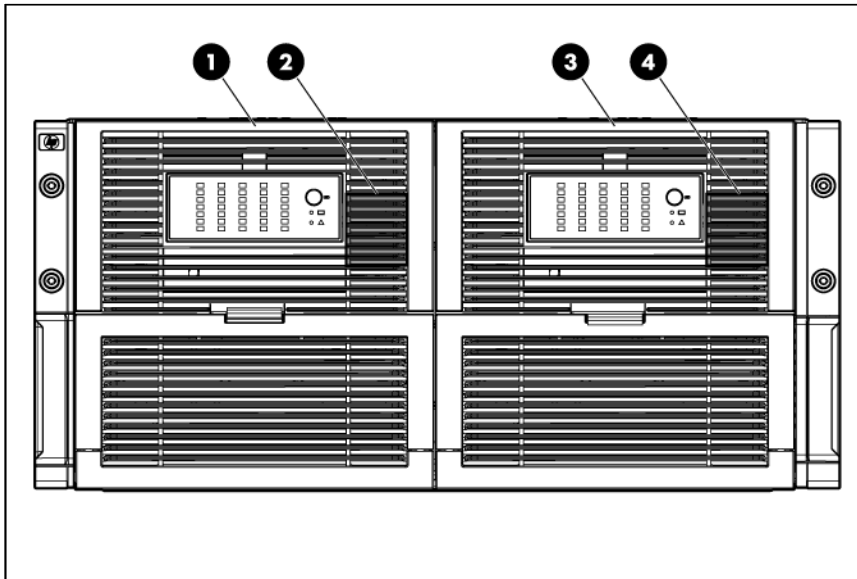
Contents

Component identification	5
Front panel components	5
Front panel LEDs and button	6
Rear panel components	7
Rear panel LEDs and buttons	8
Device bay ID numbers	10
SAS and SATA hard drive LEDs	10
SAS and SATA hard drive LED combinations	11
Operations	12
Firmware update	12
Power up	12
Power down	13
Setup	14
Space and airflow requirements	14
Temperature requirements	14
Power requirements	15
Electrical grounding requirements	15
Rack warnings	16
Third-party racks	16
Site planning considerations	16
Installing the enclosure	16
Hard drive overview	18
SAS and SATA hard drive guidelines	18
Installing the hard drives	19
Installing the I/O module	21
Cabling the MDS600	22
SAS cabling guidelines	22
Cabling guidelines for HP rack and tower servers	22
Supported cables	22
Power cords	23
Configuration and utilities	24
Configuration tools	24
Array Configuration Utility	24
Option ROM Configuration for Arrays	24
Smart Components for ROM Flash	25
Management tools	25
HP Systems Insight Manager	25
Management Agents	25
Diagnostic tools	25
Integrated Management Log	25
Array Diagnostic Utility	26
Remote support and analysis tools	26
HP Insight Remote Support software	26
Keeping the system current	27

Change control and proactive notification	27
Care Pack	27
Troubleshooting	28
When the MDS600 does not power up	28
LED behavior	28
7-segment display status codes and actions	29
Recognizing hard drive failure.....	30
Effects of a hard drive failure.....	30
Compromised fault tolerance	30
Recovering from compromised fault tolerance	31
Factors to consider before replacing hard drives	31
Automatic data recovery (rebuild)	32
Time required for a rebuild.....	32
Failure of another drive during rebuild	33
Regulatory compliance notices	34
Regulatory compliance identification numbers	34
Federal Communications Commission notice.....	34
FCC rating label	34
Class A equipment	34
Class B equipment.....	35
Declaration of conformity for products marked with the FCC logo, United States only.....	35
Modifications.....	36
Cables	36
Canadian notice (Avis Canadien).....	36
European Union regulatory notice.....	36
Disposal of waste equipment by users in private households in the European Union.....	37
Japanese notice	38
BSMI notice	38
Korean notice	38
Chinese notice	39
Vietnam compliance marking notice.....	39
Ukraine notice	39
Power cord statement for Japan	39
Electrostatic discharge	40
Preventing electrostatic discharge	40
Grounding methods to prevent electrostatic discharge.....	40
Specifications	41
Environmental specifications.....	41
Storage array specifications	41
Technical support.....	42
Before you contact HP	42
HP contact information.....	42
Customer Self Repair	42
Acronyms and abbreviations.....	50
Index.....	51

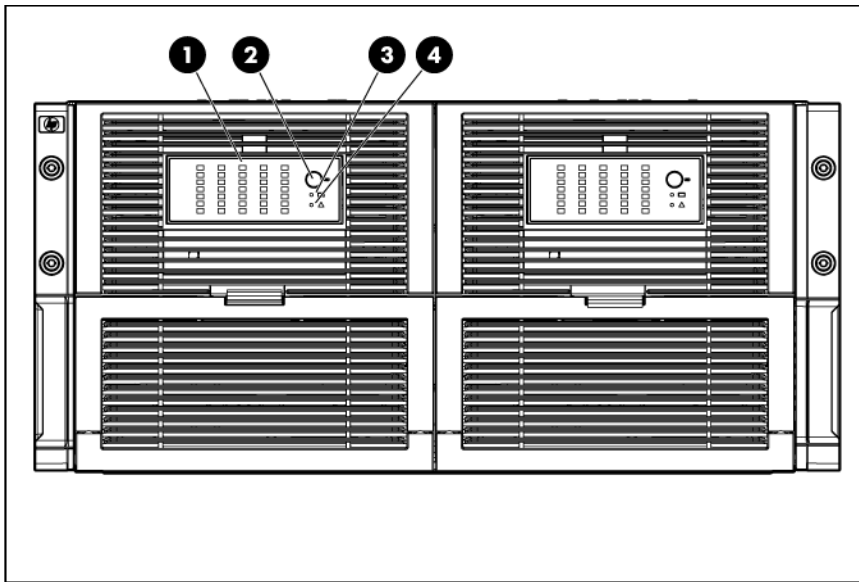
Component identification

Front panel components



Item	Description
1	Drawer 1
2	Drawer 1 diagnostic cable access (For use by authorized HP personnel only)
3	Drawer 2
4	Drawer 2 diagnostic cable access (For use by authorized HP personnel only)

Front panel LEDs and button

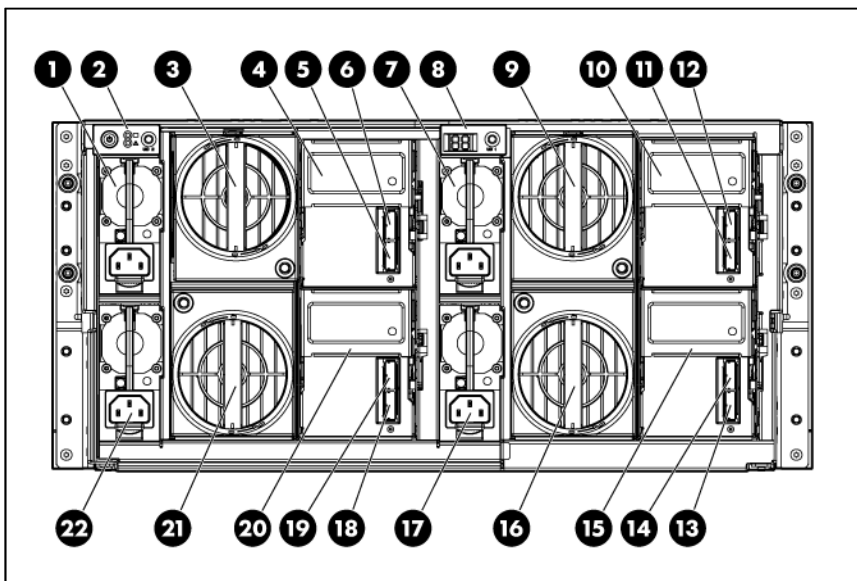


Item	Description	Status
1	Hard drive LEDs Normal mode (UID LED is solid)	<p>Green = The drive is online, but is not currently active.</p> <p>Flashing irregularly green = The drive is active and it is operating normally.</p> <p>Flashing green (1 Hz) = Do not remove the drive. Removing the drive may terminate the current operation and cause data loss. The drive is rebuilding, or it is part of an array that is undergoing expansion, logical drive extension, a stripe size migration, or RAID migration.</p> <p>Flashing amber/green = Drive is configured and indicating a predictive failure. The drive may also be undergoing a rebuild, expansion, extension, or migration.</p> <p>Flashing amber (1 Hz) = A predictive failure alert has been received for this drive. Replace the drive as soon as possible.</p> <p>Amber = Drive failure, link failure, or mismatched configuration.</p> <p>Off = The drive is offline, a spare, or not configured as part of an array.</p>

Item	Description	Status
1	Hard drive LEDs Drive locate mode (UID LED is flashing)	Green = The drive has been selected by a management application and it is operating normally. Flashing amber (1 Hz) = The drive is not selected and is indicating a predictive failure. Flashing amber/green = The drive has been selected by a management application and is indicating a predictive failure. Amber = The drive might or might not be selected and is indicating drive failure, link failure, or mismatched configuration. Off = The drive is not selected.
2	UID button/LED	Blue = UID LED is enabled from the UID button Blue flashing = Item 1 is in locate mode Off = UID LED is disabled
3	Internal Health LED	Green = System health is good Off = System is off
4	GSI LED	Amber = Enclosure requires service check: I/O, fan and power supply LEDs, and AC power cables to power supplies. Off = Enclosure is functioning normally.

Rear panel components

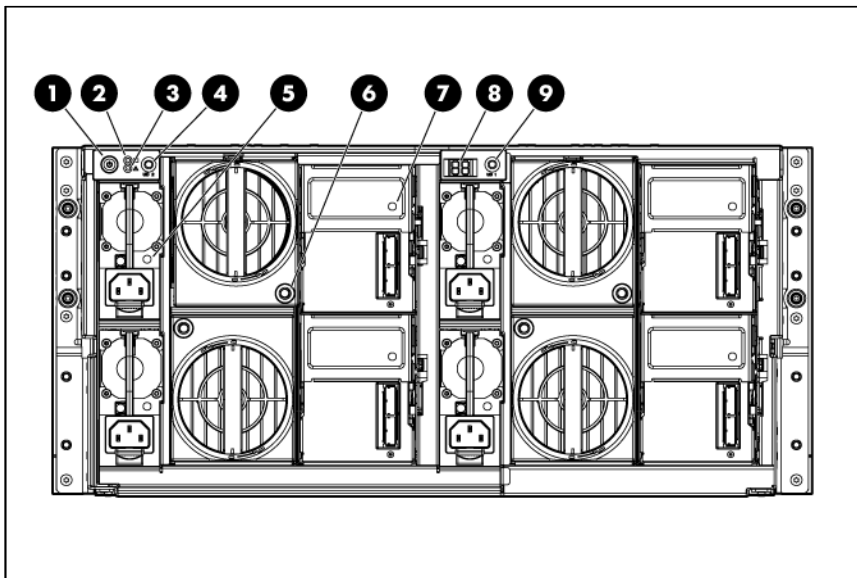
The figure shows a maximum configuration. Your enclosure might appear differently, for example, containing power supply or I/O module blanks, depending on the configuration that was ordered.



Item	Description
1	Power supply 1

Item	Description
2	Power On/UID 2 status panel
3	Fan module 1 (Drawer 2)
4	Primary I/O module (Drawer 2)
5	SAS port 1 connector
6	SAS port 2 connector
7	Power supply 3
8	UID 1 status panel
9	Fan module 1 (Drawer 1)
10	Primary I/O module (Drawer 1)
11	SAS port 1 connector
12	SAS port 2 connector
13	SAS port 1 connector
14	SAS port 2 connector
15	Secondary I/O module (Drawer 1)
16	Fan module 2 (Drawer 1)
17	Power supply 4
18	SAS port 1 connector
19	SAS port 2 connector
20	Secondary I/O module (Drawer 2)
21	Fan module 2 (Drawer 2)
22	Power supply 2

Rear panel LEDs and buttons

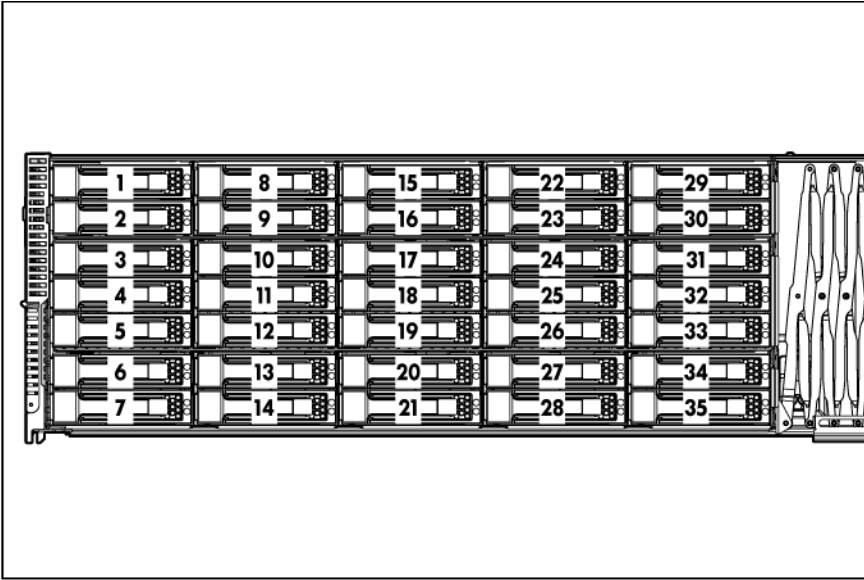


Item	Description	Status
1	Power On/Standby button and system power LED	Green = On Amber = Standby (auxiliary power present) Off = Off

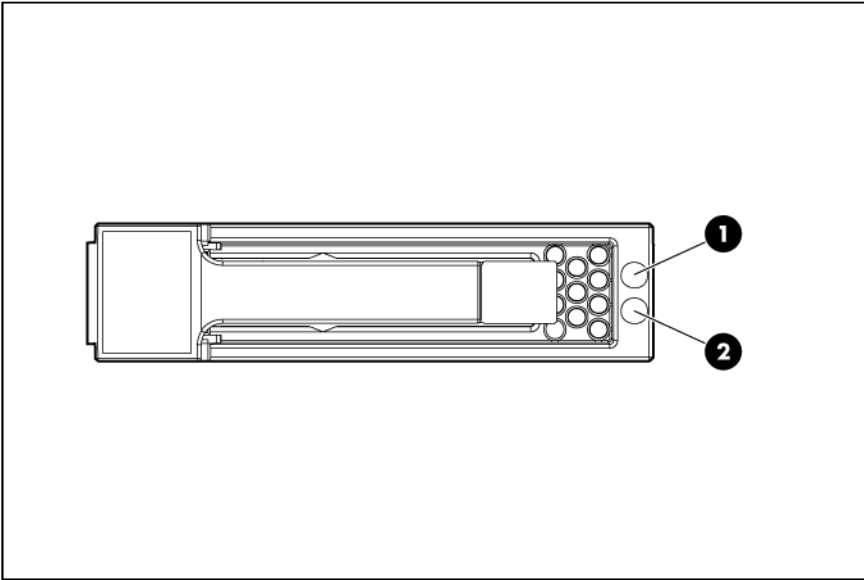
Item	Description	Status
2	Internal Health LED	Green = System health is good. Off = System is off.
3	GSI LED*	Amber = Enclosure requires service check: I/O, fan and power supply LEDs, and AC power cables to power supplies. Off = Enclosure is functioning normally.
4	UID button/LED (Drawer 2)	Blue = UID LED is enabled from the UID button. Blue flashing = System is in hard drive locate mode or an enclosure firmware update is in progress. Off = UID LED is disabled.
5	Power supply LED	Green = Power on and power supply functioning properly Off = One or more of the following conditions exists: <ul style="list-style-type: none"> • System powered off • AC power unavailable • Power supply failed • Power supply exceeded current limit
6	System fan LED	Green = Normal operation Amber flashing = Fault Off = Fan unseated from connector or failed
7	I/O module LED	Green = System activity Amber = Fault Off = Enclosure is powered off.
8	7-segment display*	1 = SES overall warning 2 = Temperature sensor warning 3 = System fan warning 4 = Power supply warning 5 = Host GSI enabled 6 = I/O Pic upgrade needed 7 = Power supply Pic upgrade needed 8 = CPLD upgrade needed 9 = Standby heartbeat failure 10 = Remote I/O module heartbeat failure
9	UID button/LED (Drawer 1)	Blue = UID LED is enabled from the UID button. Blue flashing = System is in hard drive locate mode or an enclosure firmware update is in progress. Off = UID LED is disabled.

* If the GSI is amber, the system needs service. Activate the associated drawer UID button to view any GSI error codes on the rear display.

Device bay ID numbers



SAS and SATA hard drive LEDs



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

SAS and SATA hard drive LED combinations

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 currently active.
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 a stripe size 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 array expansion, logical drive extension, a stripe size migration, or RAID 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.

Operations



Important Safety Information

Before installing this product, read the *Important Safety Information* document provided.

Firmware update

Before configuring and using the MDS600, be sure that the MDS600 and all other devices in the SAS fabric are running the latest compatible versions of firmware.

If the MDS600 is directly cabled to an HP Smart Array controller or HP StorageWorks Extreme Data Storage solution, see Smart Components for ROM Flash (on page 25) to update the MDS600 firmware offline. Attach the MDS600 I/O module or modules to the Smart Array controller, and then use the Smart Component to update the MDS600 firmware. If necessary, repeat this step to attach and update remaining MDS600 I/O modules to ensure all I/O modules have been updated to the latest compatible MDS600 firmware.

If the MDS600 is directly cabled to an HP 3Gb SAS Blade Switch, go to the HP website (<http://www.hp.com/support>) to download the MDS600 firmware image, and then use the active HP Virtual SAS Manager maintenance tab to update the MDS600 firmware offline. Before beginning, do the following:

- Power off all server blades for the firmware flash operation to be presented in the maintenance tab.
- Be sure the Virtual SAS Manager switch software in all c-Class interconnect bays is running version 2.2.4.0 or later. If you are using a version earlier than 2.2.4.0, go to the HP website (<http://www.hp.com/support>) to update the switch software.

The active Virtual SAS Manager interface flashes both of the attached MDS600 primary and secondary I/O modules using the partnered 3G SAS switches in the c-Class interconnect bay row. The passive Virtual SAS Manager interface is not used.

The new MDS600 firmware activates after the MDS600 is reset from the Virtual SAS Manager or power cycled.

Detailed instructions on how to update the Virtual SAS Manager and MDS600 firmware are located in the Virtual SAS Manager user guide.

Power up

Observe the following guidelines before powering up the MDS600:

- Always install all components of the MDS600.
- Install hard drives in the MDS600 so the connected host controllers can identify and configure them at power up.
- Always power up the MDS600 first, and then the server.

To power up the MDS600:

1. Complete server hardware installation and cabling. See the server blade documentation.
2. Connect the SAS cables and power cords to the MDS600.
3. Press and hold the Power On/Standby button.

Wait and observe the system power LED and system fans. When the MDS600 powers up, the system power LED illuminates solid green and the system fans spin to a high speed, and then spin down to a low speed.

4. Power up the servers. See the server blade documentation.

Power down

Be sure that the partner servers are the first units to be powered down and the last to be powered back up. Taking this precaution ensures that the system and the OS are shut down in an orderly manner.



IMPORTANT: If installing a hot-plug device, it is not necessary to power down the MDS600.

To power down the MDS600:

1. Power down the partner servers. See the server documentation.
2. Press and hold the Power On/Standby button for approximately 4 seconds. This action powers down both hard drive drawers.


Setup

Space and airflow requirements


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

- Leave a minimum clearance of 63.5 cm (25.0 in) in front of the rack.
- Leave a minimum clearance of 76.2 cm (30.0 in) behind the rack.
- Leave a minimum clearance of 121.9 cm (48.0 in) from the back of the rack to the back of another rack or row of racks.


The HP MDS600 draws in cool air through the front door, and then expels warm air through the rear door. Therefore, the front and rear rack doors must be ventilated adequately to enable ambient room air to enter the cabinet, and the rear door must be ventilated adequately to enable the warm air to escape from the cabinet.

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

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

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

The HP Rack 10000 series rack provides proper server cooling from flow-through perforations in the front and rear doors that provide a 64-percent open area for ventilation.

 **CAUTION:** HP has not tested or validated the MDS600 with any third-party rack. If a third-party rack is used, observe the following additional requirements to ensure adequate airflow and to prevent damage to the equipment:

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

Temperature requirements

To ensure continued safe and reliable equipment operation, install or position the MDS600 in a well-ventilated, climate-controlled environment.

The maximum TMRA for most MDS600 products is 35°C (95°F). The temperature in the cold aisle where the rack is located must not exceed 35°C (95°F). The MDS600 reports an over temperature condition and

performs an emergency shutdown of the hard drive bays within a drawer if the temperature exceeds this limit for greater than 3 minutes. To recover the system, AC power cycle the MDS600.



CAUTION: To reduce the risk of damage to the equipment when installing third-party options:

- Do not permit optional equipment to impede airflow around the MDS600 or to increase the internal rack temperature beyond the maximum allowable limits.
- Do not exceed the manufacturer's TMRA.

Power requirements

Installation of this equipment must comply with local and regional electrical regulations governing the installation of IT equipment by licensed electricians. This equipment is designed to operate in installations covered by NFPA 70, 1999 Edition (National Electric Code) and NFPA-75, 1992 (code for Protection of Electronic Computer/Data Processing Equipment). For electrical power ratings on options, refer to the product rating label or the user documentation supplied with that option.



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



CAUTION: Protect the MDS600 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 MDS600 in operation during a power failure.

When installing more than one MDS600, you may need to use additional power distribution devices to safely provide power to all devices. Observe the following guidelines:

- Balance the MDS600 power load between available AC supply branch circuits.
- Do not allow the overall system AC current load to exceed 80 percent of the branch circuit AC current rating.
- Do not use common power outlet strips for this equipment.
- Provide a separate electrical circuit for each power supply in the MDS600.

Electrical grounding requirements

The MDS600 must be grounded properly for proper operation and safety. In the United States, you must install the equipment in accordance with NFPA 70, 1999 Edition (National Electric Code), Article 250, as well as any local and regional building codes. In Canada, you must install the equipment in accordance with Canadian Standards Association, CSA C22.1, Canadian Electrical Code. In all other countries, you must install the equipment in accordance with any regional or national electrical wiring codes, such as the International Electrotechnical Commission (IEC) Code 364, parts 1 through 7. Furthermore, you must be sure that all power distribution devices used in the installation, such as branch wiring and receptacles, are listed or certified grounding-type devices.

Because of the high ground-leakage currents associated with multiple MDS600 connected to the same power source, HP recommends the use of a power distribution unit (PDU) that is either permanently wired to the building's branch circuit or includes a nondetachable cord that is wired to an industrial-style plug. NEMA locking-style plugs or those complying with IEC 60309 are considered suitable for this purpose. Using common power outlet strips for the MDS600 is not recommended.

Rack warnings



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

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



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

- At least two people are needed to safely unload the rack from the pallet. An empty 42U rack can weigh as much as 115 kg (253 lb), can stand more than 2.1 m (7 ft) tall, and 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.

Third-party racks

HP has not tested or validated the MDS600 with any third-party racks. Before installing the MDS600 in a third-party rack, be sure to properly scope the limitations of the rack.

Site planning considerations

Customer facility managers and system administrators must discuss site planning, preparation, and system installation before system delivery. A common understanding of environmental requirements and how the systems will be delivered, configured, installed, and maintained helps to create a suitable data center and aids the successful installation of the servers and related equipment.

It is important to plan the facility as a whole, not design based on calculations of individual system or rack level requirements. Too many interdependencies in a modern data center make such simple calculations unreliable. Designs and plans must be made for the data center as a whole, including all of its equipment, with the realization that making one change in the data center environment can affect many other physical, mechanical, and environmental aspects of the facility.

Take into account the requirements of third-party equipment and support equipment in the room. Dense computing locations might have high power and cooling demands that could affect power and environmental constraints. Be aware of rack positioning and airflow patterns. Ensure that the raised floor space, cooling equipment, power supply equipment and generators, and other support equipment meet the demands of all the servers and other mission-critical equipment.

Installing the enclosure



WARNING: The storage array with no drives installed weighs 72.58 kg (160.00 lb). With all drives and components installed, the storage array can weigh up to 145.15 kg (320 lb). Before configuring your rack solution, be sure to check the manufacturer weight limits and specifications. Failure to do so can result in physical injury or damage to the equipment and the facility.

△ **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:** HP has not tested or validated the MDS600 with any third-party racks. Before installing the MDS600 in a third-party 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 MDS600.
- You must install a 1U tray beneath the MDS600 to ensure proper support.
- Be sure sufficient clearance exists for cabling, installation and removal of the enclosure, actuation of the rack doors, and full articulation of the drive drawers.

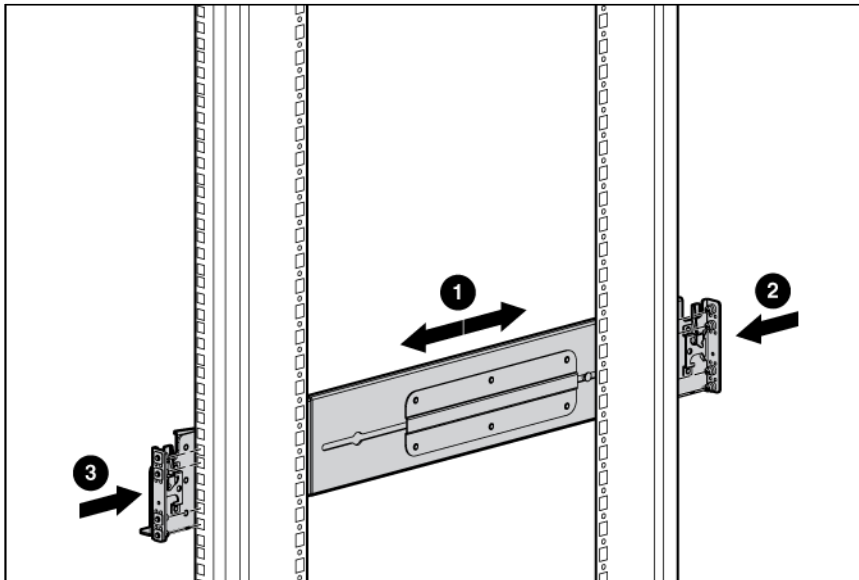


IMPORTANT: Some racks other than the HP Rack 10000 Series rack do not allow full access to hard drive bays 29–35 in hard drive drawer 2.

The rack rails are marked for easy identification. The left rack rail is marked "L" and the right rack rail is marked "R."

To install the rack rails:

1. Begin with the left rack rail. Align the end of the rail with the rear rack column.
2. Slide the rack rail closed until the end of the rail is locked in place, wrapping behind the rear rack column.
3. Slide the front end of the rail to the rack front column. When fully seated, the rack rail will lock into place.



4. Repeat the procedure for the right rack rail.



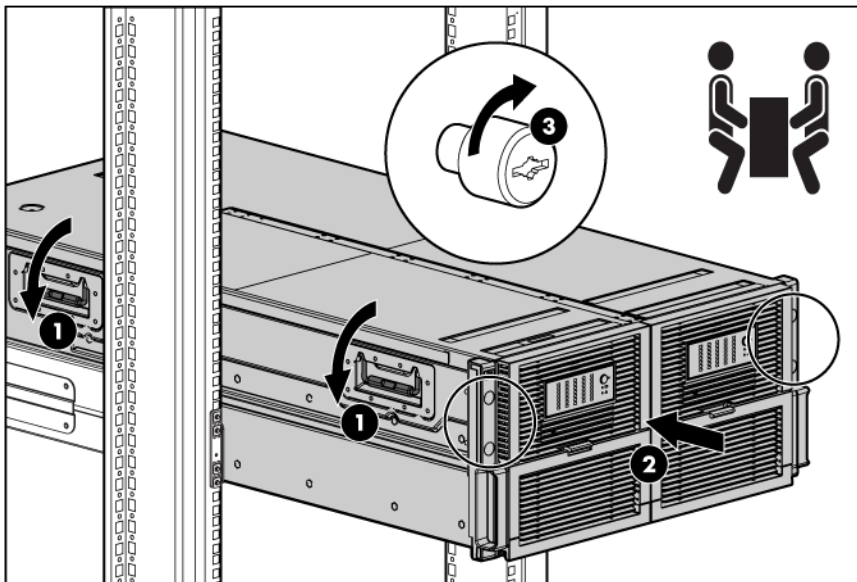
WARNING: The HP MDS600 Disk System is very heavy. To reduce the risk of personal injury or damage to the equipment:

- Observe local occupational health and safety requirements and guidelines for manual material handling.
- Remove all installed HP MDS600 Disk System components from their HP MDS600 Disk Systems before installing or moving the HP MDS600 Disk Systems.
- Use caution and get help to lift and stabilize HP MDS600 Disk Systems during installation or removal, especially when the HP MDS600 Disk System is not fastened to the rack.



WARNING: Always use at least two people to lift an enclosure into the rack. If the enclosure is being loaded into the rack above chest level, a third person must assist with aligning the enclosure with the rails while the other two people support the weight of the enclosure.

5. Install the HP MDS600 Disk System.



6. Tighten the thumbscrews to secure the HP MDS600 Disk System to the rack.

The installation is complete.

Hard drive overview

The MDS600 supports up to 35 SAS or SATA hard drives per storage drawer. Always populate hard drive bays from the rear to the front starting with the highest device bay ID number ("[Device bay ID numbers](#)" on page 10). All unpopulated drive bays require drive blanks to properly distribute air flow and cool the installed drives.

SAS and SATA hard drive guidelines

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

- Verify that the drives are fully seated before closing the drawer.
- The drawer is fully closed when the fans slow down to their normal speed.
- The drawer should be closed with the handle in the released position.

- Hard drives are sensitive to excess vibration. Use care when opening and closing the drawer.
- A RAID 1 mirror requires an even number of hard drives.
- Drives that will be configured within an array should be the same capacity to provide the greatest storage space efficiency.

NOTE: ACU does not support mixing SAS and SATA drives in the same logical volume.

Installing the hard drives

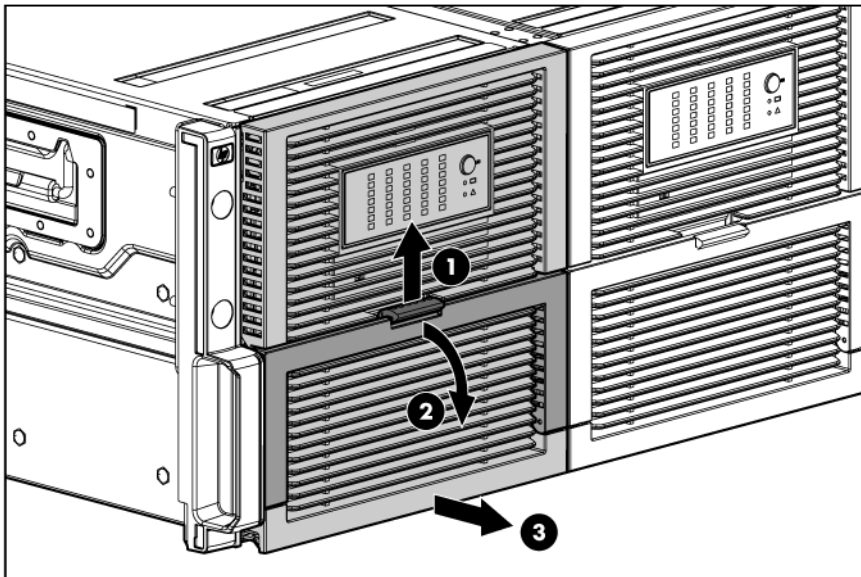
1. Be sure all I/O bays contain either an I/O module or an I/O blank. The hard drive drawer does not open if I/O bays are empty.
2. Be sure the I/O modules or I/O blanks are fully seated and their handles are in the locked position. The hard drive drawer does not open if I/O modules or I/O blanks are not fully seated with their handles in the locked position.

⚠ WARNING: TIP HAZARD! To reduce the risk of personal injury or damage to the equipment, do not extend the hard drive drawers beyond the supporting surface when the unit is not installed in a rack.

⚠ WARNING: To reduce the risk of personal injury or damage to the equipment, ensure that only one hard drive drawer is extended at a time.

⚠ WARNING: To reduce the risk of personal injury or damage to the equipment, you must adequately support the chassis during installation and removal. It is not secured to the rack frame or mounted on rails.

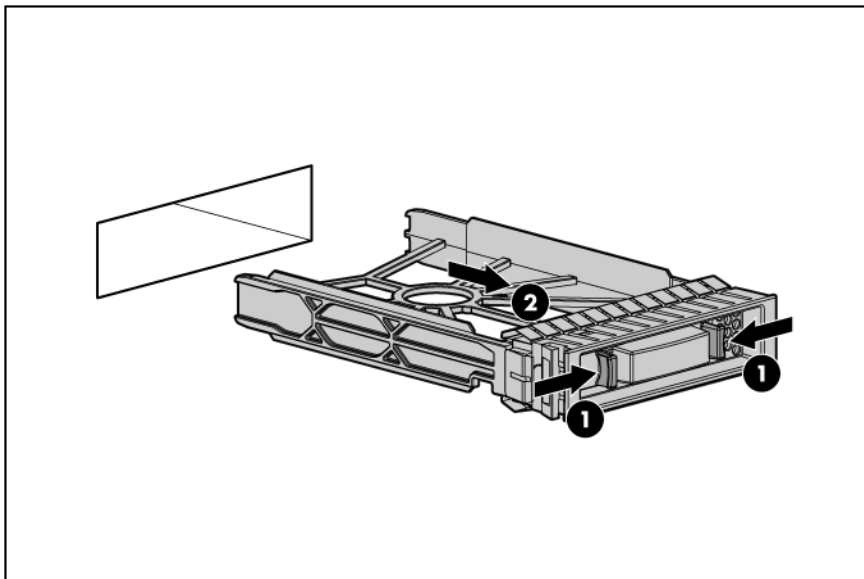
3. Extend the hard drive drawer.



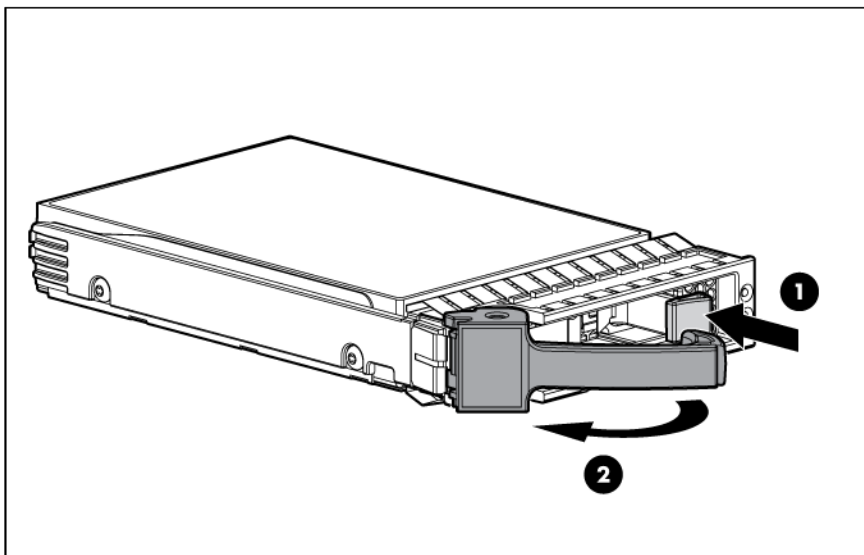
⚠ WARNING: Pinch hazard—Keep hands out of front and rear of chassis when closing hard drive drawers.

-
- △ **CAUTION:** To prevent improper cooling and thermal damage, do not operate the MDS600 for an extended period of time with the drawer open.
-
- △ **CAUTION:** To prevent improper cooling and thermal damage, do not operate the MDS600 unless all bays are populated with either a component or a blank.
-

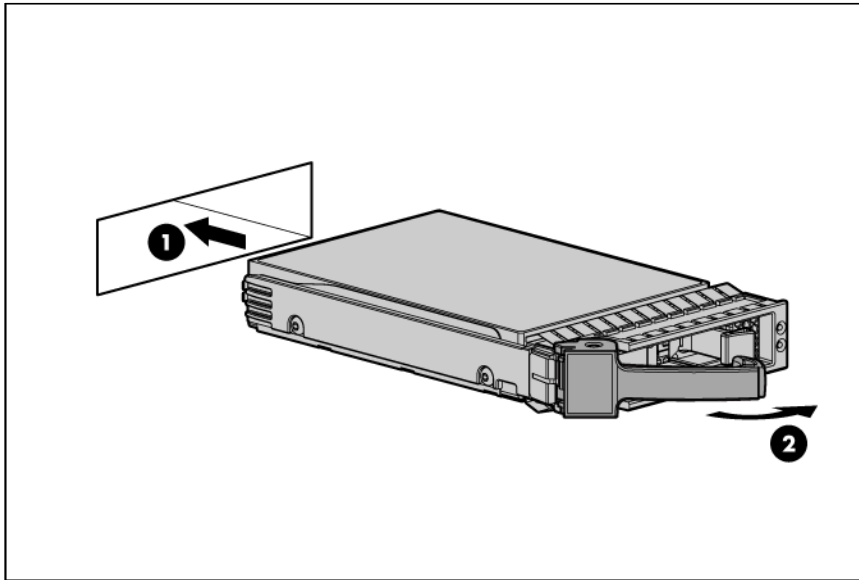
4. Remove the hard drive blank.



5. Prepare the hard drive.



6. Install the hard drive.

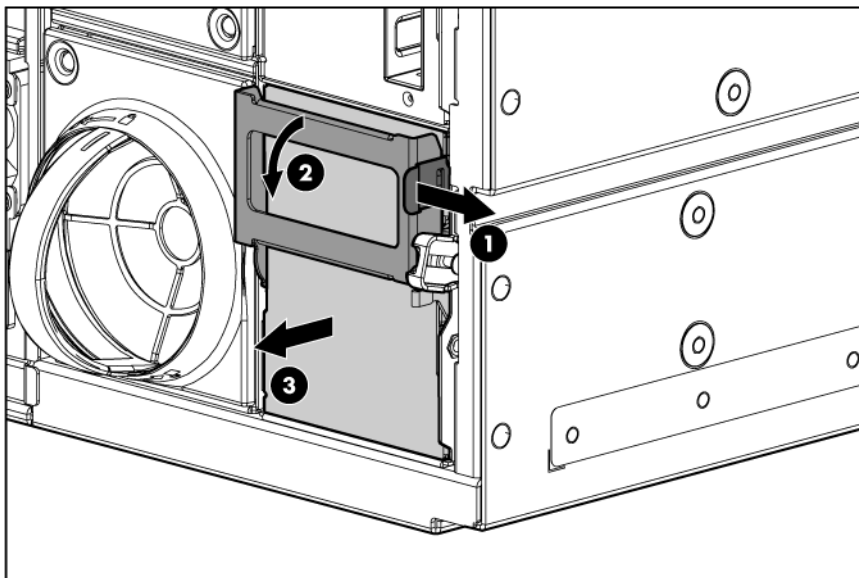


WARNING: Pinch hazard—Keep hands out of front and rear of chassis when closing hard drive drawers.

7. When all drives have been installed, close the hard drive drawer.

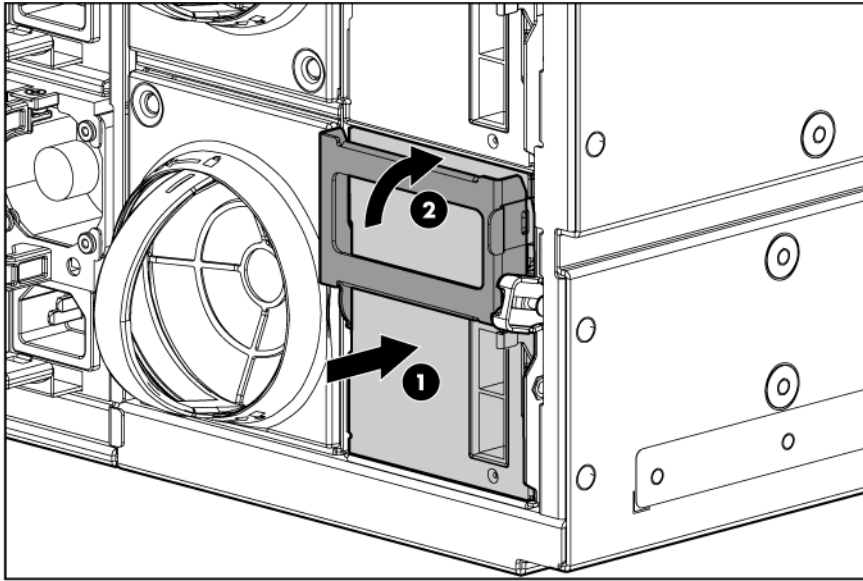
Installing the I/O module

1. Be sure the hard drive drawer is closed all the way.
2. Release the I/O blank handle.
3. Push the I/O blank handle down until it ejects the I/O blank.
4. Remove the I/O blank.



5. Install the I/O module into the enclosure.

6. Push the I/O handle up. Be sure the I/O module is fully seated and the I/O module handle is in the locked position.



CAUTION: For best cooling practices, do not operate the enclosure for extended periods with more than one component or blank removed. When removing an active component, replace it with a blank.

To install the second I/O module, repeat the procedure.

Cabling the MDS600

After installing the MDS600 in a rack, connect the I/O cables and power cords to the rear panel ("Rear panel components" on page 7).

SAS cabling guidelines

Observe the following guidelines:

- Only use supported 2.00 m (6.56 ft) external mini-SAS cables.
- Always be sure that the servers attached to the MDS600 are powered down before connecting SAS cables.

Cabling guidelines for HP rack and tower servers

When directly attaching the MDS600 to HP rack or tower servers, installing a secondary I/O module in the hard drive drawer is not a valid configuration. See the QuickSpecs on the HP website (<http://www.hp.com/go/mds600>) for additional special cabling guidelines.

Supported cables

No SAS cables ship with the MDS600. The only supported cable length that can be used is the 2.00 m (6.56 ft) mini-SAS cable.

For a complete list of supported cables, see the QuickSpecs on the HP website (<http://www.hp.com/go/mds600>).

Power cords

The power cord should be approved for use in your country. The power cord must be rated for the product and for the voltage and current marked on the electrical ratings label of the product. The voltage and current rating for the cord should be greater than the voltage and current rating marked on the product. In addition, the diameter of the wire must be a minimum of 1.00 mm² or 18 AWG, your maximum length may be up to 3.66 m (12 ft).



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

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

To connect AC power cords:

1. Connect the power cords to the power supplies.
2. Connect the power cords to the AC power source.

Configuration and utilities

Configuration tools

Array Configuration Utility

NOTE: ACU does not support mixing SAS and SATA drives in the same logical volume.

ACU is a browser-based utility with the following features:

- Runs as a local application or remote service
- Supports online array capacity expansion, logical drive extension, assignment of online spares, and RAID or stripe size migration
- Provides different operating modes, enabling faster configuration or greater control over the configuration options
- Remains available any time that the server is on
- Displays on-screen tips for individual steps of a configuration procedure

For optimum performance, the minimum display settings are 800 × 600 resolution and 256 colors. Servers running Microsoft® operating systems require Internet Explorer 5.5 (with Service Pack 1) or later. For Linux servers, refer to the README.TXT file for additional browser and support information.

For more information, refer to the *Configuring Arrays on HP Smart Array Controllers Reference Guide* on the Documentation CD or the HP website (<http://www.hp.com>).

Option ROM Configuration for Arrays

Before installing an operating system, you can use the ORCA utility to create the first logical drive, assign RAID levels, and establish online spare configurations.

The utility also provides support for the following functions:

- Reconfiguring one or more logical drives
- Viewing the current logical drive configuration
- Deleting a logical drive configuration
- Setting the controller to be the boot controller

If you do not use the utility, ORCA will default to the standard configuration.

For more information regarding array controller configuration, refer to the controller user guide.

For more information regarding the default configurations that ORCA uses, refer to the *HP ROM-Based Setup Utility User Guide* on the Documentation CD.

Smart Components for ROM Flash

To update the firmware on the server, controller, hard drives, or enclosure use Smart Components. These components are available on the Firmware Maintenance CD. A more recent version of a particular component might be available on the support page of the HP website (<http://www.hp.com/support>). Components for controller and hard drive firmware updates are also available from the support and drivers page for storage products (<http://www.hp.com/support>).

1. Find the most recent version of the component that you require. Components for controller firmware updates are available in offline and online formats.
2. Follow the instructions for installing the component on the server. These instructions are given with the CD and are provided on the same Web page as the component.

Follow the additional instructions that describe how to use the component to flash the ROM. These instructions are provided with each component.

Management tools

HP Systems Insight Manager

HP SIM is a web-based application that allows system administrators to accomplish normal administrative tasks from any remote location, using a web browser. HP SIM provides device management capabilities that consolidate and integrate management data from HP and third-party devices.



IMPORTANT: You must install and use HP SIM to benefit from the Pre-Failure Warranty for processors, SAS and SATA hard drives, and memory modules.

For additional information, refer to the Management CD in the HP ProLiant Essentials Foundation Pack or the HP SIM website (<http://www.hp.com/go/hpsim>).

Management Agents

Management Agents provide the information to enable fault, performance, and configuration management. The agents allow easy manageability of the server through HP SIM software, and third-party SNMP management platforms. Management Agents are installed with every SmartStart assisted installation or can be installed through the HP PSP. The Systems Management homepage provides status and direct access to in-depth subsystem information by accessing data reported through the Management Agents. For additional information, refer to the Management CD in the HP ProLiant Essentials Foundation Pack or the HP website (<http://www.hp.com/servers/manage>).

Diagnostic tools

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 ("HP Systems Insight Manager" on page 25)

- 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 the iLO 2 or later user interface
- From within HP Insight Diagnostics

For more information, see the Management CD in the HP Insight Foundation suite for ProLiant.

Array Diagnostic Utility

The HP Array Diagnostics Utility is a web-based application that creates a report of all HP storage controllers and disk drives. This report provides vital information to assist in identifying faults or conditions that may require attention. ADU can be accessed from the SmartStart CD or downloaded from the HP website (<http://www.hp.com>).

Remote support and analysis tools

HP Insight Remote Support software

HP strongly recommends that you install HP Insight Remote Support software to complete the installation or upgrade of your product and to enable enhanced delivery of your HP Warranty, HP Care Pack Service, or HP contractual support agreement. HP Insight Remote Support supplements your monitoring 24 x 7 to ensure maximum system availability by providing intelligent event diagnosis, and automatic, secure submission of hardware event notifications to HP, which will initiate a fast and accurate resolution, based on your product's service level. Notifications may be sent to your authorized HP Channel Partner for on-site service, if configured and available in your country. The software is available in two variants:

- **HP Insight Remote Support Standard:** This software supports server and storage devices and is optimized for environments with 1–50 servers. Ideal for customers who can benefit from proactive notification but do not need proactive service delivery and integration with a management platform.
- **HP Insight Remote Support Advanced:** This software provides comprehensive remote monitoring and proactive service support for nearly all HP servers, storage, network, and SAN environments, plus selected non-HP servers that have a support obligation with HP. It is integrated with HP Systems Insight Manager. A dedicated server is recommended to host both HP Systems Insight Manager and HP Insight Remote Support Advanced.

Details for both versions are available on the HP website (<http://www.hp.com/go/insightremotesupport>).

To download the software, go to Software Depot (<http://www.software.hp.com>).

Select **Insight Remote Support** from the menu on the right.

Keeping the system current

Change control and proactive notification

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

For more information, refer to the HP website (<http://www.hp.com/go/pcn>).

Care Pack

HP Care Pack Services offer upgraded service levels to extend and expand bundled services with easy-to-buy, easy-to-use support packages that help you make the most of your server investments. For more information, see the HP website (<http://www.hp.com/services/carepack>).

Troubleshooting

When the MDS600 does not power up

If the MDS600 does not power up:

1. Ensure that the MDS600 is connected to a working AC source.
2. Ensure that the power source is working properly:
 - o Check the status using the system power LED on the rear panel ("[Rear panel LEDs and buttons](#)" on page 8).
 - o Be sure that the Power On/Standby button was pressed firmly and held for approximately 3 seconds.
3. Ensure that the power supplies are working properly.
Check the status using the power supply LEDs ("[Rear panel LEDs and buttons](#)" on page 8).
4. Remove all AC power cords from enclosure power supplies and reinsert them.
5. Restart the system.
6. Check the MDS600 for the following normal power-up sequence to be sure that the system meets the minimal hardware requirements and is powered up during normal operations:
 - a. The rear panel power LED turns from standby (amber) to on (solid green).
 - b. The system fans spin up to a high speed, and then spin down to a normal operating speed.

LED behavior

Issue	Possible reasons	Possible solutions
Power supply LED is off	<ul style="list-style-type: none">• The power cords are not connected or AC power is not available.• The power supply might not be inserted properly, it might have a damaged connector, or it might have failed.	<ul style="list-style-type: none">• Be sure that the power cord is connected to the power supply.• Be sure that the power supply is undamaged and is fully seated.• Be sure that all pins on the connectors and components are straight.• Contact an authorized service provider for assistance.
Fan LED is off	<ul style="list-style-type: none">• The fan might not be inserted properly, it might have a damaged connector, or it might have failed.	<ul style="list-style-type: none">• Be sure that the fan is undamaged and is fully seated.• Be sure that all pins on the connectors and components are straight.• Contact an authorized service provider for assistance.

Issue	Possible reasons	Possible solutions
I/O LED is amber	<ul style="list-style-type: none"> The I/O module might not be inserted properly, it might have a damaged connector, or it might have failed. 	<ul style="list-style-type: none"> Be sure that the I/O module is undamaged and is fully seated. Be sure that all pins on the connectors and components are straight. Contact an authorized service provider for assistance.
System power LED is off	<ul style="list-style-type: none"> The Power On/Standby button was not pressed firmly or held long enough. The power supply might not be inserted properly, it might have a damaged connector, or it might have failed. The system might have experienced a short. The controller firmware might be corrupted. The system power block might need to be replaced. 	<ul style="list-style-type: none"> Press the Power On/Standby button and hold for approximately 3 seconds. Be sure that the power supply is undamaged and is fully seated. Be sure that all pins on the connectors and components are straight. Be sure that all components are fully seated. Flash the controller firmware. Contact an authorized service provider for assistance.

7-segment display status codes and actions

When the GSI LED is amber, activate the associated drawer UID button to view any GSI error codes on the rear display. The two UID buttons are used to select which drawer is displayed. The display cycles a drawer pointer, "|-" points left and "-|" points right, followed by one or more GSI error codes.

Status code	Action
1 = SES overall warning	General internal component warning. No specific action. General troubleshooting required. May be seen with status codes 2, 3, and 4.
2 = Temperature sensor warning	Check for thermal issues within the MDS600 drawer, for example, extremely hot drives, air blockages, or high ambient lab temperature.
3 = System Fan Warning	Replace any fan with an amber LED. If none of the fans have an amber LED, replace one fan, wait 30 seconds, and observe the GSI LED. AC power cycle the MDS600. If the GSI LED remains illuminated, replace another fan. If the GSI LED remains illuminated, replace the MDS600 drawer.
4 = Power Supply Warning	Verify that if a power supply does not have a green LED illuminated, that it is correctly cabled to a power source. This warning can also be caused by a failed power supply from either side of the MDS600. If cabling was not the root cause, troubleshoot by replacing each power supply in turn.
5 = Host GSI Enabled	This means host sent a command to turn the MDS600 GSI LED on. Not expected in the field.
6 = I/O PIC upgrade needed	Reflash both MDS600 I/O modules. I/O module firmware upgrade needed.*
7 = Power supply PIC upgrade needed	Reflash both MDS600 I/O modules. Power Block firmware upgrade needed.*
8 = CPLD upgrade needed	Replace the MDS600 drawer.

Status code	Action
9 = Standby heartbeat failure	Replace the I/O module that has an amber LED. If no I/O module has an amber LED, replace one I/O module then wait 30 seconds. If the GSI LED is still amber, replace the other I/O module. AC power cycle the MDS600. If replacing the I/O modules does not resolve the issue, replace the drawer.
10 = Remote I/O module heartbeat failure	Replace the I/O module that has an amber LED. If no I/O module has an amber LED, replace one I/O module then wait 30 seconds. If the GSI LED is still amber, replace the other I/O module. AC power cycle the MDS600. If replacing the I/O modules does not resolve the issue, replace the drawer.

* I/O module Firmware and Power Block Firmware are delivered through the MDS600_FW download process.

Recognizing hard drive failure

In an HP MDS600, a steadily glowing Fault LED indicates that the drive has failed.

Other indications of failed hard drives:

- ACU represents failed drives with a distinctive icon.
- HP SIM can detect failed drives remotely across a network. (For more information about HP SIM, refer to the documentation on the Management CD.)
- ADU lists all failed drives.
- CPQONLIN identifies failed drives in a NetWare environment.

For additional information about diagnosing hard drive problems, see the *HP ProLiant Servers Troubleshooting Guide*.



CAUTION: Sometimes, a drive that has previously failed may seem to be operational after the system is power-cycled or (for a hot-pluggable drive) after the drive has been removed and reinserted. However, continued use of such marginal drives may eventually result in data loss. Replace the marginal drive as soon as possible.

Effects of a hard drive failure

When a hard drive fails, all logical drives that are in the same array are affected. Each logical drive in an array may be using a different fault-tolerance method, so each logical drive can be affected differently.

- RAID 0 configurations cannot tolerate drive failure. If any physical drive in the array fails, all non-fault-tolerant (RAID 0) logical drives in the same array will also fail.
- RAID 1+0 configurations can tolerate multiple drive failures as long as no failed drives are mirrored to one another (with no spares assigned).
- RAID 5 configurations can tolerate one drive failure (with no spares assigned).
- RAID 6 with ADG configurations can tolerate simultaneous failure of two drives (with no spares assigned).

Compromised fault tolerance



CAUTION: When fault tolerance is compromised, data loss can occur. However, it may be possible to recover the data. For more information, see "Recovering from compromised fault tolerance (on page 31)."

If more drives fail than the fault-tolerance method can manage, fault tolerance is compromised, and the logical drive fails. If this failure occurs, the operating system rejects all requests and indicates unrecoverable errors.

For example, fault tolerance might occur when a drive in an array fails while another drive in the array is being rebuilt.

Compromised fault tolerance can also be caused by problems unrelated to drives. In such cases, replacing the physical drives is not required.

Recovering from compromised fault tolerance

If fault tolerance is compromised, inserting replacement drives does not improve the condition of the logical volume. Perform the following procedure to recover data:

1. Check for loose, dirty, broken, or bent cabling and connectors on all devices.
2. Power down the MDS600 ("Power down" on page 13).
3. Power up the MDS600 ("Power up" on page 12).

In some cases, a marginal drive is operational long enough to allow backup of important files.

4. Make copies of important data, if possible.
5. Replace any failed drives ("Installing the hard drives" on page 19).

Factors to consider before replacing hard drives

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 when removing failed drives, take the following precautions:

- Do not remove a degraded drive if any other drive in the array is offline (the online LED is off). In this situation, removing any other drive in the array causes 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, if no two failed drives belong to the same mirrored pair.
- When RAID 6 with 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.)

Exceptions:

- 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.
- In RAID 6 with ADG configurations, any two drives in the array can be replaced simultaneously.

Automatic data recovery (rebuild)

When you replace a hard drive in an array, the controller uses the fault-tolerance information on the remaining drives in the array to reconstruct the missing data (the data that was originally on the replaced drive) and write it to the replacement drive. This process is called automatic data recovery, or rebuild. If fault tolerance is compromised, this data cannot be reconstructed and is likely to be permanently lost.

If another drive in the array fails while fault tolerance is unavailable during rebuild, a fatal system error may occur, and all data on the array is then lost. In exceptional cases, however, failure of another drive need not lead to a fatal system error. These exceptions include:

- Failure after activation of a spare drive
- Failure of a drive that is not mirrored to any other failed drives (in a RAID 1+0 configuration)
- Failure of a second drive in a RAID 6 with ADG configuration

Time required for a rebuild

The time required for a rebuild varies considerably, depending on several factors:

- The priority that the rebuild is given over normal I/O operations (you can change the priority setting by using ACU)
- The amount of I/O activity during the rebuild operation
- The rotational speed of the hard drives
- The availability of drive cache
- The brand, model, and age of the drives
- The amount of unused capacity on the drives
- The number of drives in the array (for RAID 5 and RAID 6 with ADG)

Allow approximately 1 minute per gigabyte for the rebuild process to be completed.

System performance is affected during the rebuild, and the system is unprotected against further drive failure until the rebuild has finished. Therefore, replace drives during periods of low activity when possible.



CAUTION: If the Online LED of the replacement drive stops blinking and the amber Fault LED glows, or if other drive LEDs in the array go out, the replacement drive has failed and is producing unrecoverable disk errors. Remove and replace the failed replacement drive.

When automatic data recovery has finished, the Online LED of the replacement drive stops flashing and begins to glow steadily.

Failure of another drive during rebuild

If a non-correctable read error occurs on another physical drive in the array during the rebuild process, the Online LED of the replacement drive stops blinking and the rebuild abnormally terminates.

If this situation occurs, reboot the server. The system may temporarily become operational long enough to allow recovery of unsaved data. In any case, locate the faulty drive, replace it, and restore data from backup.

Regulatory compliance notices

Regulatory compliance identification numbers

For the purpose of regulatory compliance certifications and identification, this product has been assigned a unique regulatory model number. The regulatory model number can be found on the product nameplate label, along with all required approval markings and information. When requesting compliance information for this product, always refer to this regulatory model number. The regulatory model number is not the marketing name or model number of the product.

Federal Communications Commission notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (for example, personal computers). The FCC requires devices in both classes to bear a label indicating the interference potential of the device as well as additional operating instructions for the user.

FCC rating label

The FCC rating label on the device shows the classification (A or B) of the equipment. Class B devices have an FCC logo or ID on the label. Class A devices do not have an FCC logo or ID on the label. After you determine the class of the device, refer to the corresponding statement.

Class A equipment

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions regarding this product, contact us by mail or telephone:

- Hewlett-Packard Company
P. O. Box 692000, Mail Stop 530113
Houston, Texas 77269-2000
- 1-800-HP-INVENT (1-800-474-6836). (For continuous quality improvement, calls may be recorded or monitored.)

For questions regarding this FCC declaration, contact us by mail or telephone:

- Hewlett-Packard Company
P. O. Box 692000, Mail Stop 510101
Houston, Texas 77269-2000
- 1-281-514-3333

To identify this product, refer to the part, series, or model number found on the product.

Class B equipment

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit that is different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or television technician for help.

Declaration of conformity for products marked with the FCC logo, United States only

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions regarding this product, contact us by mail or telephone:

- Hewlett-Packard Company
P. O. Box 692000, Mail Stop 530113
Houston, Texas 77269-2000
- 1-800-HP-INVENT (1-800-474-6836). (For continuous quality improvement, calls may be recorded or monitored.)

For questions regarding this FCC declaration, contact us by mail or telephone:

- Hewlett-Packard Company
P. O. Box 692000, Mail Stop 510101
Houston, Texas 77269-2000
- 1-281-514-3333

To identify this product, refer to the part, series, or model number found on the product.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user's authority to operate the equipment.

Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

Canadian notice (Avis Canadien)

Class A equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Class B equipment

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union regulatory notice

Products bearing the CE marking comply with the following EU Directives:

- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC
- Ecodesign Directive 2009/125/EC, where applicable

CE compliance of this product is valid if powered with the correct CE-marked AC adapter provided by HP.

Compliance with these directives implies conformity to applicable harmonized European standards (European Norms) that are listed in the EU Declaration of Conformity issued by HP for this product or product family and available (in English only) either within the product documentation or at the following HP website (<http://www.hp.eu/certificates>) (type the product number in the search field).

The compliance is indicated by one of the following conformity markings placed on the product:

For non-telecommunications products and for EU harmonized telecommunications products, such as Bluetooth® within power class below 10mW.



For EU non-harmonized telecommunications products (If applicable, a 4-digit notified body number is inserted between CE and !).



Please refer to the regulatory label provided on the product.

The point of contact for regulatory matters is Hewlett-Packard GmbH, Dept./MS: HQ-TRE, Herrenberger Strasse 140, 71034 Boeblingen, GERMANY.

Disposal of waste equipment by users in private households in the European Union



This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

Japanese notice

ご使用になっている装置に VCCI マークが付いていましたら、次の説明文をお読み下さい。

この装置は、クラス B 情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。取扱説明書に従って正しい取り扱いをして下さい。

VCCI-B

VCCI マークが付いていない場合には、次の点にご注意下さい。

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者は適切な対策を講ずるよう要求されることがあります。

VCCI-A

BSMI notice

警告使用者:

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

Korean notice

Class A equipment

A급 기기 (업무용 방송통신기기)	이 기기는 업무용(A급)으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정 외의 지역에서 사용하는 것을 목적으로 합니다.
-----------------------	---

Class B equipment

B급 기기 (가정용 방송통신기기)	이 기기는 가정용(B급)으로 전자파적합등록을 한 기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.
-----------------------	--

Chinese notice

Class A equipment

声明

此为 A 级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取可行的措施。

Vietnam compliance marking notice

This marking is for applicable products only.



Ukraine notice

Україна

Додаток до документації користувача

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

Збережіть цей документ разом із документацією користувача для цього виробу

Power cord statement for Japan

製品には、同梱された電源コードをお使い下さい。
同梱された電源コードは、他の製品では使用出来ません。

Electrostatic discharge

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.

Grounding methods to prevent electrostatic discharge

Several methods are used for grounding. 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.

Specifications

Environmental specifications

Specification	Value
Temperature range*	
Operating	10°C to 35°C (50°F to 95°F) Maximum rate of change is 10° C/hr (50° F/hr)
Storage	-30°C to 60°C (-22°F to 140°F) Maximum rate of change is 20° C/hr (68° F/hr)
Relative humidity**	
Operating	10% to 90% relative humidity (Rh), 28° C (82.4° F) maximum wet bulb temperature, non-condensing
Storage	5% to 95% relative humidity (Rh), 38.7° C (101.66° F) maximum wet bulb temperature, non-condensing
Altitude ‡	
Operating	3048 m (10,000 ft) This value may be limited by the type and number of options installed.
Non-operating	9144 m (30, 000 ft)

* 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. The upper limit may be limited by the type and number of options installed.

** 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.

‡ Maximum allowable altitude change rate is 457 m/min (1500 ft/min).

Storage array specifications

Specification	Value
Height	22.10 cm (8.70 in)
Depth	89.12 cm (35.08 in)
Width	44.70 cm (17.60 in)
Weight (maximum)	145.15 kg (320.00 lb)
Weight (no drives installed)	72.58 kg (160.00 lb)

Technical support

Before you contact HP

Be sure to have the following information available before you call HP:

- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Product identification number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

HP contact information

For the name of the nearest HP authorized reseller:

- See the Contact HP worldwide (in English) webpage (<http://welcome.hp.com/country/us/en/wwcontact.html>).

For HP technical support:

- In the United States, for contact options see the Contact HP United States webpage (http://welcome.hp.com/country/us/en/contact_us.html). To contact HP by phone:
 - Call 1-800-HP-INVENT (1-800-474-6836). This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored.
 - If you have purchased a Care Pack (service upgrade), call 1-800-633-3600. For more information about Care Packs, refer to the HP website (<http://www.hp.com/hps>).
- In other locations, see the Contact HP worldwide (in English) webpage (<http://welcome.hp.com/country/us/en/wwcontact.html>).

Customer Self Repair

HP 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 HP (or HP service providers or service partners) identifies that the repair can be accomplished by the use of a CSR part, HP 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 HP 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 HP replace them for you, there may or may not be additional charges, depending on the type of warranty service designated for your product.

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

Based on availability and where geography permits, CSR parts will be shipped for next business day delivery. Same day or four-hour delivery may be offered at an additional charge where geography permits. If assistance is required, you can call the HP Technical Support Center and a technician will help you over the telephone. HP specifies in the materials shipped with a replacement CSR part whether a defective part must be returned to HP. In cases where it is required to return the defective part to HP, you must ship the defective part back to HP 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 HP billing you for the replacement. With a customer self repair, HP will pay all shipping and part return costs and determine the courier/carrier to be used.

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>).

Réparation par le client (CSR)

Les produits HP comportent de nombreuses pièces CSR (Customer Self Repair = réparation par le client) afin de minimiser les délais de réparation et faciliter le remplacement des pièces défectueuses. Si pendant la période de diagnostic, HP (ou ses partenaires ou mainteneurs agréés) détermine que la réparation peut être effectuée à l'aide d'une pièce CSR, HP vous l'envoie directement. Il existe deux catégories de pièces CSR:

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

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

REMARQUE: Certaines pièces HP ne sont pas conçues pour permettre au client d'effectuer lui-même la réparation. Pour que la garantie puisse s'appliquer, HP exige que le remplacement de la pièce soit effectué par un Mainteneur Agréé. Ces pièces sont identifiées par la mention "Non" dans le Catalogue illustré.

Les pièces CSR sont livrées le jour ouvré suivant, dans la limite des stocks disponibles et selon votre situation géographique. Si votre situation géographique le permet et que vous demandez une livraison le jour même ou dans les 4 heures, celle-ci vous sera facturée. Pour bénéficier d'une assistance téléphonique, appelez le Centre d'assistance technique HP. Dans les documents envoyés avec la pièce de rechange CSR, HP précise s'il est nécessaire de lui retourner la pièce défectueuse. Si c'est le cas, vous devez le faire dans le délai indiqué, généralement cinq (5) jours ouvrés. La pièce et sa documentation doivent être retournées dans l'emballage fourni. Si vous ne retournez pas la pièce défectueuse, HP se réserve le droit de vous facturer les coûts de remplacement. Dans le cas d'une pièce CSR, HP supporte l'ensemble des frais d'expédition et de retour, et détermine la société de courses ou le transporteur à utiliser.

Pour plus d'informations sur le programme CSR de HP, contactez votre Mainteneur Agréé local. Pour plus d'informations sur ce programme en Amérique du Nord, consultez le site Web HP (<http://www.hp.com/go/selfrepair>).

Riparazione da parte del cliente

Per abbreviare i tempi di riparazione e garantire una maggiore flessibilità nella sostituzione di parti difettose, i prodotti HP sono realizzati con numerosi componenti che possono essere riparati direttamente dal cliente (CSR, Customer Self Repair). Se in fase di diagnostica HP (o un centro di servizi o di assistenza HP) identifica il guasto come riparabile mediante un ricambio CSR, HP lo spedisce direttamente al cliente per la sostituzione. Vi sono due categorie di parti CSR:

Obbligatorie – Parti che devono essere necessariamente riparate dal cliente. Se il cliente ne affida la riparazione ad HP, deve sostenere le spese di spedizione e di manodopera per il servizio.

Opzionali – Parti la cui riparazione da parte del cliente è facoltativa. Si tratta comunque di componenti progettati per questo scopo. Se tuttavia il cliente ne richiede la sostituzione ad HP, potrebbe dover sostenere spese aggiuntive a seconda del tipo di garanzia previsto per il prodotto.

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

In base alla disponibilità e alla località geografica, le parti CSR vengono spedite con consegna entro il giorno lavorativo seguente. La consegna nel giorno stesso o entro quattro ore è offerta con un supplemento di costo solo in alcune zone. In caso di necessità si può richiedere l'assistenza telefonica di un addetto del centro di supporto tecnico HP. Nel materiale fornito con una parte di ricambio CSR, HP specifica se il cliente deve restituire dei componenti. Qualora sia richiesta la resa ad HP del componente difettoso, lo si deve spedire ad HP entro un determinato periodo di tempo, generalmente cinque (5) giorni lavorativi. Il componente difettoso deve essere restituito con la documentazione associata nell'imballo di spedizione fornito. La mancata restituzione del componente può comportare la fatturazione del ricambio da parte di HP. Nel caso di riparazione da parte del cliente, HP sostiene tutte le spese di spedizione e resa e sceglie il corriere/vettore da utilizzare.

Per ulteriori informazioni sul programma CSR di HP contattare il centro di assistenza di zona. Per il programma in Nord America fare riferimento al sito Web HP (<http://www.hp.com/go/selfrepair>).

Customer Self Repair

HP Produkte enthalten viele CSR-Teile (Customer Self Repair), um Reparaturzeiten zu minimieren und höhere Flexibilität beim Austausch defekter Bauteile zu ermöglichen. Wenn HP (oder ein HP Servicepartner) bei der Diagnose feststellt, dass das Produkt mithilfe eines CSR-Teils repariert werden kann, sendet Ihnen HP dieses Bauteil zum Austausch direkt zu. CSR-Teile werden in zwei Kategorien unterteilt:

Zwingend – Teile, für die das Customer Self Repair-Verfahren zwingend vorgegeben ist. Wenn Sie den Austausch dieser Teile von HP vornehmen lassen, werden Ihnen die Anfahrt- und Arbeitskosten für diesen Service berechnet.

Optional – Teile, für die das Customer Self Repair-Verfahren optional ist. Diese Teile sind auch für Customer Self Repair ausgelegt. Wenn Sie jedoch den Austausch dieser Teile von HP vornehmen lassen möchten, können bei diesem Service je nach den für Ihr Produkt vorgesehenen Garantiebedingungen zusätzliche Kosten anfallen.

HINWEIS: Einige Teile sind nicht für Customer Self Repair ausgelegt. Um den Garantieanspruch des Kunden zu erfüllen, muss das Teil von einem HP Servicepartner ersetzt werden. Im illustrierten Teilekatalog sind diese Teile mit „No“ bzw. „Nein“ gekennzeichnet.

CSR-Teile werden abhängig von der Verfügbarkeit und vom Lieferziel am folgenden Geschäftstag geliefert. Für bestimmte Standorte ist eine Lieferung am selben Tag oder innerhalb von vier Stunden gegen einen Aufpreis verfügbar. Wenn Sie Hilfe benötigen, können Sie das HP technische Support Center anrufen und sich von einem Mitarbeiter per Telefon helfen lassen. Den Materialien, die mit einem CSR-Ersatzteil geliefert werden, können Sie entnehmen, ob das defekte Teil an HP zurückgeschickt werden muss. Wenn es erforderlich ist, das defekte Teil an HP zurückzuschicken, müssen Sie dies innerhalb eines vorgegebenen Zeitraums tun, in der Regel innerhalb von fünf (5) Geschäftstagen. Das defekte Teil muss mit der zugehörigen Dokumentation in der Verpackung zurückgeschickt werden, die im Lieferumfang enthalten ist. Wenn Sie das defekte Teil nicht zurückschicken, kann HP Ihnen das Ersatzteil in Rechnung stellen. Im Falle von Customer Self Repair kommt HP für alle Kosten für die Lieferung und Rücksendung auf und bestimmt den Kurier-/Frachtdienst.

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

Reparaciones del propio cliente

Los productos de HP incluyen muchos componentes que el propio usuario puede reemplazar (*Customer Self Repair*, CSR) para minimizar el tiempo de reparación y ofrecer una mayor flexibilidad a la hora de realizar sustituciones de componentes defectuosos. Si, durante la fase de diagnóstico, HP (o los proveedores o socios de servicio de HP) identifica que una reparación puede llevarse a cabo mediante el uso de un componente CSR, HP le enviará dicho componente directamente para que realice su sustitución. Los componentes CSR se clasifican en dos categorías:

- **Obligatorio:** componentes para los que la reparación por parte del usuario es obligatoria. Si solicita a HP que realice la sustitución de estos componentes, tendrá que hacerse cargo de los gastos de desplazamiento y de mano de obra de dicho servicio.
- **Opcional:** componentes para los que la reparación por parte del usuario es opcional. Estos componentes también están diseñados para que puedan ser reparados por el usuario. Sin embargo, si precisa que HP realice su sustitución, puede o no conllevar costes adicionales, dependiendo del tipo de servicio de garantía correspondiente al producto.

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

Según la disponibilidad y la situación geográfica, los componentes CSR se enviarán para que lleguen a su destino al siguiente día laborable. Si la situación geográfica lo permite, se puede solicitar la entrega en el mismo día o en cuatro horas con un coste adicional. Si precisa asistencia técnica, puede llamar al Centro de asistencia técnica de HP y recibirá ayuda telefónica por parte de un técnico. Con el envío de materiales para la sustitución de componentes CSR, HP especificará si los componentes defectuosos deberán devolverse a HP. En aquellos casos en los que sea necesario devolver algún componente a HP, deberá hacerlo en el periodo de tiempo especificado, normalmente cinco días laborables. Los componentes defectuosos deberán devolverse con toda la documentación relacionada y con el embalaje de envío. Si no enviara el componente defectuoso requerido, HP podrá cobrarle por el de sustitución. En el caso de todas sustituciones que lleve a cabo el cliente, HP se hará cargo de todos los gastos de envío y devolución de componentes y escogerá la empresa de transporte que se utilice para dicho servicio.

Para obtener más información acerca del programa de Reparaciones del propio cliente de HP, póngase en contacto con su proveedor de servicios local. Si está interesado en el programa para Norteamérica, visite la página web de HP siguiente (<http://www.hp.com/go/selfrepair>).

Customer Self Repair

Veel onderdelen in HP producten zijn door de klant zelf te repareren, waardoor de reparatieduur tot een minimum beperkt kan blijven en de flexibiliteit in het vervangen van defecte onderdelen groter is. Deze onderdelen worden CSR-onderdelen (Customer Self Repair) genoemd. Als HP (of een HP Service Partner) bij de diagnose vaststelt dat de reparatie kan worden uitgevoerd met een CSR-onderdeel, verzendt HP dat onderdeel rechtstreeks naar u, zodat u het defecte onderdeel daarmee kunt vervangen. Er zijn twee categorieën CSR-onderdelen:

Verplicht: Onderdelen waarvoor reparatie door de klant verplicht is. Als u HP verzoekt deze onderdelen voor u te vervangen, worden u voor deze service reiskosten en arbeidsloon in rekening gebracht.

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

OPMERKING: Sommige HP onderdelen zijn niet ontwikkeld voor reparatie door de klant. In verband met de garantievoorwaarden moet het onderdeel door een geautoriseerde Service Partner worden vervangen. Deze onderdelen worden in de geïllustreerde onderdelencatalogus aangemerkt met "Nee".

Afhankelijk van de leverbaarheid en de locatie worden CSR-onderdelen verzonden voor levering op de eerstvolgende werkdag. Levering op dezelfde dag of binnen vier uur kan tegen meerkosten worden aangeboden, indien dit mogelijk is gezien de locatie. Indien assistentie gewenst is, belt u een HP Service Partner om via de telefoon technische ondersteuning te ontvangen. HP vermeldt in de documentatie bij het vervangende CSR-onderdeel of het defecte onderdeel aan HP moet worden geretourneerd. Als het defecte onderdeel aan HP moet worden teruggezonden, moet u het defecte onderdeel binnen een bepaalde periode, gewoonlijk vijf (5) werkdagen, retourneren aan HP. Het defecte onderdeel moet met de bijbehorende documentatie worden geretourneerd in het meegeleverde verpakkingsmateriaal. Als u het defecte onderdeel niet terugzendt, kan HP u voor het vervangende onderdeel kosten in rekening brengen. Bij reparatie door de klant betaalt HP alle verzendkosten voor het vervangende en geretourneerde onderdeel en kiest HP zelf welke koerier/transportonderneming hiervoor wordt gebruikt.

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

Reparo feito pelo cliente

Os produtos da HP são projetados com muitas peças para reparo feito pelo cliente (CSR) de modo a minimizar o tempo de reparo e permitir maior flexibilidade na substituição de peças com defeito. Se, durante o período de diagnóstico, a HP (ou fornecedores/parceiros de serviço da HP) concluir que o reparo pode ser efetuado pelo uso de uma peça CSR, a peça de reposição será enviada diretamente ao cliente. Existem duas categorias de peças CSR:

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

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

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

Conforme a disponibilidade e o local geográfico, as peças CSR serão enviadas no primeiro dia útil após o pedido. Onde as condições geográficas permitirem, a entrega no mesmo dia ou em quatro horas pode ser feita mediante uma taxa adicional. Se precisar de auxílio, entre em contato com o Centro de suporte técnico da HP para que um técnico o ajude por telefone. A HP especifica nos materiais fornecidos com a peça CSR de reposição se a peça com defeito deve ser devolvida à HP. Nos casos em que isso for necessário, é preciso enviar a peça com defeito à HP dentro do período determinado, normalmente cinco (5) dias úteis. A peça com defeito deve ser enviada com a documentação correspondente no material de transporte fornecido. Caso não o faça, a HP poderá cobrar a reposição. Para as peças de reparo feito pelo cliente, a HP paga todas as despesas de transporte e de devolução da peça e determina a transportadora/serviço postal a ser utilizado.

Para obter mais informações sobre o programa de reparo feito pelo cliente da HP, entre em contato com o fornecedor de serviços local. Para o programa norte-americano, visite o site da HP (<http://www.hp.com/go/selfrepair>).

顧客自己修理保証サービス

修理時間を短縮し、故障部品の交換における高い柔軟性を確保するために、HP製品には多数の顧客自己修理（CSR）部品があります。診断の際に、CSR部品を使用すれば修理ができるとHP（HPまたはHP正規保守代理店）が判断した場合、HPはその部品を直接、お客様に発送し、お客様に交換していただきます。CSR部品には以下の2通りがあります。

- **必須** - 顧客自己修理が必須の部品。当該部品について、もしもお客様がHPに交換作業を依頼される場合には、その修理サービスに関する交通費および人件費がお客様に請求されます。
- **任意** - 顧客自己修理が任意である部品。この部品も顧客自己修理用です。当該部品について、もしもお客様がHPに交換作業を依頼される場合には、お買い上げの製品に適用される保証サービス内容の範囲内においては、別途費用を負担していただくことなく保証サービスを受けることができます。

注：HP製品の一部の部品は、顧客自己修理用ではありません。製品の保証を継続するためには、HPまたはHP正規保守代理店による交換作業が必須となります。部品カタログには、当該部品が顧客自己修理除外品である旨が記載されています。

部品供給が可能な場合、地域によっては、CSR部品を翌営業日に届くように発送します。また、地域によっては、追加費用を負担いただくことにより同日または4時間以内に届くように発送することも可能な場合があります。サポートが必要なときは、HPの修理受付窓口に電話していただければ、技術者が電話でアドバイスします。交換用のCSR部品または同梱物には、故障部品をHPに返送する必要があるかどうかが表示されています。故障部品をHPに返送する必要がある場合は、指定期限内（通常は5営業日以内）に故障部品をHPに返送してください。故障部品を返送する場合は、届いた時の梱包箱に関連書類とともに入れてください。故障部品を返送しない場合、HPから部品費用が請求されます。顧客自己修理の際には、HPは送料および部品返送料を全額負担し、使用する宅配便会社や運送会社を指定します。

客户自行维修

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

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

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

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

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

客戶自行維修

HP 產品設計了許多「客戶自行維修」(CSR) 的零件以減少維修時間，並且使得更換瑕疵零件時能有更大的彈性。如果在診斷期間 HP (或 HP 服務供應商或維修夥伴) 辨認出此項維修工作可以藉由使用 CSR 零件來完成，則 HP 將直接寄送該零件給您作更換。CSR 零件分為兩種類別：

- **強制的** — 客戶自行維修所使用的零件是強制性的。如果您要求 HP 更換這些零件，HP 將會向您收取此服務所需的外出費用與勞動成本。
- **選購的** — 客戶自行維修所使用的零件是選購的。這些零件也設計用於客戶自行維修之用。不過，如果您要求 HP 為您更換，則可能需要也可能不需要負擔額外的費用，端視針對此產品指定的保固服務類型而定。

備註：某些 HP 零件沒有消費者可自行維修的設計。為符合客戶保固，HP 需要授權的服務供應商更換零件。這些零件在圖示的零件目錄中，被標示為「否」。

基於材料取得及環境允許的情況下，CSR 零件將於下一個工作日以快遞寄送。在環境的允許下當天或四小時內送達，則可能需要額外的費用。若您需要協助，可致電「HP 技術支援中心」，會有一位技術人員透過電話來協助您。不論損壞的零件是否必須退回，HP 皆會在與 CSR 替換零件一起運送的材料中註明。若要將損壞的零件退回 HP，您必須在指定的一段時間內（通常為五 (5) 個工作天），將損壞的零件寄回 HP。損壞的零件必須與寄送資料中隨附的相關技術文件一併退還。如果無法退還損壞的零件，HP 可能要向您收取替換費用。針對客戶自行維修情形，HP 將負責所有運費及零件退還費用並指定使用何家快遞/貨運公司。

如需 HP 的「客戶自行維修」方案詳細資訊，請連絡您當地的服務供應商。至於北美方案，請參閱 HP 網站 (<http://www.hp.com/go/selfrepair>)。

고객 셀프 수리

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

- **고객 셀프 수리가 의무 사항인 필수 부품.** 사용자가 HP에 이 부품의 교체를 요청할 경우 이 서비스에 대한 출장비 및 작업비가 청구됩니다.
- **고객 셀프 수리가 선택 사항인 부품.** 이 부품들도 고객 셀프 수리가 가능하도록 설계되었습니다. 하지만 사용자가 HP에 이 부품의 교체를 요청할 경우 사용자가 구입한 제품에 해당하는 보증 서비스 유형에 따라 추가 비용 없이 교체가 가능할 수 있습니다.

참고: 일부 HP 부품은 고객 셀프 수리가 불가능하도록 설계되었습니다. HP는 만족스러운 고객 보증을 위해 공인 서비스 제공업체를 통해 부품을 교체하도록 하고 있습니다. 이러한 부품들은 Illustrated Parts Catalog에 "No"라고 표시되어 있습니다.

CSR 부품은 재고 상태와 지리적 조건이 허용하는 경우 다음 영업일 납품이 가능하도록 배송이 이루어집니다. 지리적 조건이 허용하는 경우 추가 비용이 청구되는 조건으로 당일 또는 4시간 배송이 가능할 수도 있습니다. 도움이 필요하시면 HP 기술 지원 센터로 전화하십시오. 전문 기술자가 전화로 도움을 줄 것입니다. 결함이 발생한 부품을 HP로 반환해야 하는지 여부를 CSR 교체 부품과 함께 배송된 자료에 지정합니다. 결함이 발생한 부품을 HP로 반환해야 하는 경우에는 지정된 기간 내(통상 영업일 기준 5일)에 HP로 반환해야 합니다. 이 때 결함이 발생한 부품은 제공된 포장 재료에 넣어 관련 설명서와 함께 반환해야 합니다. 결함이 발생한 부품을 반환하지 않는 경우 HP가 교체 부품에 대해 비용을 청구할 수 있습니다. 고객 셀프 수리의 경우, HP는 모든 운송 및 부품 반환 비용을 부담하며 이용할 운송업체 및 택배 서비스를 결정합니다.

HP 고객 셀프 수리 프로그램에 대한 자세한 내용은 가까운 서비스 제공업체에 문의하십시오. 북미 지역의 프로그램에 대해서는 HP 웹 사이트(<http://www.hp.com/go/selfrepair>)를 참조하십시오.

Acronyms and abbreviations

ACU

Array Configuration Utility

ADG

Advanced Data Guarding (also known as RAID 6)

ADU

Array Diagnostics Utility

CPQONLIN

NetWare Online Array Configuration Utility

GSI

global service indicator

iLO 2

Integrated Lights-Out 2

IML

Integrated Management Log

ORCA

Option ROM Configuration for Arrays

PSP

ProLiant Support Pack

SIM

Systems Insight Manager

UID

unit identification

Index

7

7-segment display 29

A

ACU (Array Configuration Utility) 24

ADU (Array Diagnostic Utility) 26

airflow requirements 14

authorized reseller 42

automatic data recovery (rebuild) 32

B

BSMI notice 38

buttons 5

C

cables 36

cables, FCC compliance 36

cables, supported 22

cabling 22

cabling guidelines 22

Canadian notices 36

Care Pack 27

Change Control 27

Chinese notice 39

class A equipment 34

class B equipment 35

components 5

compromised fault tolerance 30, 31

configuration of system 24

configuration tools 24

connectors 5, 7

contacting HP 42

customer self repair (CSR) 42

D

Declaration of Conformity 34, 35

device numbers 10

diagnosing problems 28

diagnostic cable access 5

diagnostic tools 25

display, 7-segment 29

drive LEDs 10

dual 7-segment display board 29

E

electrical grounding requirements 15

electrostatic discharge 40

environmental specifications 41

European Union notice 36

F

failure, hard drive 30, 33

fault tolerance, compromised 30

FCC rating label 34

features 5

Federal Communications Commission (FCC)

notice 34, 35, 36

firmware update 12

front panel components 5

front panel LEDs 6

G

grounding methods 40

grounding requirements 15

guidelines, cabling 22

H

hard drive LEDs 10, 11

hard drive, failure of 30

hard drives, installing 18, 19

HP Insight Remote Support software 26

HP ProLiant Essentials Foundation Pack 25

HP Systems Insight Manager overview 25

HP technical support 42

I

I/O module 21

identification number 34

IML (Integrated Management Log) 25

Important Safety Information document 12

installation, enclosure 16

J

Japanese notice 38

K

Korean notices 38

L

LED behavior 28

LED, 7-segment display 8

LED, heartbeat 6, 8

LED, system fault 6, 8

LED, system power 8

LED, UID 6

LEDs 5, 8, 10

LEDs, fan 8

LEDs, front panel 6

LEDs, hard drive 10

LEDs, I/O module 8

LEDs, power supply 8

LEDs, rear panel 8

LEDs, troubleshooting 11, 28

M

maintenance guidelines 27

Management Agents 25

management tools 25

modifications, FCC notice 36

O

ORCA (Option ROM Configuration for Arrays) 24

P

phone numbers 42

power cord 23, 39

power requirements 15

powering down 13

powering on problems 28

powering up 12

problem diagnosis 28

R

rack installation 16

rack warnings 16

rear panel buttons 8

rear panel components 7

rear panel LEDs 8

rebuild, time required for 32

regulatory compliance identification numbers 34

regulatory compliance notices 34, 37

remote support and analysis tools 26

replacing hard drives 31

required information 42

requirements, electrical grounding 15

requirements, power 15

requirements, temperature 14

S

safety considerations 16

SAS hard drive 18

SAS hard drive LEDs 10

SATA hard drive 18

SATA hard drive LEDs 10

series number 34

site planning considerations 16

Smart Components for Remote ROM Flash 25

software 24

space requirements 14

specifications 41

static electricity 40

storage array specifications 41

support 26, 42

system configuration settings 24

system, keeping current 27

Systems Insight Manager 25

T

technical support 42

telephone numbers 42

temperature requirements 14

third-party racks 16

troubleshooting 11, 28

U

Ukraine notice 39

utilities 24

V

Vietnam compliance marking notice 39

W

warnings 16