

HP H240ar, H240, and H241 Smart HBA User Guide

Abstract

This document includes feature and installation information about HP host bus adapter hardware and is for the person who installs, administers, and troubleshoots servers and storage systems. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.



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Contents

Features	5
Overview	5
Controller features	5
Basic features	5
HP SSD Smart Path	5
HP Secure Encryption	6
HBA/RAID mode	6
Supported servers.....	6
Component identification	7
HP H240ar Smart HBA	7
H240ar LEDs	7
H240ar connectors	8
HP H240 Smart HBA.....	8
H240 LEDs	8
H240 connectors	9
HP H241 Smart HBA.....	10
H241 LEDs	10
H241 connectors	11
Specifications	11
Installation	12
Installation overview	12
Preparing the server	12
Installing the H240ar Smart HBA	12
Installing the adapter.....	12
Connecting internal storage	13
Installing the H240 or H241 Smart HBA.....	14
Installing the adapter hardware	14
Connecting the adapter	14
Completing the installation procedure	15
Configuration	16
Powering on and selecting boot options in UEFI Boot Mode	16
Configuring an array.....	16
Maintenance and troubleshooting	17
System maintenance tools	17
Updating firmware.....	17
Installing device drivers.....	17
Managing servers with Insight Agents	17
Diagnostic tools	17
Drive procedures	19
Identifying the status of an HP SmartDrive	19
Electrostatic discharge	20
Preventing electrostatic discharge	20
Grounding methods to prevent electrostatic discharge.....	20

Regulatory information	21
Safety and regulatory compliance	21
Belarus Kazakhstan Russia marking	21
Turkey RoHS material content declaration	22
Ukraine RoHS material content declaration	22
Warranty information	22
Acronyms and abbreviations	23
Documentation feedback	24
Index	25

Features

Overview

Use the information in this document to install an HP Smart Host Bus Adapter.

For more information, see the following resources:

- For expansion slot information and access procedures, see the server-specific documentation.
- For cabling and drive configuration information, see the external storage product documentation.

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

Controller features

Basic features

The HP H240ar, H240, and H241 Smart HBAs contain the following basic features:

- Capable of switching between RAID mode and HBA mode
- Supports RAID 0, 1, 10, and 5*
- Drive Erase*
- Performance optimization for video on demand*
- Dual domain
- Split mirror backup, recombining, and rollback of RAID 1 and 10 mirrors*

* RAID mode only

For more information, see the *HP Smart Storage Administrator User Guide* on the HP website (<http://www.hp.com/go/smartstorage/docs>).

HP SSD Smart Path

HP SSD Smart Path enables an optimized data path to high performance solid state drives. The optimized path bypasses the controller's RAID processing components and sends I/O directly to the drives. For more information, see the HP website (<http://h18004.www1.hp.com/products/servers/proliantstorage/software-management/smartpath/index.html>).

For more information on enabling or disabling HP SSD Smart Path, see the *HP Smart Storage Administrator User Guide* on the HP website (<http://www.hp.com/go/smartstorage/docs>).

This feature is only available when the controller is configured to run in RAID mode.

HP Secure Encryption

HP Secure Encryption is a controller-based, enterprise-class data encryption solution that protects data at rest on bulk storage hard drives and SSDs attached to a compatible HP Smart Array Controller or HP Smart HBA. The solution is compatible with HP key manager products and can operate with or without the presence of a key manager in the environment, depending on individual customer settings.

HP Secure Encryption provides encryption for data at rest as an important component for complying with data privacy requirements found in government regulations like HIPAA and Sarbanes-Oxley. HP Secure Encryption secures any data deemed sensitive and requiring extra levels of protection through the application of XTS-AES 256-bit data encryption. Many companies under government regulations require that sensitive privacy data must be secured and uncompromised using NIST-approved algorithms and methodologies for key management. As a result, HP has applied for FIPS-140-2 Level 2 validation for controllers supporting encryption. For more information, see the *Cryptographic Module Validation Program* (CMVP) on the National Institute of Standards and Technology website (<http://csrc.nist.gov/groups/STM/cmvp/index.html>).

This feature is only available when the controller is configured to run in RAID mode.

HBA/RAID mode

The controller operates in either RAID mode or HBA mode, but not both. Smart Array Controllers allowing HBA mode can be configured to run in RAID mode. In HBA mode, all physical drives are presented directly to the operating system and the hardware RAID engine is disabled.

When HBA mode is enabled, RAID mode is disabled. To enable RAID mode, disable HBA mode. For instructions on configuring HBA or RAID mode, see the *HP Smart Storage Administrator User Guide*.

Supported servers

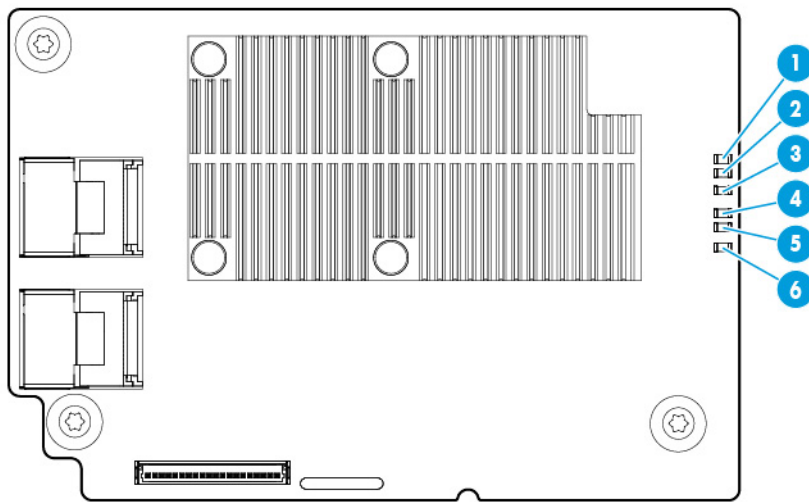
For more information on installing the component in a supported server, see the server user guide.

For the latest support information, see the component QuickSpecs on the HP website (<http://www.hp.com/go/qs>).

Component identification

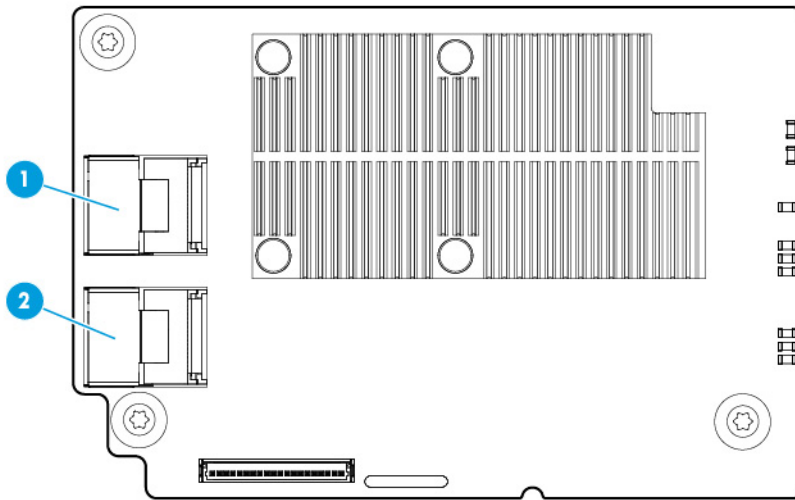
HP H240ar Smart HBA

H240ar LEDs



Item	Color	Name	Interpretation
1	Amber	Debug	On = Controller is in reset state. Off = Controller is in an idle or runtime state.
2	—	Reserved	—
3	—	Reserved	—
4	Green	Heartbeat	When the controller is in good health, this LED flashes at 1 Hz. During power up, this LED is solid for up to 2 seconds.
5	Amber	Fault	When an error occurs, this LED is on. During power up, this LED is solid for up to 2 seconds.
6	Green	Crypto 1	On = All attached volumes are encrypted Off = All attached volumes are plaintext Flashing = Both encrypted and plaintext volumes are present

H240ar connectors

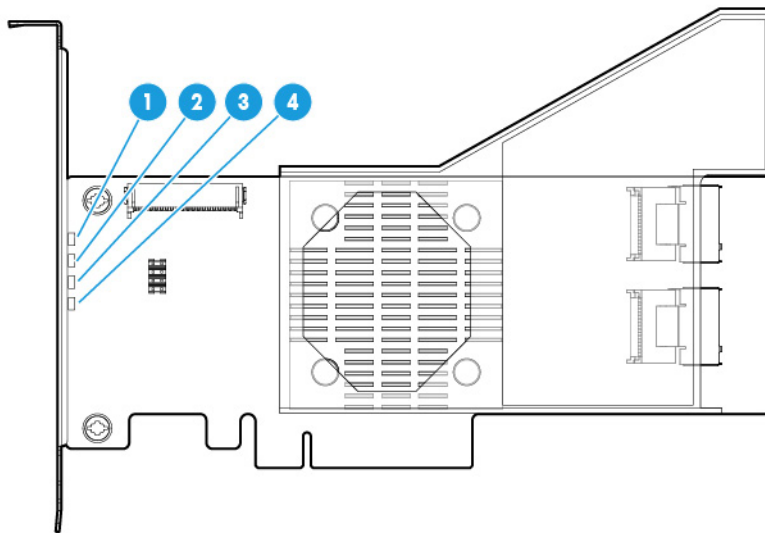


Item	Description
1	Mini-SAS 4i connector
2	Mini-SAS 4i connector

HP H240 Smart HBA

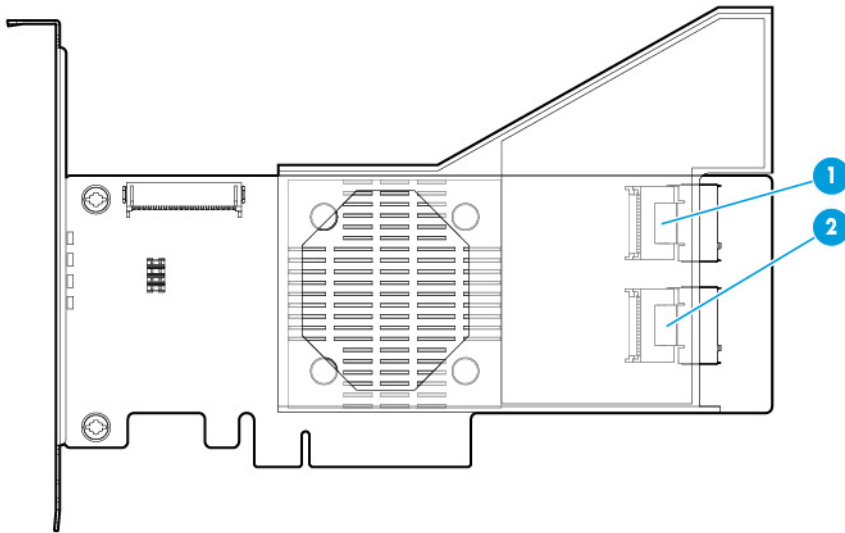
H240 LEDs

Immediately after you power up the server, the controller runtime LEDs illuminate briefly in a predetermined pattern as part of the POST sequence. At all other times during server operation, the illumination pattern of the runtime LEDs indicates the status of the controller.



Item	Color	Name	Interpretation
1	Green	Heartbeat	When the controller is in good health, this LED flashes at 1 Hz. During power up, this LED is solid for up to 2 seconds.
2	Amber	Fault	When an error occurs, this LED is on. During power up, this LED is solid for up to 2 seconds.
3	Green	Crypto	On = All attached volumes are encrypted Off = All attached volumes are plaintext Flashing = Both encrypted and plaintext volumes are present
4	—	Reserved	—

H240 connectors

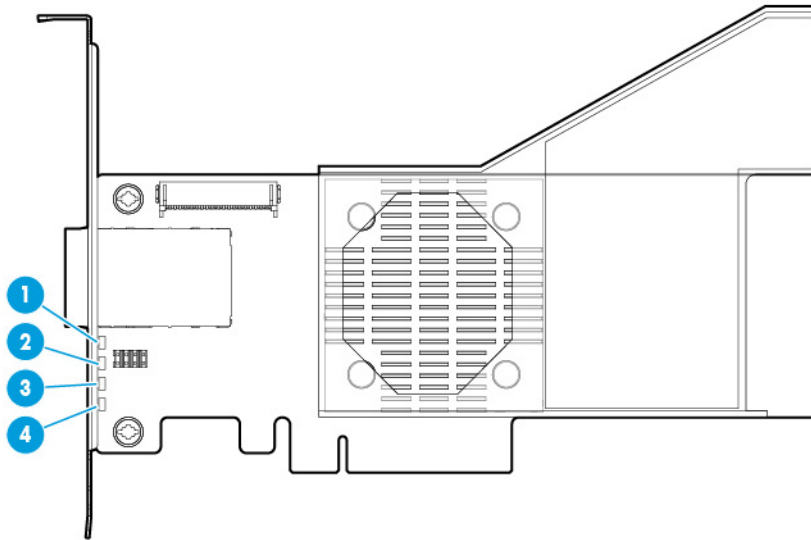


Item	Description
1	Mini-SAS 4i connector
2	Mini-SAS 4i connector

HP H241 Smart HBA

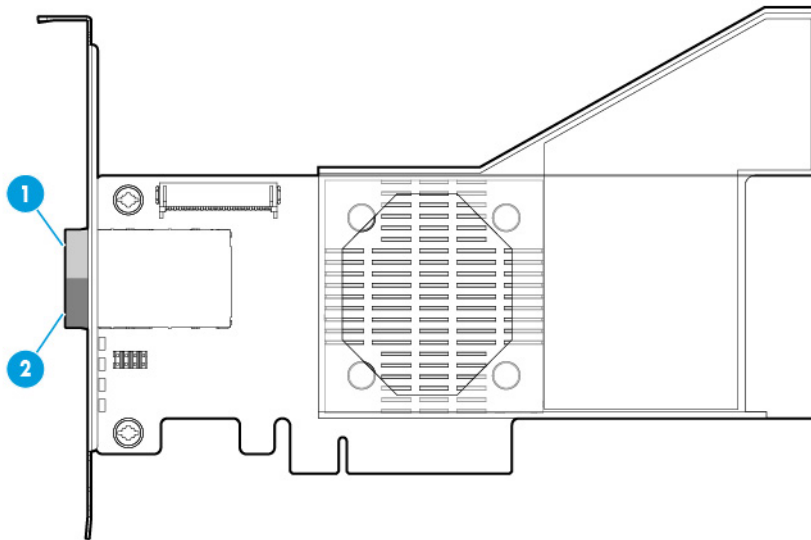
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3	Green	Crypto	On = All attached volumes are encrypted Off = All attached volumes are plaintext Flashing = Both encrypted and plaintext volumes are present
4	—	Reserved	—

H241 connectors



Item	Description
1	Mini-SAS HD 4x receptacle connector
2	Mini-SAS HD 4x receptacle connector

Specifications

To configure the adapter for maximum drive support, do not mix drive enclosures and tape drives on the same port.



Adapter	Card type	SAS max transfer rate	Max internal drive support	Max external drive support
HP ProLiant H240ar	PCIe Gen3 (custom)	12Gbit/s	27 (DL380 with 24 drives and 3 rear drives with HP 12Gb SAS Expander Card)	—
HP ProLiant H240	PCIe Gen 3, Low profile	12Gbit/s	48 (ML350 + 2x HP 12Gb SAS Expander Card)	—
HP ProLiant H241	Low profile, PCIe Gen3	12Gbit/s	200	—

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

For more information about drive support, see the documentation for the specific storage product that you are connecting to the adapter.

Installation

Installation overview

-
-  **WARNING:** To reduce the risk of personal injury or damage to the equipment, consult the safety information and user documentation provided with the server before attempting the installation. Some servers contain high energy circuits, high current circuits, moving parts (such as fan blades), or any combination of these hazards, that may be exposed if covers and access panels are removed while the product is connected to a power source, or the HP Smart Storage Battery is installed on the server. These products are intended to be serviced only by qualified personnel who have been trained to deal with these hazards. Do not remove enclosures or attempt to bypass any interlocks designed to guard against these hazardous conditions.
-
-  **WARNING:** To reduce the risk of personal injury or damage to the equipment, adequately stabilize the rack before extending a component outside the rack. Extend only one component at a time. A rack may become unstable if more than one component is extended.
-

To install the HP H240ar Smart HBA, see "Installing the H240ar Smart HBA (on page 12)."

To install the HP H240 or H241 Smart HBA, see "Installing the H240 or H241 Smart HBA (on page 14)."

Preparing the server


1. Update the server firmware by using SPP. To download SPP, see the HP website (<http://www.hp.com/go/spp>). For more information, see the server documentation.
2. Back up all server data.
3. Shut down the operating system as outlined in the operating system instructions.
4. Power down the server.
5. Power down all peripheral devices.
6. Disconnect all peripheral devices from the server.

Installing the H240ar Smart HBA

To install the component:

1. Install the adapter ("Installing the adapter" on page 12).
2. Connect internal storage ("Connecting internal storage" on page 13).
3. Complete the installation procedure ("Completing the installation procedure" on page 15).

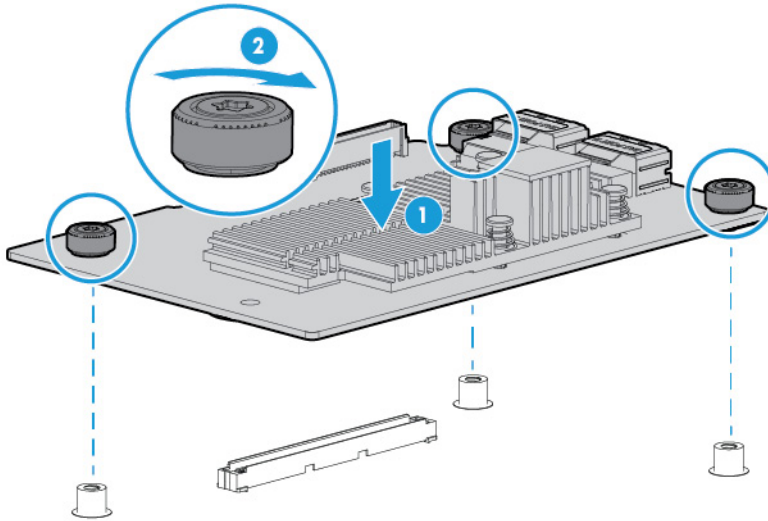
Installing the adapter

-
-  **CAUTION:** HP recommends performing a complete backup of all server data before performing a controller or adapter installation or removal.
-

CAUTION: In systems that use external data storage, be sure that the server is the first unit to be powered down and the last to be powered back up. Taking this precaution ensures that the system does not erroneously mark the drives as failed when the server is powered up.

For server-specific procedures, see the server user guide.


1. Power down the server.
2. Remove the server.
3. Remove the access panel.
4. Install the adapter by aligning the board with the alignment pins, pressing down and tightening the thumbscrew.



5. Connect storage devices to the adapter. For more information, see "Connecting internal storage (on page 13)."
6. Close or install the access panel.

Connecting internal storage

1. Power down the server.
2. Install drives, if necessary.
For the most efficient use of drive space, the drives must have comparable capacity.
For more information about drive installation, see the following resources:
 - o Server documentation
 - o Drive documentation
3. Use the internal SAS cable provided with the server to connect the HBA to the drives:
 - o If the drives are hot-plug capable, connect the internal connector of the HBA to the SAS connector on the hot-plug drive cage.
 - o If the drives are not hot-plug capable, connect the internal connector of the HBA to the non-hot-plug drives.
4. Close or install the access panel, and secure it with thumbscrews, if any are present.

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

5. Power up the server.


Installing the H240 or H241 Smart HBA

To install the component:

1. Install the adapter hardware ("[Installing the adapter hardware](#)" on page 14).
2. Connect the adapter ("[Connecting the adapter](#)" on page 14).
3. Complete the installation procedure ("[Completing the installation procedure](#)" on page 15).

Installing the adapter hardware


Installing the adapter

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


For more information, see "Electrostatic discharge (on page 20)."

To install the adapter:

1. Depending on the server model, open or remove the access panel.

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

2. Locate the PCIe expansion slots, and then select a slot that supports the adapter.
For more information, see "Specifications (on page 11)" and the server documentation.
3. Depending on the server model, remove the retaining screw or open the expansion slot latch that secures the PCIe slot.
4. Remove the slot cover and save it. To maintain proper airflow, the slot must have an expansion board or slot cover installed.

-
-  **IMPORTANT:** If installing an HP H240 or H241 Smart HBA into a low profile slot, remove the controller board air baffle.
-

5. Install the adapter in the expansion slot, and press it firmly into place. The contacts on the adapter edge must be fully seated in the expansion slot.
6. Depending on the server model, secure the adapter by installing the retaining screw or by closing the slot latch.

Connecting the adapter

Cabling configurations vary depending on the storage product. To cable this adapter to a storage product, see the documentation provided with the storage product.

Cables for connecting the adapter to other devices are provided with most HP server products. The HP H241 Smart HBA supports external Mini-SAS cables with lengths from 1 m to 6 m. Cable length for the HP H240 Smart HBA is dependent on server model and backplane location, and is determined at the time of ordering. All HP cables are keyed to ensure correct installation.

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

You can order extra cables from an authorized HP reseller or authorized HP service provider. 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>).

Completing the installation procedure

1. Verify that all cables are routed correctly and are not restricting other components or being pinched by them. For the correct cable routing, see the server documentation.
2. Connect the peripheral devices to the server.
3. Connect the power cord to the server.
4. Connect the power cord to the power source.
5. Power up all peripheral devices connected to the server.
6. Power up the server.
7. Install the latest firmware and drivers for the adapter.

HP now distributes firmware, drivers, and other support software for servers through Service Pack for ProLiant, or SPP, which you can download from the HP website (<http://www.hp.com/go/spp/download>). Be sure to use the latest SPP version for the server.

If you installed an OS by using the Intelligent Provisioning software, its Configure and Install feature may have provided the latest driver support.

To directly locate the OS drivers for a particular server, enter the following web address into the browser:

```
http://www.hp.com/support/<servername>
```

In place of <servername>, enter the server name.

For example:

```
http://www.hp.com/support/d1360g7
```

Configuration

Powering on and selecting boot options in UEFI Boot Mode

On servers operating in UEFI Boot Mode, the boot controller and boot order are set automatically.

1. Press the Power On/Standby button.
2. During the initial boot:
 - o To modify the server configuration ROM default settings, press the **F9** key in the HP ProLiant POST screen to enter the UEFI System Utilities screen. By default, the System Utilities menus are in the English language.
 - o If you do not need to modify the server configuration and are ready to install the system software, press the **F10** key to access Intelligent Provisioning.

For more information on automatic configuration, see the *HP UEFI System Utilities User Guide* on the HP website (<http://www.hp.com/go/ProLiantUEFI/docs>).

Configuring an array

To configure an array on an HP Smart HBA, use HP SSA. For more information, see the *HP Smart Storage Administrator User Guide*. This feature is only available when the controller is configured to run in RAID mode.

Remember the following factors when you build an array:

- All drives grouped in a logical drive must be of the same type (for example, either all SAS or all SATA and either all hard drives or all solid state drives).
- For the most efficient use of drive space, all drives within an array should have approximately the same capacity. Each configuration utility treats every physical drive in an array as if it has the same capacity as the smallest drive in the array. Any excess capacity of a particular drive cannot be used in the array and so is unavailable for data storage.
- The more physical drives that there are in an array, the greater the probability that the array will experience a drive failure during any given period.
- To guard against the data loss that occurs when a drive fails, configure all logical drives in an array with a suitable fault-tolerance (RAID) method.

Maintenance and troubleshooting

System maintenance tools

Updating firmware

Server and controller firmware should be updated before using the controller for the first time, unless any installed software or components require an older version. For system software and firmware updates, download the SPP from the HP website (<http://www.hp.com/go/spp>).

Installing device drivers



IMPORTANT: Always perform a backup before installing or updating device drivers.

HP now distributes drivers and other support software for servers and server blades through Service Pack for ProLiant, or SPP, which you can download from the HP website (<http://www.hp.com/go/spp/download>). Be sure to use the latest SPP version for the server or server blade.

If you installed an OS by using the Intelligent Provisioning software, its Configure and Install feature may have provided the latest driver support.

To directly locate the OS drivers for a particular server, enter the following web address into the browser:

<http://www.hp.com/support/<servername>>

In place of <servername>, enter the server name.

For example:

<http://www.hp.com/support/dl360gen8>

Managing servers with Insight Agents

When using Insight Agents to manage HP ProLiant Gen8 servers and later, HP recommends that you clear the selection for Agentless Management Service, and then select Insight Agents for installation to take place.

You can update the Management Agents by using the latest versions of the agents provided in the Intelligent Provisioning software.

Diagnostic tools

To troubleshoot array problems and generate feedback about arrays, use the following diagnostic tools:

- **HP SSA**

HP SSA can be accessed offline with HP Intelligent Provisioning, during POST, or from an ISO image. It can also be accessed online by downloading the HP SSA executables. For more information on accessing and using HP SSA, see the *HP Smart Storage Administrator User Guide*.

- **Event Notification Service**

This utility reports array events to the server IML and the Microsoft Windows system event log, and records the Smart Array serial log, which includes detailed diagnostic information of the most recent events encountered by the controller. You can obtain the utility from the HP website (<http://www.hp.com/support>). When prompted for product information, enter the server model name.

- **HP Insight Diagnostics**

HP Insight Diagnostics is a tool that displays information about the system hardware configuration and performs tests on the system and its components, including drives if they are connected to Smart Array controllers. This utility is available on the HP website (<http://www.hp.com/servers/diags>).

- **POST messages**

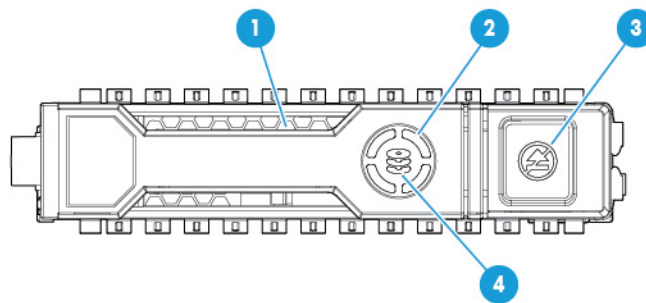
Smart Array controllers produce diagnostic error messages (POST messages) at reboot. Many POST messages suggest corrective actions. For more information about POST messages, see *The HP ProLiant Gen9 Troubleshooting Guide, Volume II: Error Messages*:

- English (http://www.hp.com/support/Gen9_EMG_en)
- French (http://www.hp.com/support/Gen9_EMG_fr)
- Spanish (http://www.hp.com/support/Gen9_EMG_es)
- German (http://www.hp.com/support/Gen9_EMG_de)
- Japanese (http://www.hp.com/support/Gen9_EMG_ja)
- Simplified Chinese (http://www.hp.com/support/Gen9_EMG_zh_cn)

Drive procedures

Identifying the status of an HP SmartDrive

HP SmartDrives are the latest HP drive technology, and they are supported beginning with ProLiant Gen8 and later servers and server blades. The HP SmartDrive is not supported on earlier generation servers and server blades. When a drive is configured as a part of an array and connected to a powered-up controller, the drive LEDs indicate the condition of the drive.



Item	LED	Status	Definition
1	Locate	Solid blue	The drive is being identified by a host application.
		Flashing blue	The drive carrier firmware is being updated or requires an update.
2	Activity ring	Rotating green	Drive activity
		Off	No drive activity
3	Do not remove*	Solid white	Do not remove the drive. Removing the drive causes one or more of the logical drives to fail.
		Off	Removing the drive does not cause a logical drive to fail.
4	Drive status	Solid green	The drive is a member of one or more logical drives.
		Flashing green	The drive is rebuilding or performing a RAID migration, strip size migration, capacity expansion, or logical drive extension, or is erasing.
		Flashing amber/green	The drive is a member of one or more logical drives and predicts the drive will fail.
		Flashing amber	The drive is not configured and predicts the drive will fail.
		Solid amber	The drive has failed.
		Off	The drive is not configured by a RAID controller.

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

*RAID mode only

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.

Regulatory information

Safety and regulatory compliance

For safety, environmental, and regulatory information, see *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the HP website (<http://www.hp.com/support/Safety-Compliance-EnterpriseProducts>).

Belarus Kazakhstan Russia marking



Manufacturer

Hewlett-Packard Company, Address: 3000 Hanover Street, Palo Alto, California 94304, U.S.

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Local representative information (Kazakh)

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Manufacturing date

The manufacturing date is defined by the serial number (HP serial number format for this product):

CCSYWWZZZZ

Valid date formats include the following:

- YWW, where Y indicates the year counting from within each new decade, with 2000 as the starting point. For example, 238: 2 for 2002 and 38 for the week of September 9. In addition, 2010 is indicated by 0, 2011 by 1, 2012 by 2, 2013 by 3, and so forth.
- YYWW, where YY indicates the year, using a base year of 2000. For example, 0238: 02 for 2002 and 38 for the week of September 9.

Turkey RoHS material content declaration

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Ukraine RoHS material content declaration

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

Warranty information

HP ProLiant and X86 Servers and Options (<http://www.hp.com/support/ProLiantServers-Warranties>)

HP Enterprise Servers (<http://www.hp.com/support/EnterpriseServers-Warranties>)

HP Storage Products (<http://www.hp.com/support/Storage-Warranties>)

HP Networking Products (<http://www.hp.com/support/Networking-Warranties>)

Acronyms and abbreviations

HBA

host bus adapter

SAS

serial attached SCSI

SATA

serial ATA

SPP

HP Service Pack for ProLiant

SSD

solid-state drive

Documentation feedback

HP is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback (<mailto:docsfeedback@hp.com>). Include the document title and part number, version number, or the URL when submitting your feedback.

Index

A

array, configuring 16

B

battery replacement notice 21

battery warranty 22

BSMI notice 21

C

Canadian notice 21

components 7, 8, 9, 10, 11

configuring an array 16

connecting internal storage 13

connectors 7, 8, 9, 11, 14

controller board, features of 5

controller components 7

D

Declaration of Conformity 21, 22

device drivers, installing 17

drives, determining status of 19

E

electrostatic discharge 20

European Union notice 21

F

features 5, 7

features, standard 5

Federal Communications Commission (FCC)
notice 21

firmware, updating 17

G

grounding methods 20

H

HBA mode 6

HP SSD Smart Path 5

I

Insight Management Agents 17

installation and configuration 15

installation instructions 12, 14

installation overview 12

installing adapters 12, 14

installing device drivers 17

J

Japanese notice 21

L

LED behavior 7, 8, 10

LED identification 7, 8, 10

limited warranty 22

load protection guarantee 22

M

methods for updating firmware 17

modifications, FCC notice 21

O

overview 5

R

RAID 6

RAID levels 6

regulatory compliance notices 21

RoHS 22

S

Secure Encryption 6

servers, disconnecting 12

servers, supported 6

specifications 11

static electricity 20

support 6

supported servers 6

system maintenance tools 17

T

Taiwan battery recycling notice 21
troubleshooting 17

U

UEFI System Utilities 16
updating firmware 17

W

warranty information 22