

### Overview

The HP StorageWorks 60 Modular Smart Array enclosure is a 2U Serial Attach SCSI (SAS) disk drive storage enclosure supporting 3.5 inch SAS, Serial ATA (SATA) and SAS Midline (MDL) drives. This enclosure delivers industry-leading data performance, availability, storage density, and upgradeability to meet customers' demanding and growing storage needs. This enclosure is designed to support 3.5 inch Universal SAS, SATA or SAS MDL hard drive form factors. The MSA60 enclosure supports direct attach storage (DAS) to HP ProLiant and HP Integrity Servers. The MSA60 supports the cascading of shelves in a 1+3 configuration to allow a maximum of 48 drives in an 8U configuration behind each of the two external ports on the HP Smart Array P800, the HP Smart Array E500, HP Smart Array P411 or the HP Smart Array P812 Controllers for a total of 96 drives in 8 enclosures (this single controller port incorporates four lanes for a total max throughput of 12Gb/s for SAS). On HP ProLiant servers Dual Domain support is available for the HP Smart Array P800 attached to a MSA60 with the addition of the HP StorageWorks Dual Domain I/O Module Option (AG779A). (Single initiator environment only). (**NOTE: Smart Array P411 and P812 Controllers are supported on ProLiant servers only**).

The MSA60 also supports the HP Smart Array P600 and the HP Smart Array P212 Controllers. Behind the single external port on the HP Smart Array P600 or the P212 Controllers 1+3 cascading allows a maximum of 48 drives in an 8U configuration. (**NOTE: Smart Array P212 Controller is supported on ProLiant servers only**).

For HP-UX and Open VMS environments on HP Integrity Servers the MSA60 supports the HP (AH303A) SC44Ge Host Bus Adapter with the addition of the HP StorageWorks Dual Domain I/O Module Option (AG779A). Behind the single external port on the HP (AH303A) SC44Ge Host Bus Adapter 1+3 cascading allows a maximum of 48 drives in an 8U configuration. The HP (AH303A) SC44Ge Host Bus Adapter will only support HP-UX and Open VMS environments and will be available on all rack mounted HP Integrity Servers with PCIe slots.

The addition of the I/O Module with the HP SC44Ge Host Bus Adapter adds support for Multi Initiator JBOD Clusters. It will support HP-UX and Open VMS on selected HP Integrity servers only. The MSA60 with the I/O Module and the HP SC44Ge Host Bus Adapter will not support ProLiant servers. Multi Initiator JBOD clusters are supported with dual port SAS drives only. Support for HP Serviceguard software on HP-UX with HP-UX 11iv2/11iv3 only.

HP Serviceguard monitors the health of each node and rapidly responds to failures in a way that minimizes or eliminates application downtime.

**NOTE: HP Integrity servers that are supported:**

[rx2660, rx3600, rx6600, rx7640, rx8640, Superdome sx2000 \(only the version that support PCI-e cards\)](#)

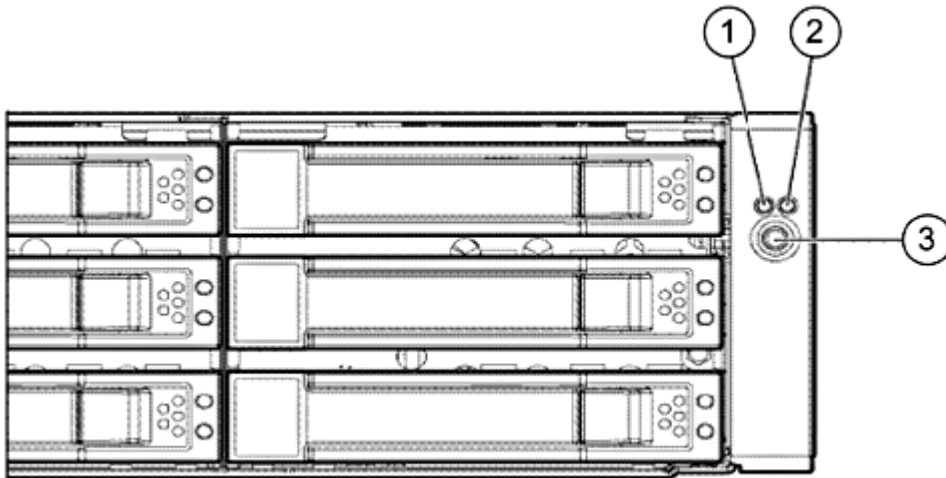
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### What's New

- Introducing support for the new HP Smart Array Controller for the MSA60 with ProLiant servers
  - HP Smart Array P812 Controller/1G Flash Backed Cache Controller
- Introducing support for new drives
  - HP 2 TB 3G SATA 7.2K LFF (3.5 inch) MDL HDD
  - HP 1 TB 6G SAS 7.2K LFF (3.5 inch) DP MDL HDD
  - HP 2 TB 6G SAS 7.2K LFF (3.5 inch) DP MDL HDD

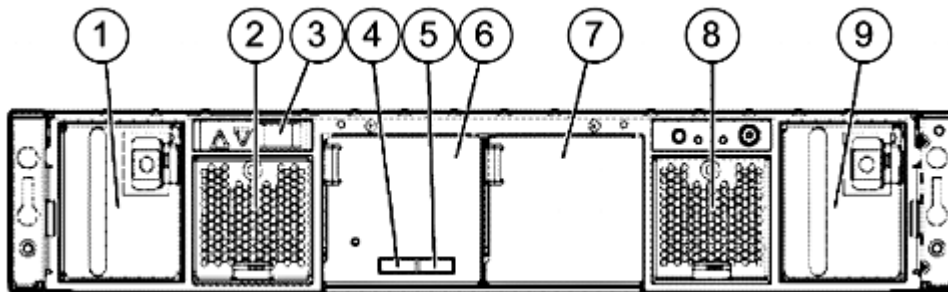


## Overview



### Front panel LEDs and buttons

1. Heartbeat LED
2. Fault LED
3. UID button/LED



### Rear Panel components

- |  |                   |
|--|-------------------|
| 1. Power Supply 1                                | 6. I/O module bay |
| 2. System fan 1                                  | 7. I/O module bay |
| 3. Dual 7 segment display board (for future use) | 8. System fan 2   |
| 4. SAS in connector                              | 9. Power supply 2 |
| 5. SAS out connector                             |                   |

### Overview

#### At A Glance

- 2U rackmount form factor
- 3 Gb/s SAS host connectivity
- Dual Domain support with HP Smart Array P800 Controller for HP ProLiant and Integrity servers (requires dual port SAS drives)
- Multi Initiator support with the SC44Ge Host Bus Adapter (AH303A) (HP-UX and Open VMS on selected HP Integrity Servers) with dual port SAS drives only
- Supports HP SAS single port and dual port 3G SAS disk drives, (72 GB, 146 GB, 300 GB & 450 GB 15K & 400 GB 10K capacities) and 6G DP SAS disk drives (300GB, 450GB & 600GB 15K capacities)
- Ability to support HP SAS dual port MDL (Midline) 6G disk drives (1 TB and 2 TB capacities)
- Compatible with HP SATA 3G disk drives, (500 GB, 1 TB and 2 TB capacities)
- Maximum storage capacity of 7.2 TB (with twelve HP SAS 6G 600 GB hard drives) or 24 TB (with twelve HP SATA 3G 2 TB hard drives or 2 TB SAS MDL drives)
- 1+3 Cascade support (behind a single SAS port)
- Supports boot from storage
- Redundant hot-plug power supplies and fans standard
- Addition of second I/O Module adds Dual Domain capability providing higher level of redundancy and reliability



### Standard Features

#### Modular Smart Array Family

The HP StorageWorks Modular Smart Array family delivers simple, affordable storage technology to meet today's demanding and growing IT needs. These storage solutions offer the best price/performance and best price/availability features for direct attach environments, small clusters, workgroups and entry-level SAN environments. Each solution is designed for easy deployment, secure operation, and reduced management costs while driving rapid return on investment.

#### MSA60

The HP StorageWorks MSA60 Enclosure (hereafter referred to as "MSA60") is a disk drive storage enclosure with 3G SAS host connectivity. These enclosures deliver industry-leading availability, storage density, and upgradeability to meet customers' demanding and growing storage needs. The MSA60 delivers the ideal mix of low-cost and high capacity, for minimum I/O workloads such as reference data, archival, and disk-to-disk backup.

#### Key Features

- 2U rackmount form factor
- SAS host interface
- Dual Domain support with HP Smart Array P800 Controller (requires dual port SAS drives)
- Multi Initiator support with the SCG44e Host Bus Adapter (AH303A) (HP-UX and Open VMS on selected HP Integrity Servers) with dual port SAS drives only
- Supports twelve 3.5-inch hot pluggable drives
- Ability to support, 72 GB ,146 GB, 300 GB & 450 GB 15K and 400 GB 10K 3.5 inch 3G SAS single port and dual port drives, and 300GB, 450GB & 600GB 6G SAS dual port drives
- Ability to support HP 6G SAS dual port MDL (Midline) disk drives (1 TB & 2 TB capacities)
- Compatible with HP SATA 3G disk drives, (250 GB, 500 GB, 750 GB, 1 TB & 2 TB capacities)
- Modular design
- 1+3 Cascade support (behind a single SAS port)
- SATA 3G - Delivering data transfer rates greater than 100 MB/s
- Provides storage capacity of up to 7.2 TB per enclosure using 6G , 600GB DP SAS disk drives
- Provides storage capacity of up to 24 TB per enclosure using 2 TB SATA disk drives or 2 TB SAS MDL HDD
- Hot pluggable disk drives, power supplies, and fans
- Redundant fans and power supplies ship as standard equipment with base enclosure
- Each MSA60 enclosure comes with dual power supplies that are sufficient to provide power to the enclosure and maintain normal operating levels
- Integrated Environmental Monitoring - Monitors environmental conditions within the enclosure and components such as the power supply, fans and temperature
- Easy removal of parts provides better serviceability. No tools are required!
- Supports MS Windows 2003, MS Windows 2008, Red Hat Linux, SUSE Linux, Novell NetWare, HP-UX 11iv2 and 11iv3, Open VMS 8.3 1H
- Supported with Smart Array P800, the Smart Array E500, the Smart Array P600, the Smart Array P411, the Smart Array P212 or the HP Smart Array P812 Controller for HP ProLiant Servers and HP Integrity Servers in a single initiator environment. (NOTE: Smart Array P411, P212 & P812 Controllers are supported on ProLiant servers only).
- Attached to HP SC44Ge Host Bus Adapter for HP-UX and Open VMS support on selected HP Integrity Servers (servers that support PCI-e cards)
- Supported with ACU, ORCA and HP Systems Insight Manager through configuration utilities provided via the Smart Array controller
- RoHS compliant
- 3 year limited warranty (MSA60 enclosure only)
- Pre-Failure warranty that covers SAS and SATA disk drives (See note below)



### Standard Features

**NOTE:** Customer must be running HP Systems Insight Manager in order to qualify for Pre-Failure warranty. The enclosure is only covered for the warranty period of the drive (3 years for SAS and 1 year for SAS Midline (MDL) and SATA drives).



### Product Highlights

#### High Levels of Storage Density, Data Protection, and Functionality

- **Storage Capacity** - The MSA60 enclosure supports up to 12 SAS drives for a maximum capacity of 7.2 TB SAS drives or 24 TB with SATA or SAS MDL drives
- **Data Protection** - MSA60 is designed for a high level of data protection. It includes redundant fans and power supplies (standard), and support for various RAID level including RAID6 with ADG (depending upon the Smart Array Controller used)
- **Dual Domain** - Dual domain SAS creates redundant pathways from servers to storage devices. The redundant paths created by these configurations reduce or eliminate single points of failure within the storage network. This provides increased levels of high availability with redundant paths from the controller to the drives.
- **Storage Manageability** - The MSA60 features familiar configuration and management tools such as Array Configuration Utility (ACU) and HP Systems Insight Manager (SIM). Online Management Features include: Online Capacity Expansion, Online RAID Level Migration, Online Stripe Size Migration, Online Spares (Global)
- **Choice of Computing Platform** - The MSA60 is designed and qualified for HP ProLiant and HP Integrity servers
- **Advanced Data Guarding (RAID 6 with ADG) Fault Tolerance** - It allocates two sets of parity data across drives and allows simultaneous write operations. This level of fault tolerance can withstand two simultaneous drive failures without downtime or data loss.

#### Low Total Cost of Ownership

The modular, scalable design of the MSA60 provides an extremely flexible platform. You can buy what you need today and purchase additional capacity as your data storage needs grow, instead of making a large up-front investment. Additional drives and enclosures can be easily added as your needs dictate.

- **Cascading** - The MSA60 has the unique capability of cascading up to 4 - four enclosures behind a single SAS port (depends on the Smart Array Controller).
- **Tiered Storage** - MSA60 supports mixing SAS and SATA drives in the same enclosure, allowing you to more effectively utilize mission critical storage where you need it most.
- **Universal SATA Hard Drive** - Since the MSA60 supports HP Universal SATA drives, your investment in disk drives is protected and cost is minimized as you add new drives.
- **Pre-Failure Warranty** - Drives installed in a MSA60 and monitored under HP Systems Insight Manager are supported by a Pre-Failure (replacement) Warranty (3 years for SAS and 1 year for SAS MDL and SATA drives). Pre-Failure Warranty allows for the replacement of designated drives in MSA60 before they actually fail when using HP Systems Insight Manager on HP ProLiant or HP Integrity servers.  
**NOTE:** [Some operating systems may not support all of these features.](#)
- **Integrated Configuration and Management Tools** - The MSA60 utilizes the standard, integrated set of Smart Array management and utility software for HP ProLiant Servers. These tools consistently lower the cost of ownership by reducing training and technical expertise necessary to install and maintain HP server storage. HP-UX and Open VMS uses HP Integrity ODE for storage enclosure support.



### MSA60 Components

#### MSA60 Enclosure

The 2U array houses up to twelve 3.5 inch Universal hot pluggable SAS or SATA drives. Each MSA60 includes the following standard components:

- MSA60 base enclosure with redundant power supplies and fan modules
- Rack mounting hardware kit
- 0.5m mini-SAS cable
- Two AC power cords and two PDU interconnect cords

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#### Smart Array P800 Features

- HP's highest performing 16-port PCI-express controller with expander support
- Expander support enables the addition of external storage, allowing increased number of drives for increased performance
- Provides highest level of data protection standard by using RAID 6 with Advanced Data Guarding
- Supports a maximum total of 104 hard drives (96 drives across eight enclosures plus 8 drives in the server internal backplane)
- Supported in a single initiator environment
- For more information see:  
[http://h18004.www1.hp.com/products/quickspecs/12616\\_na/12616\\_na.html](http://h18004.www1.hp.com/products/quickspecs/12616_na/12616_na.html)

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#### Smart Array E500 Features

- HP's first external connect only PCI Express (PCIe) Serial Attached SCSI (SAS) RAID controller
- Expander support enables the addition of external storage, allowing increased number of drives for increased performance
- Offers RAID 0, 1 & 0+1 and can be upgraded with battery-backed write cache (BBWC) module for RAID 5
- Supports a maximum total of 108 hard drives
- Supported in a single initiator environment
- For more information see:  
[http://h18004.www1.hp.com/products/quickspecs/12700\\_na/12700\\_na.html](http://h18004.www1.hp.com/products/quickspecs/12700_na/12700_na.html)

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#### Smart Array P411 Features

- The HP Smart Array P411 is HP's PCI Express (PCIe) Serial Attached SCSI (SAS) RAID controller
- Low profile, half height card has 8 ports and utilizes DDR2-800 memory
- The P411 is ideal for RAID 0/1, 5, 1+0 & 5+0 and can be upgraded with the 512MB battery-backed write cache (BBWC) module and Smart Array Advanced via license key for RAID 6 &, 6 + 0, 50 and 60
- For more information see:  
[http://h18004.www1.hp.com/products/quickspecs/13202\\_na/13202\\_na.html](http://h18004.www1.hp.com/products/quickspecs/13202_na/13202_na.html)

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#### Smart Array P212 Features

- The HP Smart Array P212 is HP's entry level PCI Express (PCIe) Serial Attached SCSI (SAS) RAID controller
- The Low Profile, Half Height card has 8 ports and utilizes DDR2-266 memory
- The P212 is ideal for RAID 0/1, 1+0 and can be upgraded with the 256MB battery-backed write cache (BBWC) module for RAID 5, 5+0
- For more information see:  
[http://h18004.www1.hp.com/products/quickspecs/13203\\_na/13203\\_na.html](http://h18004.www1.hp.com/products/quickspecs/13203_na/13203_na.html)



### MSA60 Components

#### Smart Array P812 Features

- The HP Smart Array P812 provides superior RAID performance, while delivering high levels of connectivity, reliability, and many advanced features
- Increased connectivity with 8 internal ports and 16 external ports.
- 1 G 72-bit wide DDR2-800 flash-backed write cache (FBWC).
- Smart Array Advanced Pack (SAAP) license key included standard
- For more information see:  
[http://h18004.www1.hp.com/products/quickspecs/13558\\_na/13558\\_na.html](http://h18004.www1.hp.com/products/quickspecs/13558_na/13558_na.html)

#### HP (AH303A) SC44Ge Host Bus Adapter

- SAS technology delivers high performance and data bandwidth up to 3 Gbps per physical link.
- PCI Express x8 capable
- PCIe x8 (2.5 GB/s bandwidth)
- Supported in a Multi Initiator environment

#### RAID

Several fault tolerant configurations keep data available and servers running while drives are being replaced – RAID levels that offer fault tolerance include:

- **RAID 50 (RAID 5+0)** protects against failure of one drive (and failure of particular multiple drives). RAID 50 is a nested RAID method that uses RAID 0 striping across RAID 5 arrays. RAID 50 tolerates one drive failure in each spanned array without loss of data. RAID 50 requires less rebuild time than single RAID 5 arrays RAID 50 requires a minimum of six drives.
- **RAID 60 (RAID 6+0)** allows administrators to split the RAID 6 storage across multiple external boxes. RAID 60 requires a minimum of eight drives. RAID 60 is a nested RAID method that uses RAID 0 block-level striping across multiple RAID 6 arrays with dual distributed parity. With the inclusion of dual parity, RAID 60 will tolerate the failure of two disks in each spanned array without loss of data.
- **RAID 6 with ADG:** Allocates the equivalence of two parity drives across multiple drives and allows simultaneous write operations. **Distributed Data Guarding (RAID 5):** Allocates parity data across multiple drives and allows simultaneous write operations. **Drive Mirroring (RAID 1 and 1+0 Striped Mirroring):** Allocates half of the drive array to data and the other half to mirrored data, providing two copies of every file.

#### Dual Domain (NEW)

Dual domain SAS creates redundant pathways from servers to storage devices. The redundant paths created by these configurations reduce or eliminate single points of failure within the storage network. This provides increased levels of high availability with redundant paths from the controller to the drives. Dual domain SAS implementations make it possible to tolerate host bus adapter (HBA) failure, external cable failure, expander failure, failure in a spanned disk (JBOD) environments.



### Software Components

<b>Utilities</b>	The MSA60 utilizes a single, consistent set of utility software for storage and RAID management, setup, configuration and troubleshooting. This consistency reduces the cost of ownership by reducing the training and technical expertise necessary to install and maintain your HP server storage solution.
<b>Configuration Utilities</b>	Array Configuration Utility (ACU) [On-line for Microsoft and Linux, Remote Web-Based & Off-line] Option ROM Configuration for Arrays (ORCA), NetWare ACU CPQONLIN ( <a href="#">only online support no Web based support</a> )
<b>Management/Health Utilities</b>	HP Systems Insight Manager

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<b>Array Configuration Utility (ACU)</b>	<ul style="list-style-type: none"><li>• Provides a graphical view of HP drive array configurations.</li><li>• Easy to use Wizards for configuration.</li><li>• Web Based ACU supports On-Line, Remote Web Based and Off-line configuration.</li><li>• Supports on-line configuration for Microsoft, NetWare and Linux.</li></ul>
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<b>HP Systems Insight Manager</b>	<ul style="list-style-type: none"><li>• Powerful storage, server and server option management tool.</li><li>• Monitor storage from a remote central location.</li><li>• Browser based Insight Manager 7 provides full access from anywhere on the Intranet, eliminating the need for a dedicated Insight Manager console.</li></ul>
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<b>Supported Operating Systems</b>	<b>HP ProLiant Servers</b> <b>NOTE:</b> For information on supported Operating Systems, please see the following Smart Array Quickspecs:
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E500: [http://h18004.www1.hp.com/products/quickspecs/12700\\_na/12700\\_na.html](http://h18004.www1.hp.com/products/quickspecs/12700_na/12700_na.html)

P600: [http://h18004.www1.hp.com/products/quickspecs/12247\\_na/12247\\_na.html](http://h18004.www1.hp.com/products/quickspecs/12247_na/12247_na.html)

P800: [http://h18004.www1.hp.com/products/quickspecs/12616\\_na/12616\\_na.html](http://h18004.www1.hp.com/products/quickspecs/12616_na/12616_na.html)

P212: [http://h18004.www1.hp.com/products/quickspecs/13203\\_na/13203\\_na.html](http://h18004.www1.hp.com/products/quickspecs/13203_na/13203_na.html)

P411: [http://h18004.www1.hp.com/products/quickspecs/13202\\_na/13202\\_na.html](http://h18004.www1.hp.com/products/quickspecs/13202_na/13202_na.html)

P812: [http://h18004.www1.hp.com/products/quickspecs/13558\\_na/13558\\_na.html](http://h18004.www1.hp.com/products/quickspecs/13558_na/13558_na.html)

#### HP Integrity Servers

- HPUX 11iv2/11iv3
- Open VMSV 8.3 1H

**NOTE:** HPUX 11iv2/11iv3 (for Dual Domain only)

Needs I/O Module (#AG779A), and HP SC44Ge Host Bus Adapter or HP Smart Array P800 Controller

Qualified for the following HP Integrity servers:

rx2660, rx3600, rx6600, rx7640, rx8640, Superdome sx2000 (only the version that support PCI-e cards)

**NOTE:** Open VMS (for Dual Domain only)

Needs I/O Module (#AG779A), and HP (AH303A) SC44Ge Host Bus Adapter

Qualified for the following HP Integrity servers:

rx2660, rx3600, rx6600, rx7640, rx8640, Superdome sx2000 (only the version that support PCI-e cards)



### Service and Support, HP Care Pack, and Warranty Information

#### Service and Support

Three-year limited parts only warranty, including hardware diagnostic support, pre-failure warranty (coverage of hard drives, memory and processors). The warranty is fully supported by HP Services and a worldwide network of resellers and service providers. In addition 90-day's getting started software telephone support may be covered under the warranty or available for an additional fee. Enhancements to warranty services are available through HP Care Pack services.

**NOTE:** The MSA60 has a limited 3 year parts only warranty. The SAS drives have a 3 year warranty. SAS MDL and SATA drives have a 1 year warranty

Care Pack services provide a range of life cycle support options that let you choose the service levels that meet your business requirements, from basic to mission-critical.

A full range of HP Care Pack hardware and software services are available including:

- Installation and start up
- Education courses
- Extended onsite hardware coverage hours from same business day 13 hours, 5 day to 24 hours, 7 days call window with options including 4-hour response or 6-hour Call To Repair
- Comprehensive range of software technical support for Microsoft, Linux, ProLiant Essentials solutions helping to deliver high level of application availability. Response times range from 30 minutes for critical problems to 2 hours.
- System Management, Performance Services and Mission Critical Support Solution

Service includes HP branded hardware options qualified for the storage enclosure, purchased at the same time or afterwards, internal to the enclosure. These will be covered at the same service level and coverage period as the storage enclosure.

**NOTE:** For more information on HP Care Pack services, contact any of our worldwide sales offices or resellers or visit our worldwide Web site on the Internet at: <http://www.hp.com/hps/carepack>

**NOTE:** For more complete information on HP Services offerings, customers and resellers, please visit us at: <http://www.hp.com/hps>

**NOTE:** Additional information regarding worldwide limited warranty and technical support is available at: <http://h18004.www1.hp.com/products/servers/platforms/warranty/index.html>

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HP Care Pack Information Flexible Support	1 Year Support	HA101A1-87G
		HA103A1-87G
		HA104A1-87G
		HA105A1-87G
		HA109A1-87G
	3 Year Support	HA110A1-87G
		HA111A1-87G
		HA112A1-87G
		HA101A3-87G
		HA103A3-87G
HA104A3-87G		
HA105A3-87G		
HA109A3-87G		



### Service and Support, HP Care Pack, and Warranty Information

		HA110A3-87G	
		HA111A3-87G	
		HA112A3-87G	
	4 Year Support	HA101A4-87G	
		HA103A4-87G	
		HA104A4-87G	
		HA105A4-87G	
		HA109A4-87G	
		HA110A4-87G	
		HA111A4-87G	
		HA112A4-87G	
	5 Year Support	HA101A5-87G	
		HA103A5-87G	
		HA104A5-87G	
		HA105A5-87G	
		HA109A5-87G	
		HA110A5-87G	
		HA111A5-87G	
		HA112A5-87G	
		HA113A1-564	
Fixed Care Packs	Installation & Start-Up	UF297E	
	HP 1Y NBD,9X5 MSA60 HW Support	UF298E	
	HP 1Y 4h 13x5 MSA60 HW Support	UF299E	
	HP 1Y 4h 24x7 MSA60 HW Support	UF300E	
	HP 1y 6h CTR MSA60 HW Support	UF301E	
	HP 3y NBD 9x5 MSA60 HW Support	UF302E	
	HP 3y 4h 13x5 MSA60 HW Support	UF303E	
	HP 3y 4h 24x7 MSA60 HW Support	UF304E	
	HP 3y 6h CTR MSA60 HW Support	UF305PE	
	HP 1y PW NBD MSA60 HW Support	UF306PE	
	HP 1y PW 4h 13x5 MSA60 HW Support	UF307PE	
	HP 1y PW 4h 24x7 MSA60 HW Support	UF308PE	
	HP 1y PW 6h CTR MSA60 HW Support	U8132E	
		Hardware Installation, Electronic	



### Configuration Information

#### Step 1: Base Configuration

Model	Shipping Dimensions	Part Number
MSA60	HP StorageWorks 60 Modular Smart Array	418408-B21
I/O Module	HP StorageWorks Modular Dual Domain I/O Module Option Kit	AG779A
	<p><b>NOTE:</b> The I/O Module is a field upgradeable Option Kit the addition of which in the MSA60 will allow dual domain capability providing higher level of redundancy and reliability.</p> <ul style="list-style-type: none"> <li>• HP Smart Array P800 Controller (381513-B21) supports Dual Domain on the MSA60 with the addition of the HP StorageWorks Dual Domain I/O Module in a single initiator environment. <ul style="list-style-type: none"> <li>○ Requires Dual port SAS drives</li> </ul> </li> <li>• HP (AH303A) SC44Ge Host Bus Adapter supports Dual Domain on the MSA60 with the addition of the HP StorageWorks Dual Domain I/O Module in a Multi Initiator environment. Supports only HP-UX and Open VMS and on selected HP Integrity Servers only.</li> </ul>	
MSA60 SAS MDL Dual Port drive bundle	HP StorageWorks MSA60 5.4TB SAS DP HDD Bundle (MSA60 w/12 450GB 15K SAS LFF DP HDD + Additional I/O Module)	AP713A
	HP StorageWorks MSA60 12 TB SAS DP MDL HDD Bundle (MSA60 w/12 1 TB 7.2K SAS Midline (MDL) DP HDD + Additional I/O Module)	AP714A
MSA60 Americas bundles <b>NOTE:</b> available in USA & Canada only	HP MSA60 w/ Dual Domain I/O Module, (12) 3.5-in. 300GB SAS Drives w/ cable Solution	AJ922A
	(1) HP MSA60 Modular Smart Array Enclosure; (1) HP Modular Dual Domain I/O Module Option Kit; (12) HP 300GB 3G 15K SAS 3.5" DP HDD; (1) Mini SAS 4x2M Cable All	
	HP MSA60 w/ (12) 1TB 3.5-in. LFF 7.2K rpm SATA MDL Drives w/ cable Solution	AJ924A
	(1) HP MSA60 Modular Smart Array Enclosure; (12) HP 1TB 3G SATA7.2K 3.5"MDL HDD; (1) Mini SAS 4x2M Cable All	



### Configuration Information

#### Step 2: Array Controllers

	Description	Part Number
<b>Smart Array Controllers Supported</b> (Single Domain)	<b>HP ProLiant Servers</b>	
	HP Smart Array P800 controller	381513-B21
	HP Smart Array E500 controller	435129-B21
	HP Smart Array P600/256 BBWC Controller	337972-B21
	HP Smart Array P812 Controller/ 1G Flash Backed Cache Controller	487204-B21
	HP Smart Array P411/256MB Controller	462830-B21
	HP Smart Array P411/512MB BBWC	462832-B21
	HP Smart Array P411/1G FBWC Controller	572531-B21
	HP Smart Array P212/256MB Controller	462834-B21
	<b>HP Integrity Servers</b>	
	HP Smart Array P800 controller	AD335A
	HP Smart Array E500 controller	AH226A
	HP Smart Array P600/256 BBWC Controller	337972-B21
	<b>NOTE:</b> The HP Smart Array P800 supports the cascading of shelves in a 1+3 configuration to allow a maximum of 48 drives in an 8U configuration behind or the HP Smart Array P800 controller for a total of 96 drives on the two external ports.	
<b>NOTE:</b> Dual Domain is support for the HP Smart Array P800 controller (single initiator only)		
<b>NOTE:</b> The HP Smart Array P600 supports the cascading of shelves in a 1+3 configuration to allow a maximum of 48 drives in an 8U configuration behind or the HP Smart Array P600 controller as the P600 has only a single external port.		
<b>NOTE:</b> The Smart Array E500 offers RAID 0, 1 and 0+1 and can be upgraded with ProLiant server to RAID 5 with battery-backed write cache (BBWC) module - 383280-B21.		
<b>NOTE:</b> Smart Arrays P411 and P212 are supported on ProLiant servers only		
<b>Smart Array Controllers Supported</b> (Dual Domain)	<b>HP ProLiant Servers</b>	
	HP Smart Array P800 controller	381513-B21
	<b>HP Integrity Servers</b>	
	HP SC44Ge Host Bus Adapter	AH303A
<b>NOTE:</b> Only HP-UX and Open VMS on selected HP Integrity servers supported.		
<b>NOTE:</b> HP Integrity servers that are supported: rx2660, rx3600, rx6600, rx7640, rx8640, Superdome sx2000 (only the version that support PCI-e cards).		



### Configuration Information

#### Step 3: Choose HP ProLiant Server(s)/HP Integrity Server(s)

##### Server Compatibility

##### HP ProLiant Servers

For up to date compatibility, please see the following URL for complete Smart Array P600, P800, E500, P411, P212 & P812 Controller compatibility and support information:

<http://h18004.www1.hp.com/products/servers/proliantstorage/arraycontrollers/index.html>

##### HP Integrity Servers

HP Integrity Server rx2660 with combination PCIx/PCIe riser only

HP Integrity Server rx3600 with combination PCIx/PCIe backplane only

HP Integrity Server rx6600 with combination PCIx/PCIe backplane only

HP integrity Server rx7640 with combination PCIx/PCIe only

HP integrity Server rx8640 with combination PCIx/PCIe only

HP integrity Server sx2000 with combination PCIx/PCIe only

**NOTE:** HP Integrity Server home:

[http://www.hp.com/products1/serverconnectivity/support\\_matrices.html](http://www.hp.com/products1/serverconnectivity/support_matrices.html)

#### Step 4: Choose Hard Drives

##### SAS Drives

##### 6G LFF Serial Attached SCSI (SAS) Hard Drives

HP 300GB 6G SAS 15K LFF (3.5-inch) DP ENT HDD 516814-B21

HP 450GB 6G SAS 15K LFF (3.5-inch) DP ENT HDD 516816-B21

HP 600GB 6G SAS 15K LFF (3.5-inch) DP ENT HDD 516828-B21

**NOTE:** 6G SAS drives will work in 3G systems like the MSA60. 6G SAS drives will only function as 3G drives in a MSA60.

**NOTE:** 6G SAS drives will only function as 3G drives in a MSA60

##### SAS MDL (Midline)

HP 1TB 6 GB SAS 7.2K LFF (3.5 inch) DP MDL HDD 507614-B21

HP 2TB 6 GB SAS 7.2K LFF (3.5 inch) DP MDL HDD 507616-B21

##### SATA Drives

HP 2 TB 3G SATA 7.2K LFF (3.5-inch) MDL HDD 507632-B21

HP 1 TB 3G 7.2K 3.5-inch SATA MDL HDD 454146-B21

HP 500 GB 3G SATA 7.2K LFF (3.5-inch) SATA MDL HDD 458928-B21

**NOTE:** The following PN#s for SATA drives have been replaced by new PN#s:

250GB: New PN# 458926-B21 replaces Old PN# 349239-B21

500GB: New PN# 458928-B21 replaces Old PN# 394573-B21

750GB: New PN# 458930-B21 replaces Old PN# 432341-B21

**NOTE:** SATA drives are not Dual Port drives

**NOTE:** There is a known compatibility issue with some early 3.5 inch SATA HDD that will make them unable to be used with the MSA20/60. Customers should verify that they are not using hard drive part number 356536-002/003 (spare 353044-001). The following SATA hard drives require SATA FirmWare flash in order to work properly. They are:

500GB SATA 1.5 - Model # 6H500F0, min F/W rev: HA431DDO

80GB RoHS Mask Rom SATA 1.5, Model # 6L080M0, min F/W rev BACE1GG0

160GB RoHS Mask Rom SATA 1.5, Model # 6L160M0, min F/W rev BACE1GG0

250GB RoHS Mask Rom SATA 1.5, Model # 6L250S0, min F/W rev BACE1GG0



### Configuration Information

**NOTE:** Go to the HP Hard Drive Compatibility table for complete drive compatibility information (<http://www.hp.com/products/harddiskdrives>). Using hard drives in unsupported configurations will result in voiding the warranty and could result in damage to the drive and/or loss of data.

### Step 5: Choose Rack Option

HP Racks	HP Universal Rack 10642 G2 Pallet ALL	AF001A
	HP Universal Rack 10642 G2 Shock Rack	AF002A
	HP Universal Rack 10642 G2 Crated ALL	AF003A
	HP Universal Rack 10642 G2 w/Ext Shock Rack	AF004A
	HP Universal Rack 10636 G2 Pallet ALL	AF011A
	HP Universal Rack 10636 G2 Shock Rack	AF012A
	HP Universal Rack 10636 G2 Crated ALL	AF013A
	HP Universal Rack 10636 G2 w/Ext Shock Rack	AF014A
	HP 10642 G2 200mm Extn Shock Rack	AF034A
	HP 10647 G2 200mm Extn Shock Rack	AF044A
	HP Rack S10614 (14U) Rack Cabinet – Shock Pallet	292302-B22

### Step 6: Choose Cables

Cable Options	<b>Cables used for connecting the HP Smart Array P800/512 BBWC Controller (P/N 381513-B21 or AD335A) the HP Smart Array E500 (P/N 435129-B21 or AH226A), the HP Smart Array P212 (P/N 462834-B21), the HP Smart Array P411 (P/Ns 462830-B21 or 462832-B21) or the P812 (P/Ns 487204-B21) to MSA60</b>	
	Mini SAS 4x 2M Cable All	407339-B21*
	Mini SAS 4x 4M Cable All	432238-B21*
	Mini SAS 4x 6M Cable All	432239-B21*
	*#0D1 will appear after this part number on your sales order if factory integration is indicated.	
	<b>Cables used for connecting the HP Smart Array P600/512 BBWC Controller (P/N 337972-B21) or the HP SC44Ge Host Bus Adapter (P/N AH303A) to MSA60</b>	
	SAS 4x to Mini SAS 4x 2M	419571-B21*
	SAS 4x to Mini SAS 4x 4M	419572-B21*
	SAS 4x to Mini SAS 4x 6M	419573-B21*
	*#0D1 will appear after this part number on your sales order if factory integration is indicated.	



### Technical Specifications

LED Indicators for HDDs	Online (bottom) Drive Failure/ID (top)
LED Indicators on Front Panel	Heartbeat LED Fault LED UID button/LED
LED Indicators on Rear Panel	I/O Module LED UID button/LED Heartbeat LED Fault LED Power On/Standby button/system power LED Power supply LED
Host Interface	4 x wide SAS 3 Gb/s ports
Maximum Number of Drives	Up to 12 (twelve), 3.5 inch SAS, SATA or SAS MDL drives
Temperature Range	<b>Operating</b> 50° to 95° F (10° to 35° C) <b>Shipping</b> -40° to 150° F (-40° to 66° C) <b>NOTE:</b> Rated 1°C per 1000 feet of elevation to 10,000 ft.
Relative Humidity	<b>Operating</b> 10% to 90% <b>Non-operating</b> Up to 95%
Input Power Requirements	<b>Rated Input Voltage</b> 100 to 240 VAC <b>Rated Input Frequency</b> 50 to 60 Hz <b>Rated Input Current</b> 3.9A at 110 VAC typical, 6A Maximum <b>Input Power (max)</b> 345 W
Heat Dissipation (maximum)	1175 Btu/hr* * Input Power and Heat Dissipation specifications are maximum values and apply to worst-case conditions at full rated power supply load. The power/heat dissipation for your installation will vary depending on the equipment configuration.
RAID Support	See Quickspecs for Smart Array Controllers P600, P800, E500, P212, P411 & P812 <a href="http://h18004.www1.hp.com/products/servers/proliantstorage/arraycontrollers/index.html">http://h18004.www1.hp.com/products/servers/proliantstorage/arraycontrollers/index.html</a>
Upgradeable Firmware	Yes, Offline only. Firmware updates available through hp.com
Disk Drives and Enclosure Protocol Support	HP 3.5 inch SAS 3 Gb/s
I/O Module	<b>Connector Type</b> IPass (mini-SAS) <b>Number of Ports</b> Two (one IN, other is OUT)
MSA60 Enclosure	<b>2U Rack Form Factor</b> <b>Dimensions (HxWxD)</b> 3.47 x 17.64 x 23.25 in (8.8 x 44.8 x 59 cm) <b>Weight (base unit)</b> 34 lb (15.4 kg) <b>Weight (with all drives)</b> 54 lb (24.6 kg)



### *Technical Specifications*

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For hard drives, 1 GB = 1 billion bytes. Actual formatted capacity is less.

