

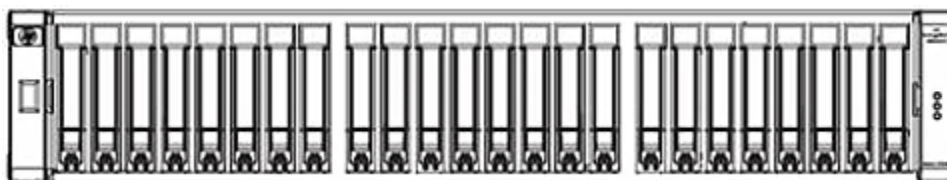
Overview

The HP StorageWorks 2000sa G2 Modular Smart Array is a 3Gb SAS direct attach, external shared storage solution that helps customers easily transition from direct attached to centralized storage. It allows departmental and small to medium businesses customers to grow capacity as demands increase up to 29.7 TB SAS or 60 TB SATA, and supporting up to 64 hosts

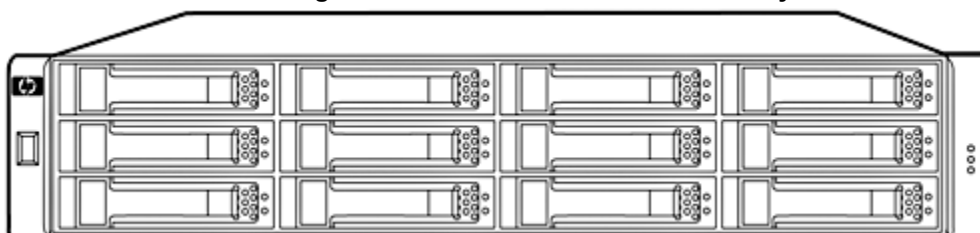
With up to 511 LUNs and LUN sizes up to 16 TB, the MSA2000sa G2 gives maximum configuration flexibility. The MSA2000sa G2 allows mixing of enterprise-class, dual-ported SAS drives and archival-class SATA drives, and supports both Large Form Factor and Small Form Factor drives. The optional HP StorageWorks 2000 Modular Smart Array Snapshot Software offers increased data protection. The MSA2000sa G2 can be configured with a single controller for a low initial price with future expansion, or with dual controller for situations that require higher availability and performance for the most demanding entry-level situations.

What's New

- New SAS controller with four SAS host ports
- Supports up to 8 hosts with SAS direct connect and 64 hosts (BladeSystem servers) using 3Gb SAS BL switch
- Support for Small Form Factor (SFF) SAS and SATA drives, common with ProLiant
- Support for attachment of THREE dual I/O MSA70 SFF JBODs (total ninety-nine SFF drives)
- Increased support to FOUR MSA2000 LFF disk enclosures with the MSA2012 Chassis (sixty LFF drives)
- Support for new Small Form Factor 300 GB SAS drive - doubling the SFF SAS capacity
- Increased optional snapshot capability to 255 snaps
- Additional LUN support up to 511 total volumes in a Dual Controller system
- Availability of a carrier grade NEBS-certified DC-powered MSA2024 SFF chassis



HP StorageWorks 2024 G2 Modular Smart Array



HP StorageWorks 2012 G2 Modular Smart Array

Models

Models

HP StorageWorks 2000sa G2 Modular Smart Array

Controller-less CHASSIS & MSA2300sa G2 Controller

HP StorageWorks 2012 Modular Smart Array 3.5-in Drive Bay Chassis (LFF) (Will accept one or two controllers or Disk Enclosure I/O modules) AJ948A

HP StorageWorks 2024 Modular Smart Array 2.5-in Drive Bay Chassis (SFF) (Will accept one or two controllers) AJ949A

HP StorageWorks 2300sa G2 Modular Smart Array Controller AJ808A

Disk Enclosures

HP StorageWorks MSA2000 Single I/O 3.5-inch 12 LFF Drive Enclosure (w/ two .6m SAS to SAS cables) Used with single controller array head AJ749A

HP StorageWorks MSA2000 Dual I/O 3.5-inch 12 LFF Drive Enclosure (w/ two .6m SAS to SAS cables) Used with dual controller array head AJ750A

HP StorageWorks MSA2000 Drive Enclosure I/O Module (no cable included) AJ751A

HP StorageWorks MSA70 2.5-inch 25 SFF Drive Enclosure 2.5 in Drive Enclosure (single I/O, single domain) (w/one .5m miniSAS to miniSAS cable) 418800-B21

HP StorageWorks Dual Domain I/O Module for MSA70 enclosure (upgrades MSA70 to dual domain) (w/ one .5m miniSAS to miniSAS cable) AG779A

Configured Units

HP StorageWorks 2312sa G2 Dual Controller Modular Smart Array (LFF) AJ805A

HP StorageWorks 2324sa G2 Dual Controller Modular Smart Array (SFF) AJ807A

Controller-less Chassis: DC-powered units

HP StorageWorks 2012 Modular Smart Array 3.5-in Drive Bay DC-power Chassis (LFF) (can add one or two MSA2300sa G2 controllers or MSA2000 JBOD I/O modules) AJ950A

HP StorageWorks 2024 Modular Smart Array 2.5-in Drive Bay DC-power Chassis (SFF) (can add one or two MSA2300sa G2 controllers. No MSA2000 JBOD I/O module support) AJ951A

Controller-less Carrier Grade Chassis

HP StorageWorks 2024 Modular Smart Array 2.5-in Drive Bay Carrier-Grade Chassis (SFF) AM337A

Related Option

HP StorageWorks 2000sa Modular Smart Array Controller (limited use) (for use only with an AJ948A LFF chassis for those needing to configure an older MSA2012sa. Only supports older features, functionalities. No SFF or MSA70 JBOD support, max 48 LFF drives, max 64 snaps) AJ754A

Related Items

MSA2324sa G2 DL380 G6 Package Cluster

HP StorageWorks 2324sa G2 Modular Smart Array DL380 G6 Package Cluster AP813A

NOTE: The HP MSA2324sa G2 DL380 G6 Package Cluster Bundle contains the following components:

One MSA2324sa G2 Dual-controller array;

Two DL380 G6 Servers

Four HBAs

Four SAS cables

Snapshot software 8 LTU

(NOTE: This bundle is available worldwide except APJ and Brazil)

MSA2000sa Switch Bundle

HP StorageWorks 2000sa Modular Smart Array 3Gb SAS BL Switch Bundle AP716A

NOTE: The HP MSA2000sa 3Gb SAS BL Switch Bundle contains the following



Models

components:

- HP MSA2012sa DC Modular Smart Array (Qty 1)
- HP 3Gb SAS BL Switches (Qty 2)
- HP mini-SAS 2M Cable (Qty 4)

NOTE: This bundle includes original MSA2000sa controllers

3Gb SAS Switch

HP StorageWorks 3Gb SAS BL Switch (CTO Only)

AJ864A

HP StorageWorks 3Gb SAS BL Switch - Dual Pack

AJ865A

Configuration Rules:

1. The SAS Switch is supported only in the HP c-Class Enclosures (C7000 & C3000)
2. The switch is placed into an interconnect bay in the back of the c-Class Enclosure chassis. C7000 chassis has 6 interconnect bays for switches & C3000 chassis has 3 interconnect bays for switches, however for this solution we will only support the use of 4 interconnect bays in the C7000 and 2 interconnect bays in the C3000.
3. (2) SAS Switches are required in the same c-Class enclosure interconnect bay row.
4. For the C3000 enclosure, the SAS Switch can only be placed into interconnect bays (3 and 4)
5. For the C7000 enclosure, the SAS Switch can only be placed into interconnect bays (3 and 4), or (5 and 6) or (7 and 8). The preferred interconnect bays are (5 and 6) then (7 and 8).
6. For the C3000 enclosure, using a server's mezzanine slot 1 along with enclosure interconnect bay 2 is not supported.

Blade Mezzanine Module

HP Smart Array P700m Controller/256BBWC Controller

507925-B21

HP Smart Array P700m Controller/512 BBWC Controller

508226-B21

Battery Kit

452348-B21

Configuration Rules:

1. A half height blade server must have a P700m (508226-B21 or 507925-B21) installed in server mezzanine slot 1 or mezzanine slot 2. The preferred mezzanine slot is slot 2.
2. A full height blade server must have a P700m 508226-B21 or 507925-B21 installed in server mezzanine slot 1, mezzanine slot 2 or mezzanine slot 3. The preferred mezzanine slot is slot 2.
3. A double density blade server must have a P700m (508226-B21 or 507925-B21) installed in server mezzanine slot 2 of each server. 4 SAS Switches, in interconnect bays 5, 6, 7 and 8, must also be included in this configuration.

Features and Benefits

Key Hardware Features

- Highly efficient consolidation and sharing of storage geared to departmental and small to medium business requirements
 - Cost efficient plus high-availability choices
 - Flexibility in drives: LFF MSA2 3.5-inch or HP ProLiant SFF 2.5-inch drives
 - Enterprise-class SAS or archival-class SATA drives as the need and budget dictates
 - Dual-ported SAS drives for enterprise needs
 - Large capacity SATA drives for inexpensive archival storage
 - Able to mix SAS and SATA drives within the same drive enclosure
 - Choose either single or dual controller array models to fit the budget
 - Choice of low cost single I/O or high-availability dual I/O drive enclosure models
-

Customer Benefits

- The HP StorageWorks 2000 Modular Smart Array family manages growing storage requirements across multiple HP ProLiant servers for customers who need a centralized dedicated storage solution for applications. Shared storage allows for controlled, cost-effective growth and increased protection of data.
- Its ease of management allows a department or small company to effectively handle growing storage requirements with a minimum of complexity.
- The MSA2000sa G2 extends the benefits of shared storage resources to first time implementers on a tight budget
- Depending on the model chosen, the modular design allows the user to start relatively small but supports future growth to hundreds of users and up to 27 TB of LFF SAS or 60 TB of LFF SATA storage, or 29.7 TB of SFF SAS or 24.7 TB of SFF SATA storage.
- The optional controller-based snapshot and clone capability as part of the MSA2000 family allows the smaller departmental user or company to implement functionality once only available to much larger firms with expensive arrays.

At a Glance

HP MSA2000sa G2 At a Glance:

- High performance Modular Smart Array controller with four 3Gb SAS ports per controller
- Single and dual controller capability
- 1 GB transportable cache per controller - battery-free cache backup with super capacitors and compact flash
- 511 LUNs with 16TB LUNs supported
- 2U rack mount chassis combining both the controller and disk shelf
- Twelve 3.5 inch dual-ported SAS or SATA MSA2000-specific drives (supports mixing of drive types in a single shelf)
- Twenty-four 2.5 inch dual-ported SAS or SATA ProLiant drives (also supports mixing of drive types in a single shelf)
- Support expansion to 4 additional enclosures & total of 48 disk drives
- Supports expansion to 3 additional SFF enclosures (MSA70) for a maximum total of 99 SFF disks
- Redundant power supplies and fans are standard
- RAID levels 0, 1, 3, 5, 6, 10, 50
- Non-disruptive on-line controller code upgrade
- Heterogeneous support for 32-bit and 64-bit Windows, Red Hat and SuSE Linux
- Windows Server 2008 x64 Hyper-V, VMware, RedHat Enterprise Linux Virtualization, and Citrix XenServer
- Qualified and certified for Windows, Linux and Solaris clustering
- Optional controller-based snapshot and clone functionality

Family Information

	MSA2000sa G2		MSA2000fc G2		MSA2000i G2	
Capacity (raw) Minimum / with maximum additional drive enclosures	LFF:	5.4 TB SAS or 12 TB SATA w/ 4 drive enclosures: 27 TB SAS or 60 TB SATA	LFF:	5.4 TB SAS or 12 TB SATA w/ 4 drive enclosures: 27 TB SAS or 60 TB SATA	LFF:	5.4 TB SAS or 12 TB SATA w/ 4 drive enclosures: 27 TB SAS or 60 TB SATA
	SFF:	7.2 TB SAS or 6.0 TB SATA w/ 3 MSA70 JBODs: 29.7 TB SAS or 24.7 TB SATA	SFF:	7.2 TB SAS or 6.0 TB SATA w/ 3 MSA70 JBODs: 29.7 TB SAS or 24.7 TB SATA	SFF:	7.2 TB SAS or 6.0 TB SATA w/ 3 MSA70 JBODs: 29.7 TB SAS or 24.7 TB SATA
Controller Cache	1 GB per controller		1 GB per controller		1 GB per controller	
Total LUNs	511		512		512	
Host connect MSA2000 has 1 or 2 controllers, EVA has 2 controllers standard	Four 3Gb SAS ports per controller		Two 4Gb Fibre Channel ports per controller		Two 1GbE iSCSI ports per controller	
Maximum Drives w/ expansion	60 LFF/99 SFF		60 LFF/99 SFF		60 LFF/99 SFF	
Maximum host supported	64**		64		32	
Snapshot, remote replication	Snapshot, clone		Snapshot, clone		Snapshot, clone	
Use for Storage	Primary Storage with SAS Secondary with SATA		Primary Storage with SAS Secondary with SATA		Primary Storage with SAS Secondary with SATA	

*maximum available storage capacity depends on the RAID level being implemented, and is based on maximum number of LUNs and LUN size

** Supports up to 8 hosts with SAS direct connect and 64 hosts (BladeSystem servers) using 3Gb SAS BL switch

Product Technology	SAS	Four 3Gb host ports per controller
	Modular Chassis	2U rack height. 12 Large Form Factor or 24 Small Form Factor drive bays, accommodating SAS and SATA. Comes with space for one or two controllers, or MSA2000 3.5-inch disk Enclosure I/O modules (LFF chassis only).
	Drives available	The new MSA2300sa G2 controller supports both the MSA2 3.5-inch Large Form Factor (LFF) drives, or the HP ProLiant 2.5-inch Small Form Factor (SFF) drive

Serial Attached SCSI (SAS) enterprise-class drives designed for high volume, 24x7 usage. Serial-ATA (SATA) are usually reserved for archival of data as they are both relatively inexpensive and are available in very large capacities. The MSA2000 family of arrays can accommodate both SAS and SATA drives within the same enclosure making it ideal to have both business-critical, high activity files on SAS drives while using snapshot or clone capability to keep back-up data on the less expensive drives.

For investment protection, the MSA2300sa G2 controller will support single port SAS & SATA drives in a single-domain MSA70. This support allows current owners of MSA70s to migrate their single port drives (in their MSA70 only) to be attached to an MSA2000sa G2. They can only



Family Information

Optional Disk enclosures

cascade to another single I/O MSA70. This is not a data-in-place transition.

SAS drive performance can be approximately 30% greater than SATA performance on sequential host IO. SAS performance excels in sequential lower latency response time and random IO per second transaction performance due to higher rpm disk speeds yielding lower seek times.

NOTE: MSA2 3.5" Large Form Factor (LFF) drives are for use only in the MSA2000 family.

Just as the user has a choice of chassis for the array head (LFF and SFF drive bays), so also do they have a choice of expansion disk enclosures accommodating either drive size. (NOTE: these are not supported as part of a NEBS-certified with the MSA Carrier Grade Chassis.)

MSA2000 3.5-inch drive enclosure. This 2U unit has twelve LFF (3.5-inch) drive bays and accepts for MSA2 dual-ported SAS and SATA drives. One model (AJ749A) has a single I/O module that matches with a single controller array head, giving a single path to the drives. The second model (AJ750A) comes standard with two I/O modules installed, required when paired with a dual controller array head, giving two paths to the drives for higher availability.

- This 3.5-inch drive enclosure can be attached to either the LFF or SFF MSA2000sa G2 array head.
- Each model ships standard with two .6m SAS to SAS cables for cascading to other MSA2000 drive enclosures
- For connection to either form-factor MSA2300sa array head, miniSAS to SAS cable(s) must be purchased.
- The single I/O model can be upgraded to a dual model with the purchase of an additional MSA2000 Drive Enclosure I/O module (AJ751A). No cable is included with this upgrade.
- Up to four MSA2000 3.5-inch enclosures can be attached to an MSA2300i controller in the array head.

MSA70 2.5-inch drive enclosure. This 2U storage enclosure (418800-B21) is designed to support twenty five ProLiant 2.5-inch Universal form factor (SFF) SAS or SATA hard drives. It ships standard with a single I/O module installed.

- This 2.5-inch drive enclosure can be attached behind either LFF or SFF MSA2000sa G2 Array head.
- The MSA70 enclosure ships with a single .5m miniSAS to miniSAS cable.
- To support a dual controller MSA2000sa G2 array head, the user needs to purchase and install an MSA70 Dual Domain I/O Module (AG779A). This option ships standard with an additional .5m miniSAS to miniSAS cable.
- Up to three MSA70s may be attached to the array head, given total support for 99 SFF drives.

Scalability

The MSA2300sa G2 controller is designed to allow an installation to begin with smaller capacity and be able to grow gradually as needed. The flexibility of SAS or SATA drive technology, form factors, sizes, speeds, and costs per GB allows a system to easily fit in almost any budget.

- Large Form Factor configurations can scale up to 5.4 TB SAS or 12 TB SATA, expandable to 27 TB SAS or 60 TB SATA with the

Family Information

addition of a maximum of four MSA2000 3.5-inch Drive Enclosures.

- Small Form Factor configurations can scale from 7.2 TB SAS or 6.0 TB SATA. With the addition of three MSA70 JBODs, the MSA2000sa G2 can support 29.7 TB SAS or 24.7 TB SATA.
- Users may configure a 24-drive MSA2000sa G2 SFF array head with up to three 12-drive LFF MSA2000 3.5-inch disk enclosures. This is an excellent method for a configuration that support fast SFF enterprise-class SAS drives in the array head, combined with economical LFF drives staged for archival purposes, all in the same array.

Qualification of larger capacity drives is ongoing.

LUNs

The MSA2000 family of arrays supports 511 LUNs and LUN sizes up to 16TB. The arrays support LUN expansion and deletion of any LUN.

RAID 0, 1, 3, 5, 6, 10, 50

In addition to the usual RAID levels, the MSA2000 family features several important additional levels. RAID 6 is the highest level of RAID protection. It allocates two sets of parity data across drives and allows simultaneous write operations. It can withstand two simultaneous drive failures without downtime or data loss. RAID 10 is mirroring and striping without parity. It is the most popular of the multiple RAID levels, allowing large arrays with high performance in most cases and superior fault tolerance. RAID 50 combines the block striping and parity of RAID 5 with the straight block striping of RAID 0, yielding higher performance than RAID 5 through the addition of RAID 0, particularly during writes.

Configuration and Management Tools

HP StorageWorks MSA Storage Management Utility (SMU), Management access, out-of-band: WEB GUI, CLI. Interface Types: Mini DB9 RS232, 10/100 Ethernet Protocols Supported SNMP, SSL, SSH, SMTP, HTTP, Telnet.

Hot Plug Expansion and Replacement Support

The MSA2000sa G2 supports hot plug expansion and replacement of redundant controllers, fans, power supplies, and I/O modules for simple, fast installation and maintenance.

Snapshot and Clone

Optional controller based functionality. Offers higher levels of data protection, enabling an almost instant recovery from data failure or corruption. Offers alternative development testing of 'offline' production data and the ability to backup snapped/cloned data.

Performance

Performance numbers are a guideline as established by tests using RAW I/O in an Operating System Agnostic test lab environment. A total of 96 72GB 15K SAS drives were used in a dual controller configuration of eight 12 Disk vdisks, eight 806 GB volumes, and two volumes per host. Four hosts directly attached to the MSA2000sa G2 were used in this test configuration (results cannot be expected with a single host). Results were achieved in Sequential Writes with 256K blocks; all random test were based on 8K block sizes. Number and type of applications, drive type, operating system used, and the number of hosts will affect overall performance.

Workload

MSA2300sa G2

Host Connect

3Gb SAS

MSA2000 RAID 10 Performance Results (rounded)

Random Reads IOPs

21861

Random Writes IOPs

14491

Random Mix IOPs 60/40 read/write

17700

Sequential Reads MB

1049

Family Information

Sequential Writes MBs	531
MSA2000 RAID 5 Performance Results (rounded)	
Random Reads IOPs	21019
Random Writes IOPs	2705
Sequential Reads MBs	1051
Sequential Writes MBs	644
Random Mix IOPs	5897
60/40 read/write	
MSA2000 RAID 6 Performance Results (rounded)	
Random Reads IOPs	21029
Random Writes IOPs	1918
Sequential Reads MBs	1054
Sequential Writes MBs	736
Random Mix IOPs 60/40 read/write	4872

Overview	The MSA2000sa G2 comes integrated with web browser based software for storage and RAID management, setup, configuration and troubleshooting. This reduces the cost of ownership by reducing the training and technical expertise necessary to install and maintain your HP storage solution.
Server Compatibility	<p>Supports most HP ProLiant servers including:</p> <ul style="list-style-type: none"> • HP ProLiant DL, ML • HP Integrity c-class Blades <p>Following BladeSystem servers are supported ONLY when connected using 3Gb SAS Switch:</p> <ul style="list-style-type: none"> • HP ProLiant BL2x 220c G5 • HP ProLiant BL460c • HP ProLiant BL465c • HP ProLiant BL465c G5 • HP ProLiant BL480c • HP ProLiant BL495c G5 • HP ProLiant BL680c G5 • HP ProLiant BL685c • HP ProLiant BL685c G5
Industry Standard X86 servers support	<ul style="list-style-type: none"> • Supports most multi-vendor industry standard 32-bit Intel and AMD based (x86) servers. HP requires the Third-Party Server to be logo'd and listed on the Microsoft Windows Server Catalog. • Refer to the Microsoft website: http://www.microsoft.com/windows/catalog/server/ • HP StorageWorks Division recommends that the Third-Party Server Vendor is an active member of TSANet. Refer to the TSANet website for details: www.tsanet.com
OS Support	<ul style="list-style-type: none"> • Microsoft Windows Server 2008 - IA32, x64, IA64 (Standard, Enterprise, Datacenter) • Microsoft Windows Server 2008 Hyper-V • Microsoft Windows 2003 and 2003 R2 - IA32, x64, IA64 • HP-UX 11i V3 • Red Hat Enterprise Linux (32/64) • SuSE SLES (32/64) • VMware (32/64) • RedHat Enterprise Linux Virtualization • Sun Solaris 10 <p>NOTE: For detail operating support list, please visit: www.hp.com/storage/spock</p>

Family Information

Supported Clustering Solutions	<ul style="list-style-type: none"> • Microsoft Cluster Service for Microsoft Windows Server 2008 and 2003 • Serviceguard for Linux on Red Hat Enterprise Linux and SuSE Linux Enterprise • Solaris Cluster 3.2 • Serviceguard for HP-UX
Application Solutions	<p>The MSA is the ideal solution for small and midsized business customers running Oracle, Microsoft, SAP, VMware, and Xen environments. The MSA offers these customers an affordable, scalable solution that will grow as business needs change. The MSA is flexible offering customers the choice of FC, SAS, or iSCSI host connections.</p> <p>Oracle, Microsoft, SAP and VMware and Citrix customers benefit when using the MSA because it offers the functionality and technology they require at highly affordable price points. It supports simultaneous accommodation of enterprise-class, dual-ported SAS drives and archival-class SATA drives.</p> <p>HP has developed an in-depth understanding of application and virtualization technology needs, by extensive lab-testing resulting in best practice papers for the HP MSA, along with HP servers, and management software. In conjunction with replication software, snapshots and data protection software, the HP MSA offers high availability and disaster recovery solutions for Oracle, Microsoft, and SAP application platforms. As a result, our customers can expect a wide range of operational and business benefits including:</p> <ul style="list-style-type: none"> • Achieve optimal performance on an Oracle, Microsoft, SAP platform • Minimize back windows and simplify recovery of their database and/or application • Significantly improve Exchange messaging recovery points and recovery time • Provide cost effective Remote Office/Branch Office shared storage for virtualized servers • Deliver predictable operational service levels • Reduce implementation costs and risks
Learn More	<p>To learn more about specific HP Storage Solutions that are built with Oracle, Exchange, SAP environments in mind, visit the solution sites supporting each of these applications.</p> <p>HP Storage for Oracle hyperlink to: http://www.hp.com/storage/oracle HP Storage for Microsoft SQL Server hyperlink to: http://www.hp.com/storage/sqlserver HP Storage for Microsoft Exchange hyperlink to: http://www.hp.com/storage/exchange HP Storage for SAP hyperlink to: http://www.hp.com/storage/sap</p>
Web Browser support	<ul style="list-style-type: none"> • MSA2000sa G2 supports target based management, and requires a web browser for management. Only Microsoft Internet Explorer V6.X and above (Internet Explorer V7.X is strongly encouraged), and Mozilla Firefox 1.0.7 or later are supported

Optional Software

Optional Software

MSA2300 Snapshot and Volume Copy Software

Product Features

Data Protection

- Snapshots create up to 255 point-in-time pictures of data
- Volume Copies create up to 128 point-in-time copies of data
- Recovery is instant - revert data from any previous Snapshot or Volume Copy
- Backup 'snapped' data to disk, virtual tape, or physical tape without a backup window

Data Testing

- Snap or clone data to test the performance of a software application on 'offline' production data
- Snap or clone data to test how a software patch or enhancement will function on 'offline'; production data

HP StorageWorks 2000 Modular Smart Array Snapshot 255 Software LTU ¹	T5539A
HP StorageWorks 2000 Modular Smart Array Snapshot 64 Software LTU	T5512A
HP StorageWorks 2000 Modular Smart Array Snapshot 8 Software LTU	T5513A
HP StorageWorks 2000 Modular Smart Array Snapshot 8/255 Upgrade Software LTU ¹	T5540A
HP StorageWorks 2000 Modular Smart Array Snapshot 64/255 Upgrade Software LTU ¹	T5541A
HP StorageWorks 2000 Modular Smart Array Snapshot 8 to 64 Upgrade Software LTU	T5515A
HP StorageWorks 2000 Modular Smart Array Volume Copy Software LTU	T5514A

¹ The snapshot software is supported on the MSA2324 and MSA2312 (G2) models only

Path Failover (MPIO)

MPIO Basic Failover for Windows provides a single multi-path solution for HP StorageWorks MSA2000sa G2 Modular Smart Array on HP ProLiant servers by providing basic path failover. Supports Windows 2008, Windows 2003, Windows 2003 R2, and Windows 2003 X64 operating systems.

- HP MPIO Full DSM for the MSA2000sa
- Microsoft Windows 2008: Microsoft MPIO is bundled with Windows Server 2008 and must be installed as an operating system feature.
- Failover support for Linux is with Device Mapper 4.0 or higher
- HP-UX 11iv3 Native Multipathing for Mass Storage
- Sun Solaris native MPxIO

HP StorageWorks Storage Mirroring

HP StorageWorks Storage Mirroring Software provides host-based, continuous replication for customers seeking a low-cost alternative to fabric or array-based replication. Patented replication and failover technology continuously captures byte-level data changes as they happen and replicates those changes to one or more target servers at any location without geographic limitations. By replicating only the bytes that change, Storage Mirroring Software uses the absolute minimum bandwidth on your existing LAN or WAN to replicate your data. Storage Mirroring also provides server failover where a production server can automatically be 'replaced' by the storage mirroring server in the event of failure. Couple Storage Mirroring with MSA2000 Snapshots and/or Volume Copy to achieve an Enterprise class data protection strategy creating different data recovery points using continuous data protection with Storage Mirroring and point-in-time data protection with Snapshots and/or Volume Copy.

Storage Mirroring Software supports:

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- DA - 13331 Worldwide QuickSpecs — Version 2 — 7.31.2009

Optional Software

- Any DAS, NAS, and SAN storage device.
- Any Windows ProLiant server including all ML, DL, and BL platforms
- Many Windows platforms including Windows Server 2000, Windows Server 2003, Windows Server 2003 R2, Windows Storage Server 2003, Windows Storage Server 2003 R2, 64-bit Windows, and Windows on Itanium

For more information visit: <http://h18006.www1.hp.com/products/storage/software/sm/index.html>

HP Storage Mirroring Software Server Edition Stock LTU	TA711A
HP Storage Mirroring SW Enterprise Server Edition Stock LTU	TA712A
HP Storage Mirroring Software NAS Edition Stock LTU	TA713A
HP Storage Mirroring Software 5 Virtual Machines Stock LTU	TA714A
HP Storage Mirroring Software Linux Edition Stock LTU	TA717A
HP Storage Mirroring SW Virtual Infrastructure Ed Stock LTU	TA718A
HP Storage Mirroring Software Server Image Copy Stock LTU	TA719A
HP Storage Mirroring Software Data Migration Stock LTU	TA722A
HP Storage Mirroring for Hyper-V Standard Edition Stock LTU	TA737A
HP Storage Mirroring for Hyper-V Enterprise Edition Stock LTU	TA735A
HP Storage Mirroring for Hyper-V Data Center Edition Stock LTU	TA733A

Service and Support, HP Care Pack, and Warranty Information

Warranty

- Three-year limited warranty
- Three years parts exchange
- Next Business day delivery

Enclosures, Hard drives, and Options for the MSA2000sa G2 carry their own warranty. Refer to HP's Limited Warranty Statement for more information.

The MSA2000sa has been designed with customer self repairable parts to minimize repair time and provide greater flexibility in performing defective parts replacement. Please refer to HP's limited warranty Statement and parts replacement instructions for further details.

<http://h18006.www1.hp.com/products/storageworks/warranty.html>

Products included in various Kits carry their own individual warranties.

NOTE: The warranty of the hard drive options purchased with the MSA2000sa product is different for SAS hard drives versus SATA hard drives. SAS hard drive options have a three year warranty and SATA hard drives options have a one year warranty. Reference HP's communication for further details: <http://www.hp.com/go/search>, enter CN0089W

HP Care Pack Services. Scalable, Flexible, Dependable. Like your storage.

Your storage is evolving. Get scalable support that evolves with it. HP Care Pack Services is an easy-to-buy, easy-to-use portfolio of packaged services covering your lifecycle needs. You can rely on our highly skilled, HP certified professionals to offer a breadth of expertise across leading storage technologies, and work side by side with you for optimal results. Partner with HP Technology Services to boost availability and avoid costly downtime by mitigating technology-related business risks. To help take the worry out of deploying, supporting and managing your storage technologies, we've designed a portfolio of service options that are as flexible, scalable and affordable as our storage.

Protect your business beyond the warranty

Standard warranty protects against product defects and some causes of downtime. HP Care Pack Services helps you proactively guard against unplanned downtime which can reduce your productivity and profitability. By using a standard approach to warranty uplifts, such as HP Care Pack Services, customers can be certain of consistency of operations for both mission-critical and standard business computing.

Extending warranties with HP Care Pack Services

The key to normalizing the warranty of combined solutions-is making service uplift simple: HP Care Pack Services. This portfolio of predefined packages, extending across the entire IT lifecycle, offering consulting, education, technical support, optimization, risk assessment, and more. It's entirely flexible allowing customers to extend the cover to the precise level of support required. Customer's standard hardware warranty, for example, can be upgraded to next-business-day response, to same-day coverage, or even to a committed six-hour call-to-repair service available 24 hours every day of the week.

Provide consistent, predictable levels of support across your entire department or business

Give you direct access to proven technical and problem-solving expertise

Offer a choice of response-time and repair-time commitments

Are available whenever and wherever you do business

For many products, post-warranty HP Care Pack Services are available when your original warranty has expired. Choose the support levels that meet your business requirements, from basic to mission-critical. In the new world of business technology, when your technology has to work for your business to work, who can you trust to make your technology work? HP Technology Services, the trusted business technology experts who manage your technology in action, because when technology works, business works. <http://www.hp.com/hps/storage>

NOTE: Care Pack Services availability may vary by product and country.

Product Number	Product Name	Service Name	Care Pack Services Product # and Band	Alternate Care Pack Services Product #
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Service and Support, HP Care Pack, and Warranty Information

		HP StorageWorks MSA Family Disk Array Installation and Startup Service	Contact your HP sales rep or Channel Partner for assistance	UA868A/E
AJ948A	HP StorageWorks 2012 Modular Smart Array 3.5-in Drive Bay Chassis (LFF)	3-Year HP Support Plus 24		
AJ949A	HP StorageWorks 2024 Modular Smart Array 2.5-in Drive Bay Chassis (SFF)	3-Year HP Support Plus 24		
AJ808A	HP StorageWorks 2300sa G2 Modular Smart Array Controller	3-Year HP Support Plus 24		
AJ749A	HP StorageWorks MSA2000 Single I/O 3.5-inch 12 LFF Drive Enclosure	3-Year HP Support Plus 24		
AJ750A	HP StorageWorks MSA2000 Dual I/O 3.5-inch 12 LFF Drive Enclosure	3-Year HP Support Plus 24		
AJ751A	HP StorageWorks MSA2000 Drive Enclosure I/O Module	3-Year HP Support Plus 24		
418800-B21	HP StorageWorks MSA70 2.5-inch 25 SFF Drive Enclosure 2.5 in Drive Enclosure	3-Year HP Support Plus 24		
AG779A	HP StorageWorks Dual Domain I/O Module for MSA70 enclosure	3-Year HP Support Plus 24		
AJ950A	HP StorageWorks 2012 Modular Smart Array 3.5-in Drive Bay DC-power Chassis (LFF) (can add one or two MSA2300sa G2 controllers or MSA2000 JBOD I/O modules)	3-Year HP Support Plus 24		
AJ951A	HP StorageWorks 2024 Modular Smart Array 2.5-in Drive Bay DC-power Chassis (SFF) (can add one or two MSA2300sa G2 controllers. (No MSA2000 JBOD I/O module support)			
AM337A	HP StorageWorks 2024 Modular Smart Array 2.5-in Drive Bay Carrier-Grade Chassis (SFF)			

Service and Support, HP Care Pack, and Warranty Information

AJ754A	HP StorageWorks 2000sa Modular Smart Array Controller (limited use)
AP813A	HP StorageWorks 2324sa G2 Modular Smart Array DL380 G6 Package Cluster
AP716A	HP StorageWorks 2000sa Modular Smart Array 3Gb SAS BL Switch Bundle

Services that will enhance the user experience in many product deployments.

HP Proactive Select Service	HP Proactive Select Service improves IT performance and manageability through the use of cost effective flexible proactive services. This proactive service allows you to accelerate the ROI of your technology environment, by tailoring specific services to more quickly take advantage of your investment. http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA2-3842ENN.pdf
HP Entry Storage Data Migration Service for Windows	HP Entry Storage Data Migration Service for Windows offers you a cost competitive and convenient way to accommodate data migration triggered by a need to refresh or consolidate storage, or to create different storage tiers. This service offers a migration cost in line with the costs of storage products in small and medium-sized storage environments. The service is delivered via a skilled HP service specialist with special consideration for data availability, integrity, and ongoing operational performance during the transfer process. http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA2-4734ENW.pdf

Service Name	Care Pack Services Product # and Band	Alternate Care Pack Service Product #
HP Proactive Select Service	Contact your HP sales rep or Channel Partner for assistance	Contact your HP sales rep or Channel Partner for assistance
HP Entry Storage Data Migration Service for Windows	Contact your HP sales rep or Channel Partner for assistance	Contact your HP sales rep or Channel Partner for assistance

Service and Support, HP Care Pack, and Warranty Information

eSupport

HP eSupport is a portfolio of technology-based services that assist you with managing your business environment - from the desktop to the data center.

Support Portal

The HP support portal provides one-stop access to the information, tools and services you need to manage the daily operations of your IT environment.

Features include:

- Access to self-solve tools (including search technical knowledge base)
- Efficient logging and tracking of support cases
- Collaboration with other business and IT professionals
- Download of patches and drivers
- Access to diagnostic tools
- Proactive notification of relevant information

Access to certain features of the support portal requires an HP service agreement. To access the support portal, visit: <http://www.hp.com/support>

Remote Support Technology (RST)-HP Remote Support Pack

Taking a more proactive approach to IT support, the HP Remote Support pack plug-in module easily integrates with HP Systems Insight Manager to provide a powerful, unified "single pane of glass" solution for onsite and remote management.

HP Remote Support Pack enhances HP Systems Insight Manager with intelligent event diagnosis plus the automatic submission of hardware event notifications securely to HP support, including acknowledgment and status returns. It adds remote configuration collections to allow the delivery of assessment and proactive services for your SAN storage and HP-UX environments.

Customer Technical Training

Consider education as an integral part of your strategy to get the best return on investment for your HP storage solution. HP offers a variety of training courses on storage software, networking, archiving and disk storage systems. Our classes are available in many delivery modalities from traditional instructor-led courses at one of our 80 training centers worldwide to on-site training customized to your needs or online. www.hp.com/learn/storage

HP Services Awards

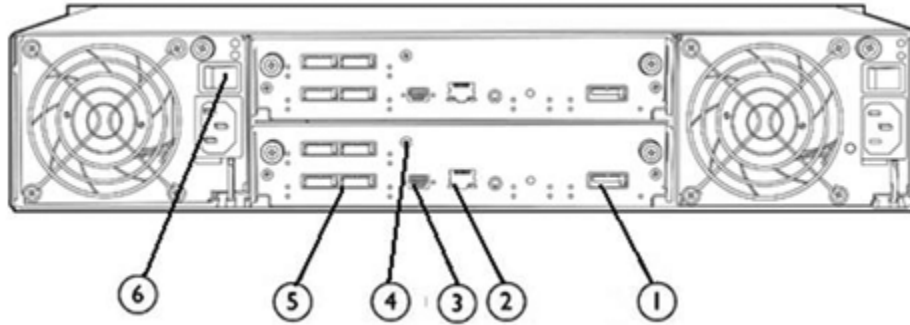
HP Services continues to be recognized for service and support excellence by customers, partners, industry organizations and publications around the world. Recent honors and award reflect our services team's dedications, technical expertise, professionalism and uncompromising commitment to customer satisfaction. For a list of all our awards, please visit: <http://h20219.www2.hp.com/services/cache/433028-0-0-225-121.html>

Additional Services Information

For more information about HP Care Pack Services for Storage, please visit: <http://www.hp.com/hps/storage>

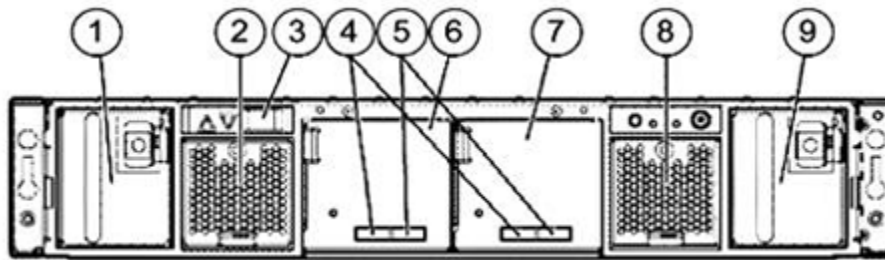
If you have specific questions, contact your local HP representative. Contact information for a representative in your area can be found at "Contact HP" <http://www.hp.com>

Configuration Information



Dual Controller MSA2000sa G2

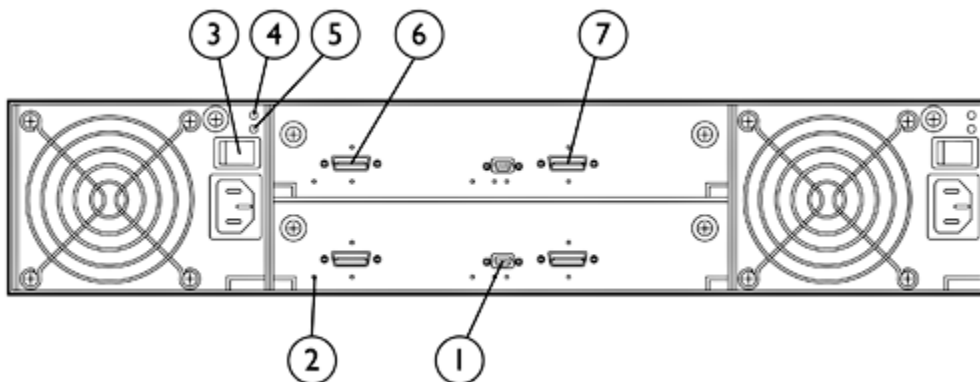
- | | |
|-------------------|-------------------|
| 1. Expansion Port | 4. Service Port |
| 2. Ethernet Port | 5. SAS host Ports |
| 3. CLI Port | 6. Power Switch |



MSA70 Dual I/O 2.5-inch 25 Drive Enclosure

Rear Panel components

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



MSA2000 Dual I/O 3.5 inch 12 Drive Enclosure

- | | |
|---------------------------|------------------|
| 1. Service Port | 5. AC Power Good |
| 2. Unit Locator | 6. SAS In Port |
| 3. Power Switch | 7. SAS Out Port |
| 4. DC Voltage / Fan Fault | |

Configuration Information

Step 1 - MSA2000sa G2- Base Configuration

Select one:

Model Name	Model Description:	Part Number
HP StorageWorks 2012 Modular Smart Array 3.5-inch Drive Bay Chassis	Controller-less chassis with twelve Large Form Factor (LFF) MSA2 drive bays. Space for two controllers.	AJ948A
HP StorageWorks 2024 Modular Smart Array 2.5-inch Drive Bay Chassis	Controller-less chassis with twenty-four Small Form Factor (SFF) ProLiant drives. Space for two controllers.	AJ949A

There are two array-head chassis - one with twelve 3.5-inch large form factor bays, the other with twenty-four 2.5-inch small form factor drive bays. For additional twelve additional drive bays purchase an MSA2000 3.5-inch Disk Enclosure. You may attach a total of four MSA2000 Drive Enclosures for a total of sixty LFF drives. For 25 additional SFF drive bays purchase an MSA70 JBOD with the 2nd I/O module. You may attach a total of three MSA70 JBODs for a total of ninety-nine SFF drives. Single controller arrays support Single I/O Disk Enclosures; dual controller arrays support Dual I/O Disk Enclosures.

Step 2 - Options

Select each option with quantities specified.

Step 2a - Options

Description with Parts Shipped:	Quantity	Part Number
HP StorageWorks 2300sa G2 Modular Smart Array Controller (for either the LFF MSA2012, SFF MSA2024, or the two DC-powered chassis)	1 or 2	AJ808A

Step 2b - Choose Supported Options For SAS HBA

Select each required option with quantities specified.

SAS HBA	Description with Parts Shipped:	Part Number
HP SC08Ge HBA	SAS HBA to connect to a host	488765-B21

Step 2c - MSA2 SAS and SATA Drive Options

NOTE: SATA drives are designed for archival or reference data. They should not be used in a heavy or intense I/O environment. Those situations require the use of enterprise-class SAS drives. MSA2 3.5-inch drives are for use only with MSA2000 products.

MSA2 Large Form Factor (LFF) SAS drives for MSA2000 3.5-inch Drive Chassis and Enclosure

HP StorageWorks MSA2 146GB 3G 15K 3.5 inch Dual-port SAS HDD	AJ735A
HP StorageWorks MSA2 300GB 3G 15K 3.5 inch Dual-port SAS HDD	AJ736A
HP StorageWorks MSA2 450GB 3G 15K 3.5 inch Dual-port SAS HDD	AJ737A

MSA2 Large Form Factor (LFF) SATA drives for MSA2000 3.5-inch Drive Chassis and Enclosure

HP StorageWorks MSA2 500GB 7.2K 3.5 inch SATA HDD	AJ738A
HP StorageWorks MSA2 750GB 7.2K 3.5 inch SATA HDD	AJ739A
HP MSA2 1TB 7.2K rpm 3.5 inch SATA HDD	AJ740A

ProLiant Small Form Factor (SFF) SAS drives for MSA2000 2.5-inch Drive Chassis and MSA70 JBOD

HP 72GB 3G 10K 2.5-inch SAS SFF DP HDD	384842-B21
HP 146GB 3G 10K 2.5-inch SAS SFF DP HDD	418367-B21
HP 300GB 3G 10K SAS 2.5-inch SFF DP HDD (not supported for rack-level CTO at this time)	492620-B21
HP 36GB 3G 15K 2.5-inch SAS SFF DP HDD	418369-B21
HP 72GB 3G 15K 2.5-inch SAS SFF DP HDD	418371-B21
HP 146GB 3G 15K 2.5-inch SAS DP HDD	504062-B21
HP 72GB 3G 10K 2.5-inch SAS SFF SP HDD (MSA70 only)	375861-B21
HP 146GB 3G 10K 2.5-inch SAS SFF SP HDD (MSA70 only)	431958-B21



Configuration Information

HP 36GB 3G 15K 2.5-inch SAS SFF SP HDD (MSA70 only)	431933-B21
HP 72GB 3G 15K 2.5-inch SAS SFF SP HDD (MSA70 only)	431935-B21
ProLiant Small Form Factor (SFF) SATA drives for MSA2000 2.5-inch Drive Chassis and MSA70 JBOD	
HP 60 GB 1.5 G 5.4K 2.5-inch SATA SFF HDD	379306-B21
HP 250 GB 3G 5.4K 2.5-inch SATA ETY HDD	460355-B21
HP 120 GB 1.5G 5.4K 2.5-inch SATA SFF HDD	458924-B21

Step 2d - Drive Enclosure Options

Should you want a drive enclosure, the model you choose depends on which array model it attaches to. If it is a single controller array, then choose the JBOD designated as "Single I/O". If it is attaching to a dual controller array then choose the "Dual I/O" JBOD

HP StorageWorks MSA2000 Single I/O 3.5-inch 12 Drive Enclosure (use with single controller array heads. Ships with two .6m SAS to SAS cables)	AJ749A
HP StorageWorks MSA2000 Drive Enclosure I/O Module (Use to upgrade the Single I/O model to dual I/O. No cable included)	AJ751A
HP StorageWorks MSA2000 Dual I/O 3.5-inch 12 Drive Enclosure (use with dual controller array heads. Ships with two .6m SAS to SAS cables)	AJ750A
HP StorageWorks 70 Modular Smart Array (MSA70) SFF 2.5-inch drive Single I/O JBOD Single I/O, single domain. 25 Small Form Factor (SFF) drive bays (use only with MSA2324sa G2 array head. Includes one miniSAS to miniSAS cable)	418800-B21
HP StorageWorks Dual Domain I/O Module for MSA70 Makes the standard MSA70 (above) into a dual I/O, dual domain JBOD (Includes one miniSAS to miniSAS cable)	AG779A

MSA70 NOTE: Only Dual Port (DP) drives will work in the Dual Domain environment. Dual Domain environment requires the HP StorageWorks Dual Domain I/O Module Option (# AG779A).

For more information on the MSA70, go to the MSA70 Home Page:

http://h18006.www1.hp.com/storage/disk_storage/msa_diskarrays/drive_enclosures/msa70/index.html

Step 2e - SAS Cable Options

Connecting MSA2300sa G2 Controller to an HBA

Model Description	Part Number
mini-SAS 4x 1M Cable All	407337-B21
mini-SAS 4x 2M Cable All	407339-B21
mini-SAS 4x 4M Cable All	432238-B21

miniSAS to miniSAS Cables:

Connecting MSA2300sa G2 controller to MSA70 JBOD if a longer cable is desired.

HP Ext miniSAS to miniSAS 1m Cable	407337-B21
HP Ext miniSAS to miniSAS 2m Cable	407339-B21

SAS to miniSAS Cables:

Connecting MSA2300sa G2 controller to MSA2000 3.5-inch Disk Enclosure

HP SAS to miniSAS .5m Cable	419569-B21
HP SAS to miniSAS 1m Cable	419570-B21
HP SAS to miniSAS 2m Cable	419571-B21

SAS Cables (SAS to SAS)

Older MSA2000sa controller to MSA2000 3.5-inch Disk Enclosure or cascading two MSA2000 3.5-inch Disk Enclosures if included .6m cables is not of sufficient length

HP Ext SAS to SAS 1m Cable	389665-B21
HP Ext SAS to SAS 2m Cable	389668-B21

Configuration Information

Step 3 - Other MSA2000sa Options

Description	Quantity	Part Number
HP StorageWorks 2000sa Modular Smart Array Controller (ONLY for those desiring to configure an older MSA2012sa by using the MSA2012 chassis and installing either one or two of this model controller. The resulting array head will have the attributes of the first generation MSA2012i with no support for SFF drives, limited total drive count, limited snaps, etc.)		AJ754A
Must choose optional Power Cord for Non-U.S. Configurations		
NOTE: Shipped standard with all units.		
2 ea. Power Cord, 110/220 VAC, US/Canada/Mexico 227099-001		
Power Cord, 220/240 VAC, (US/Canada/Mexico)	2	227099-001
Power Cord, (Australia/China/New Zealand)	2	227098-001
Power Cord, (Central Europe)	2	157215-001
Power Cord, (United Kingdom/Hong Kong)	2	157216-001
Power Cord, (Switzerland)	2	157219-001
Power Cord, (Italy)	2	157217-001
Power Cord, (Denmark)	2	157218-001
Power Cord, (Japan)	2	139867-001
Power Cord, (South East Asia/India)	2	157220-001

Step 4 - Choose Rack Options

Select each required option with quantities specified.

Rack Cabinet, Customer Assembled

5642 - 5000 Series rack 358254-B21

14U rack

HP S10614 Rack with Shock Pallet 292302-B22

Rack Cabinets 10622 G2

10622 G2 Universal Rack w/Shock Pallet AF022A

10622 G2 Universal Rack w/Standard Pallet AF021A

Rack Cabinets under 10636 G2

10636 G2 (36U) Rack Cabinet - Pallet AF011A

10636 G2 (36U) Rack Cabinet - Shock Pallet AF012A

10636 G2 (36U) Rack Cabinet - Crated AF013A

10636 G2 (36U) Rack Cabinet, with Extension - Shock Pallet AF014A

Rack Cabinets 10642 G2

10642 G2 (42U) Rack Cabinet - Pallet AF001A

10642 G2 (42U) Rack Cabinet - Shock Pallet AF002A

10642 G2 (42U) Rack Cabinet - Crated AF003A

10642 G2 (42U) Rack Cabinet, with Extension - Shock Pallet AF004A

Modular Cooling System G2 (MCS G2) AF025A

MCS G2 10642 G2 Expansion Rack AF026A



Configuration Information

Rack Cabinets 10842 G2

10842 G2 Universal Rack w/Shock Pallet	AF042A
10842 G2 Universal Rack w/Standard Pallet	AF041A

Rack Cabinets 10647 G2

10647 Rack G2 Pallet	AF031A
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Configure to Order (CTO) Program Information

HP introduces the new Configure to Order program for the MSA2000 family. The MSA2000 models and options may or may not be factory installed in a rack with add-on controllers, switches, hubs, MSA2000 disk enclosures and hard drives. The MSA2000 arrays may be integrated with ProLiant servers or as standalone storage.

Orders to be shipped through the CTO process must have a minimum of two drives ordered per controller.

Description	Product #
HP StorageWorks 2012 Modular Smart Array 3.5-in Drive Bay Chassis (LFF)	AJ948A#0D1
HP StorageWorks 2024 Modular Smart Array 2.5-in Drive Bay Chassis (SFF)	AJ949A#0D1
HP StorageWorks 2300sa Modular Smart Array Controller	AJ808A#0D1
HP StorageWorks 2312sa G2 Dual Controller Modular Smart Array (LFF)	AJ805A#0D1
HP StorageWorks 2324sa G2 Dual Controller Modular Smart Array (SFF)	AJ807A#0D1
HP 2000sa Modular Smart Array Controller (ONLY for use by those wishing to build an older model MSA2012sa)	AJ754A#0D1
HP MSA2000 3.5-inch Single I/O 12 Drive Encl	AJ749A#0D1
HP MSA2000 3.5-inch Dual I/O 12 Drive Encl	AJ750A#0D1
HP StorageWorks 2024 Modular Smart Array 2.5-in Drive Bay Carrier-Grade Chassis	AM337A#0D1
HP StorageWorks 2012 Modular Smart Array 3.5-in Drive Bay DC-power Chassis (LFF)	AJ950A#0D1
HP StorageWorks 2024 Modular Smart Array 2.5-in Drive Bay DC-power Chassis (SFF)	AJ951A#0D1
HP MSA2000 Drive Enclosure I/O Module (for CTO, only available for use in a AJ950A DC-powered chassis)	AJ751A#0D1
HP MSA2 146GB 3G 15K 3.5-inch SAS HDD	AJ735A#0D1
HP MSA2 300GB 15K 3.5-inch SAS HDD	AJ736A#0D1
HP MSA2 450GB 3G 15K 3.5-inch SAS HDD	AJ737A#0D1
HP MSA2 500GB 7.2K 3.5-inch SATA HDD	AJ738A#0D1
HP MSA2 750GB 7.2K 3.5-inch SATA HDD	AJ739A#0D1
HP MSA2 1TB 7.2K 3.5-inch SATA HDD	AJ740A#0D1
MSA70 Single I/O, single domain 25 Small Form Factor (SFF) drive bays	418800-B21
MSA70 I/O Module HP StorageWorks Dual Domain I/O Module	AG779A
Makes the standard MSA70 (above) into a dual I/O, dual domain JBOD	
NOTE: The I/O Module is a field upgradeable Option Kit the addition of which in the MSA70 will allow dual domain capability providing higher level of redundancy and reliability	
SAS Drives (SFF 2.5-inch) HP 72GB 3G 10K SAS 2.5-inch SFF DP HDD	384842-B21
HP 146GB 3G 10K SAS 2.5-inch SFF DP HDD	418367-B21
HP 300GB 3G 10K SAS 2.5-inch SFF DP HDD	492620-B21
HP 146GB 3G 15K 2.5-inch SAS DP HDD	504062-B21
HP 36GB 3G 15K SAS 2.5-inch SFF DP HDD	418369-B21
HP 72GB 3G 15K SAS 2.5-inch SFF DP HDD	418371-B21

Configuration Information

NOTE: Only Dual Port (DP) drives will work as dual-port in a Dual Domain environment. Dual Domain environment requires the HP StorageWorks Dual Domain I/O Module Option (# AG779A).

SATA Drives (SFF 2.5-inch)	HP 60 GB 1.5 G SATA 5.4K 2.5-inch SFF HDD	379306-B21
	HP 120 GB 1.5G SATA 5.4K 2.5-inch SFF HDD	458924-B21
	HP 250 GB 3G 5.4K 2.5-inch SATA ETY HDD	460355-B21

NOTE: SATA drives for the MSA70 are not dual port (DP) drives.

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

Technical Specifications

MSA2000 Chassis	POWER REQUIREMENTS	
	Input Power Requirements	110 VAC 3.6A/394W; 220VAC 1.9/385W
	Max Input Power	100-240 VAC, 50/60 Hz., 4.5-1.9A; 48-60 VDC 10.4A/8.3A
	Heat Dissipation	1622 BTU/hr
	TEMPERATURE AND HUMIDITY RANGES	
	Operating Temperature	41°F to 104°F (5°C to 40°C)
	Shipping Temperature	-40°F to 158°F (-40°C to 70°C)
	Operating Humidity	10% to 90% RH @ 104°F (40°C) non-condensing
	Non-Operating Humidity	Up to 93% RH @ 104°F (40°C)
	DECLARED ACOUSTIC NOISE LEVELS	
	Sound Power	< 6.5 Bels
	Sound Pressure	< 57 dBA
	SHOCK AND VIBRATION	
	Shock, Operational	5G's for 11 milliseconds, half sine
	Shock, Non-Operational	15G 11ms half sine
	Vibration, Operational	5-500Hz, 0.21Grms flat spectrum 0.000089g ² /HZ Random Vibration
	Vibration, Non-Operational	5-500-5Hz, 0.5 G peak to peak, sinusoidal
	PHYSICAL	
	Height	3.436 in/ 8.727 cm
	Depth (excluding cables) (back of ear to back of controller handle)	MSA2024: 20.28 in / 51.510 cm MSA2012: 21.8 in. / 55.372 cm
Width (body only)	17.55 in / 44.58 cm (w/ ears 19 in / 48.26 cm)	
Chassis Weight (no controllers)	MSA2012 chassis: 44 lbs. MSA2024 chassis: 43 lbs	

MSA2000sa G2 Controller	Host Interface	4 x4 lane SAS ports - 3Gb/s per lane
	Protocol Support	SAS
	RAID Support	0, 1, 3, 5, 6, 10, 50
	Cache Memory	1GB Read/Write
	Cache Backup	ECC protection with back up to flash memory (indefinite backup)
	Upgradeable Firmware	yes
	Disk Drive and Enclosure Protocol Support	3Gb SAS - Serial Attached SCSI / 3 Gb SATA II
	Expansion Port	One 4X SAS connector (SFF8470) Expand up to 3 more drive enclosures

Technical Specifications

Regulatory	Safety	UL 60950-1:2003 (USA)
		CAN/CSA-C22.2 No.60950-1-03 (Canada)
		EN 60950-1 :2001 + A11 (European Union)
		IEC 60950-1 :2001 (International)
	Electromagnetic Compatibility	CFR 47 Part 15 Subpart B (U.S.A., Class A)
		ICES-003 Issue 4 (Canada, Class A)
		EN 55022 :98 +A1 +A2 (European Union, Class A)
		EN61000-3-2:2000+A1,+A2,+A14 (Harmonics)
		EN 61000-3-3 :2001 (Flicker)
		EN 55024 :1998 +A1 (European Union, Immunity)
		CISPR 22 :2005 (International, Class A)
		CISPR 24 :97 (International, Immunity)
	RoHS and WEEE	RoHS-5 Compliance , China RoHS, WEEE
	Country Approvals	Australia/New Zealand, Canada, China (PRC), European Union, Germany (GS Mark), Japan, South Korea, Taiwan, United States

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