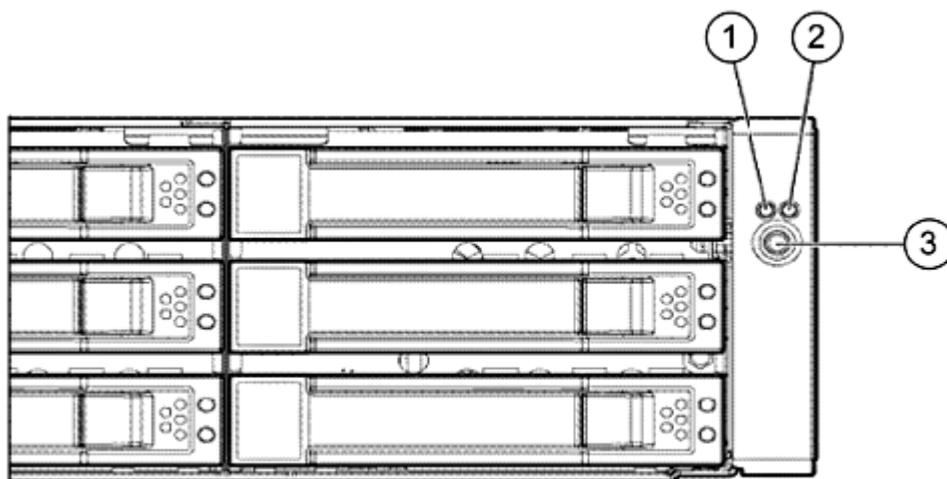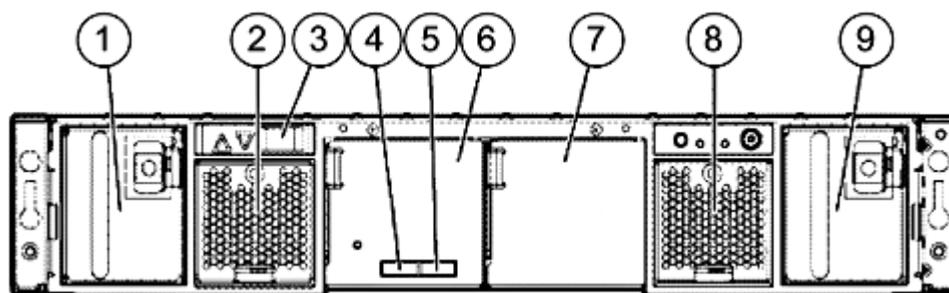# QuickSpecs

Overview

The HP StorageWorks 60 Modular Smart Array enclosure is a 2U Serial Attach SCSI (SAS) disk drive storage enclosure supporting 3.5" SAS or Serial ATA (SATA) 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" Universal SAS or SATA hard drive form factors. The MSA60 enclosure supports direct attach storage (DAS) to HP ProLiant 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 port on the Smart Array P800 controller 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)

Front panel LEDs and buttons
1. Heartbeat LED
2. Fault LED
3. UID button/LED

Rear Panel components

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

Overview

At A Glance

- 3Gb/s SAS host connectivity
- Supports twelve 3.5" hot pluggable drives
- Supports HP SAS 3Gb/s disk drives, (36GB, 72GB, 146GB and 300GB capacities)
- Supports HP SATA 1.5Gb/s disk drives, (250GB & 500GB capacities)
- Maximum storage capacity of 3.6 TB (with twelve HP SAS 3 Gb/s,) or 6TB (with twelve HP SATA 1.5Gb/s 500GB hard drives)
- Attached to Smart Array P800
- Supports boot from storage
- Redundant hot-plug power supplies and fans standard

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 3 Gb/s 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
- Supports twelve 3.5" hot pluggable drives
- Ability to support 36GB, 72GB ,146GB & 300GB 3.5" 3Gb/s SAS drives
- Ability to support 250GB & 500GB 3.5" 1.5Gb/s SATA drives
- Modular design
- 1+3 Cascade support (behind a single SAS port)
- SATA 1.5Gb/s - Delivering data transfer rates greater than 100MB/s
- Provides storage capacity of up to 6TB per enclosure (using 500GB 1" SATA disk drives)
- 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, Red Hat Linux, SUSE Linux, Novell NetWare
- Supported with Smart Array P800 SAS controller
- 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)

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 SATA drives).

Product Highlights

High Levels of Storage Density, Data Protection, and Functionality	

- **Storage Capacity** – The MSA60 enclosure supports up to twelve SAS drives for a maximum capacity of 3.6 TB SAS drives or 6 TB with SATA 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 RAID 6 with ADG (depending upon the Smart Array Controller used)
- **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 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 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 ProLiant 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. These tools consistently lower the cost of ownership by reducing training and technical expertise necessary to install and maintain HP server storage.

QuickSpecs

HP StorageWorks 60 Modular Smart Array

MSA60 Components

MSA60 Enclosure	The 2U array houses up to twelve 3.5" 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

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)

RAID

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

- 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.

Software Components

Utilities	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.
Configuration Utilities	Array Configuration Utility (ACU) [On-line for Microsoft and Linux, Remote Web-Based & Off-line] Option ROM Configuration for Arrays (ORCA), NetWare ACU CPQONLIN (only online support no Web based support)
Management/Health Utilities	HP Systems Insight Manager

Array Configuration Utility (ACU)
- Provides a graphical view of HP drive array configurations.
- Easy to use Wizards for configuration.
- Web Based ACU supports On-Line, Remote Web Based and Off-line configuration.
- Supports on-line configuration for Microsoft, NetWare and Linux.

HP Systems Insight Manager
- Powerful storage, server and server option management tool.
- Monitor storage from a remote central location.
- Browser based Insight Manager 7 provides full access from anywhere on the Intranet, eliminating the need for a dedicated Insight Manager console.

Supported Operating Systems
- Microsoft Windows Server 2003 Web Edition
- Microsoft Windows Server 2003 Standard Edition
- Microsoft Windows Server 2003 Enterprise Edition
- Novell NetWare 6.5

Not all configurations are supported on all operating systems; please refer to compatibility matrix http://www.hp.com/products/sharedstorage for latest compatibility information.

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 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 and VMware-based IT 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 Care Packs**

1 Year Next Day HW	HA101A1-7GT
1 Year 4h 13x5 HW	HA103A1-7GT
1 Year 4h 24x7 HW	HA104A1-7GT
1 Year 6h CTR HW	HA105A1-7GT
1 Year Support Plus	HA109A1-7GT
1 Year Support Plus 24	HA110A1-7GT
3 Year Next Day HW	HA101A3-7GT
3 Year 4h 13x5 HW	HA103A3-7GT
3 Year 4h 24x7 HW	HA104A3-7GT
3 Year 6h CTR HW	HA105A3-7GT
3 Year Support Plus	HA109A3-7GT
3 Year Support Plus 24	HA110A3-7GT
Installation	HA113A1-564

Service and Support, HP Care Pack, and Warranty Information

Fixed Care Packs	3 Year Next Business Day, 5-Day x 9-Hour Coverage, Electronic	U8128A/E
	3 Year Four Hour, 5-Day x 13-Hour Coverage, Electronic	U8129A/E
	3 Year Four Hour, 7-Day x 24-Hour Coverage, Electronic	U8130A/E
	3 Year Six Hour, Call to Repair, 7-Day x 24-Hour Coverage, Electronic	U8131A/E
	1 Year Next Business Day, 5-Day x 9-Hour Coverage, Electronic	U8151A/E
	1 Year Four Hour, 5-Day x 13-Hour Coverage, Electronic	U8152A/E
	1 Year Four Hour, 7-Day x 24-Hour Coverage, Electronic	U8153A/E
	1 Year Six Hour, Call to Repair, 7-Day x 24-Hour Coverage, Electronic	U8154A/E
	Hardware Installation, Electronic	U8132A/E
Flexible Care Packs	1 Year Next Day HW	HA101A1-7GT

QuickSpecs

Configuration Information

Step 1: Base Configuration

Model	Shipping Dimensions	Part Number
MSA60	35.25 x 23.5 x 15.75 in (89.5 x 59.7 x 40.0 cm)	418408-B21

Step 2: Array Controllers

	Description	Part Number
Smart Array Controllers Supported	Smart Array P800 controller	381513-B21

Step 3: Choose HP ProLiant Server(s)

Server Compatibility	HP ProLiant ML350 G5
	HP ProLiant ML370 G5
	HP ProLiant DL360 G5
	HP ProLiant DL380 G5
	HP ProLiant DL320 G4
	HP ProLiant DL320s
	HP ProLiant DL365 G2
	HP ProLiant DL580 G4
	HP ProLiant DL585 G2
	HP ProLiant DL385 G2
	HP ProLiant 140 G3

NOTE: HP ProLiant servers above may not support all Smart Array controllers, see matrix on
ftp://ftp.compaq.com/pub/products/servers/ProLiantstorage/arraycontrollers/compatability-matrix.pdf

Step 4: Choose Hard Drives

SAS Drives	HP 36GB 15K SAS 3.5" Hot Plug Hard Drive	375868-B21
	HP 72GB 15K SAS 3.5" Hot Plug Hard Drive	375870-B21
	HP 146GB 15K SAS 3.5" Hot Plug Hard Drive	375872-B21
	HP 300GB 15K SAS 3.5" Hot Plug Hard Drive	431944-B21

Configuration Information

SATA Drives	HP 500GB 1.5G SATA 7.2K 3.5" HDD	395473-B21
	HP 250GB 1.5G SATA 7.2K 3.5" HDD	349239-B21

NOTE: There is a known compatibility issue with some early 3.5" SATA HDD that will make them unable to be used with the MSA20. 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: HA431DD0
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

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 10642 G2 (no door) Shock	AF005A
	HP Universal Rack 10642 G2 w extn (no door) Shock	AF006A
	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 Rack 10636 G2 (no door) Shock	AF015A
	HP Rack 10636 G2 w extn (no door) Shock	AF016A
	HP Module Cooling System	AF092A
	Rack HP Infrastructure 42U (LV)	379006-001
	Rack HP Infrastructure 42U (HV)	379005-001
	HP Rack S10614 (14U) Rack Cabinet – Shock Pallet	292302-B22
	HP Rack 10842 (42U, 800mm wide) – Pallet	257415-B21
	HP Rack 10842 (42U, 800mm wide) – Shock Pallet	257415-B22
	HP Rack 10647 (47U) – Pallet	245160-B21
	HP Rack 10647 (47U) – Crated	245160-B23
	HP Rack 10622 (22U) – Pallet	245163-B21
	HP Rack 10622 (22U) – Shock Pallet	245163-B22
	HP Rack 10622 (22U) – Crated	245163-B23

Configuration Information

Step 6: Choose Cables

Mini SAS 4x 2M Cable All	407339-B21
Mini SAS 4x 4M Cable All	432238-B21
Mini SAS 4x 6M Cable All	432239-B21

Technical Specifications

LED Indicators for Drive Modules (2)	Online (bottom)	
	Drive Failure/ID (top)	
LED Indicators on Front Panel	Heartbeat LED	
	Fault LED	
	UID button/LED	
LED Indicators on Rear Panel (6)	I/O Module LED	
	UID button/LED	
	Heartbeat LED	
	Fault LED	
	Power On/Standby button/system power LED	
	Power supply LED	
Host Interface	SAS 3 Gb/s	
Maximum Number of Drives	Up to twelve, 3.5" SAS or SATA drives	
Temperature Range	Operating	50° to 95° F (10° to 35° C)
	Shipping	-40° to 150° F (-40° to 66° C)
		NOTE: Rated 1°C per 1000 feet of elevation to 10,000 ft.
Relative Humidity	Operating	10% to 90%
	Non-operating	Up to 95%
Input Power Requirements	Rated Input Voltage	100 to 240 VAC
	Rated Input Frequency	50 to 60 Hz
	Rated Input Current	3.9A at110 VAC typical, 6A Maximum
	Input Power (max)	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.	
User Interface	Controller display with Status indicators (2) and push buttons (4) on front of controller	
Logical Drives (LUN)	Up to 32 Logical drives when connected to P800 Smart Array controller	
Maximum Logical Drive Size	> 2 TB	
RAID Support	RAID 6 with ADG (Advanced Data Guarding RAID 5 (Distributed Data Guarding) RAID 1 + 0 (Mirroring and Stripping) RAID 1 (Mirroring) RAID 0 (Stripping)	
Upgradeable Firmware	4MB Flashable	
Disk Drives and Enclosure Protocol Support	HP 3/5" SAS 3 Gb/s	

Technical Specifications

I/O Module	**Connector Type**	IPass (mini-SAS)
	Number of Ports	Two (one IN, other is OUT)
MSA60 Enclosure	2U Rack Form Factor	
	Dimensions (HxWxD)	3.47 x 17.64 x 23.25 in (8.8 x 44.8 x 59 cm)
	Weight (base unit)	34 lb (15.4 kg)
	Weight (with all drives)	54 lb (24.6 kg)