QuickSpecs
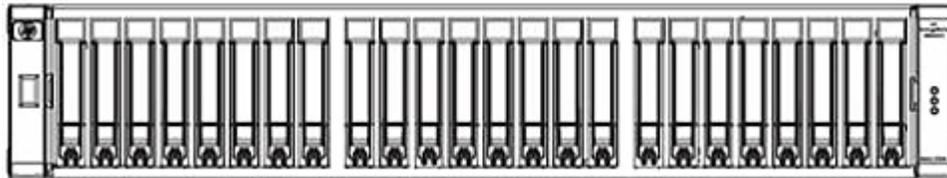
Overview

The HP 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 89 TB SAS or 120 TB SAS Midline (MDL) or SATA, and supporting up to 64 hosts.
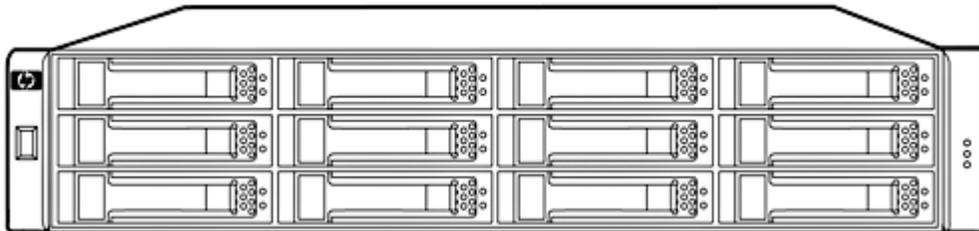
With up to 511 LUNs and LUN sizes up to 16 TB, the MSA2000sa G2 gives maximum configuration flexibility. The MSA2000sa G2 allows mixing of enterprise-class, dual-ported SAS drives and archival-class SATA drives, and supports both Large Form Factor and Small Form Factor drives. The optional HP 2000 Modular 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

- Offering electronic LTUs for MSA2000 optional software SKUs

HP 2024 G2 Modular Smart Array

HP 2012 G2 Modular Smart Array

QuickSpecs

Models

Models

HP 2000sa G2 Modular Smart Array		
	Controller-less CHASSIS & MSA2300sa G2 Controller	
	HP 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 2024 Modular Smart Array 2.5-in Drive Bay Chassis (SFF) (Will accept one or two controllers)	AJ949A
	HP 2300sa G2 Modular Smart Array Controller	AJ808A
	Disk Enclosures	
	HP 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 MSA2000 Dual I/O 3.5-inch inch 12 LFF Drive Enclosure (w/ two .6m SAS to SAS cables) Used with dual controller array head	AJ750A
	HP MSA2000 Drive Enclosure I/O Module (no cable included)	AJ751A
	HP 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 Dual Domain I/O Module for MSA70 enclosure (upgrades MSA70 to dual domain) (w/ one .5m miniSAS to miniSAS cable)	AG779A
	Configured Units	
	HP 2312sa G2 Dual Controller Modular Smart Array (LFF)	AJ805A
	HP 2324sa G2 Dual Controller Modular Smart Array (SFF)	AJ807A
	Controller-less Chassis: DC-powered units	
	HP 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 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 2024 Modular Smart Array 2.5-in Drive Bay Carrier-Grade Chassis (SFF)	AM337A
	Related Option	
	HP 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 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)	

Models

MSA2000sa Switch Bundle	HP 2000sa Modular Smart Array 3Gb SAS BL Switch Bundle	AP716A

NOTE: The HP MSA2000sa 3Gb SAS BL Switch Bundle contains the following 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 3Gb SAS BL Switch (CTO Only)	AJ864A
	HP 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.

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:**	7.2 TB SAS or 24 TB SAS MDL or SATA w/ 4 drive enclosures: 36 TB SAS or 120 TB SAS MDL or SATA	**LFF:**	7.2 TB SAS or 24 TB SAS MDL or SATA w/ 4 drive enclosures: 36 TB SAS or 120 TB SAS MDL or SATA	**LFF:**	7.2 TB SAS or 24 TB SAS MDL or SATA w/ 4 drive enclosures: 36 TB SAS or 120 TB SAS MDL or SATA
	SFF:	21.6 TB SAS or 24TB SAS MDL w/ 3 MSA70 JBODs: 89 TB SAS or 99TB SAS MDL	**SFF:**	21.6 TB SAS or 24TB SAS MDL w/ 3 MSA70 JBODs: 89 TB SAS or 99TB SAS MDL	**SFF:**	21.6 TB SAS or 24TB SAS MDL w/ 3 MSA70 JBODs: 89 TB SAS or 99TB SAS MDL
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		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. SAS Midline and SATA Midline 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 SAS, SAS MDL and SATA MDL

Family Information

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 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.

Optional Disk enclosures   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.

Family Information

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 7.2 TB SAS or 24 TB SAS MDL or SATA, expandable to 36 TB SAS or 120 TB SAS MDL or SATA with the addition of a maximum of four MSA2000 3.5-inch Drive Enclosures.
- Small Form Factor configurations can scale from 21.6 TB SAS or 24TB SAS MDL. With the addition of three MSA70 JBODs, the MSA2000sa G2 can support 89 TB SAS or 99 TB SAS.
- 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 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.

Family Information

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
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 60/40 read/write	5897
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	Supports most HP ProLiant servers including: ● HP ProLiant DL, ML ● HP Integrity c-class Blades Following BladeSystem servers are supported ONLY when connected using 3Gb SAS Switch: ● 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

Family Information

Industry Standard X86 servers support	• 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 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	• 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 **NOTE:** For detail operating support list, please visit: www.hp.com/storage/spock
Supported Clustering Solutions	• 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	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. 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. 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: • 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	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. 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

Family Information

Web Browser support	● 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
HP Insight Control Storage Module for vCenter	**HP Insight Control Storage Module for vCenter** HP Insight Control Storage Module for vCenter allows customers who are using vCenter to better monitor and manage the storage associated with VMware virtual machines. HP Storage can be added to vCenter, allowing vCenter administrators to list LUN/volume connections, determine the storage attributes associated with virtual machines, and monitor the status and health of the arrays. **Features and Benefits:** 1. **Monitor the status and health of HP arrays:** Administrators managing their virtual machine environment can get additional information about the health and status of their HP arrays. This information helps in diagnosing problems, and communicating with storage administrators on the various storage requirements for the virtualized environment. 2. **Manage LUN / volume connections from VMs and ESX servers to the arrays:** As administrators manage virtual machines, it is often very important that they know exactly what storage is connected to each, and the location and attributes of that storage within the SAN. This allows for much more intelligent decisions about VM movement and placement, and also an increased understanding of what kind of storage is being used. 3. **Understand which storage features are available:** Often when allocating storage for a virtual machine administrators need to match the characteristics of the VM with the attributes of the storage. A great example is that a "critical" VM would need highly available storage, whereas a "temp" VM could use non-protected storage. This feature will tell the administrators what "type" of storage is available to simplify their communication with the storage administrator (or to easily make the change themselves in smaller businesses).

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 2000 Modular Smart Array Snapshot 255 Software LTU[1]	T5539A
HP 2000 Modular Smart Array Snapshot 255 Software E-LTU[1]	T5539AAE
HP 2000 Modular Smart Array Snapshot 64 Software LTU	T5512A
HP 2000 Modular Smart Array Snapshot 64 Software LTU	T5512AAE
HP 2000 Modular Smart Array Snapshot 8 Software LTU	T5513A
HP 2000 Modular Smart Array Snapshot 8 Software LTU	T5513AAE
HP 2000 Modular Smart Array Snapshot 8/255 Upgrade Software LTU[1]	T5540A
HP 2000 Modular Smart Array Snapshot 8/255 Upgrade Software LTU[1]	T5540AAE
HP 2000 Modular Smart Array Snapshot 64/255 Upgrade Software LTU[1]	T5541A
HP 2000 Modular Smart Array Snapshot 64/255 Upgrade Software LTU[1]	T5541AAE
HP 2000 Modular Smart Array Snapshot 8 to 64 Upgrade Software LTU	T5515A
HP 2000 Modular Smart Array Snapshot 8 to 64 Upgrade Software LTU	T5515AAE
HP 2000 Modular Smart Array Volume Copy Software LTU	T5514A
HP 2000 Modular Smart Array Volume Copy Software LTU	T5514AAE

[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 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 Storage Mirroring

HP 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

Optional Software

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:

- 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 to search, enter CN0089W

HP Care Pack Services: Packaged server and storage services for increased uptime, productivity and ROI
When you buy HP server and storage products and solutions, it's also a good time to think about what levels of support you may need. Our portfolio of service options reduce deployment and management worries while helping you get the most out of your server and storage investments. We take a holistic approach to your environment, bridging servers, blades, storage, software and network infrastructures with our packaged HP Care Pack Services for servers and storage.

Protect your business beyond warranty
When it comes to robustness and reliability, standard computing equipment warranties have matured along with technology. Good news that can also create problems stemming from depending on standard warranties designed to only protect against product defects and some downtime causes. Using a standard approach to warranty uplifts, such as HP Care Pack Services, helps reduce downtime risks and provides operational consistency for mission-critical and standard business computing.

HP Care Pack Services: Upgrading or extending standard server and storage warranties cost effectively
HP Care Pack Services offer a standard reactive hardware and software support services suite sold separately, or combined with our Support Plus and Support Plus 24 services. The portfolio also provides a combination of integrated proactive and reactive services, such as Proactive 24 Service and Critical Service. In addition with HP Proactive Select, you can acquire the specific proactive constancy and technical services. HP Proactive Select menu offers a broad set of service options that you can mix and match depending on your specific requirements. Proactive service options include offers for server, storage, network, SAN device, software, environment and education services.

HP server and storage lifecycle support services offers a full spectrum of customer care-from technology support to complex migrations to complete managed services. HP Factory Express provides customization, integration and deployment services for turnkey solutions. HP Education Services offer flexible, comprehensive training on to help your IT staff get the most out of your server and storage investments. HP Financial solutions extend innovative financing and cost-effective asset management programs-from purchase to equipment retirement.
Learn more: www.hp.com/services/servers and www.hp.com/services/storage

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

Service and Support, HP Care Pack, and Warranty Information

HP Care Pack Services are sold by HP and HP Authorized Service Partners:

- Services for customers purchasing from HP or an enterprise reseller are quoted using HP order configuration tools.
- Customers purchasing from a commercial reseller can find HP Care Pack Services at:
  http://www.hp.com/go/lookuptool

Recommended HP Care Pack Services for optimal satisfaction with your HP product.

3-Year HP Support Plus 24

For a higher return on your server and storage investment, HP Support Plus 24 provides integrated hardware and software support services designed specifically for your technology. Available 24x7, this 3-year combined reactive support option delivers onsite hardware support and over-the-phone software support around-the-clock. Leverage the full strength of HP Technology Services - customers can trust the services professionals at HP to work collaboratively with them, putting our strategic and technical know-how to work across their entire infrastructure.

- Improve uptime with responsive hardware and software services
- Enjoy consistent service coverage across geographically dispersed sites
- Update HP software at a predictable cost
- Increase customer satisfaction-with no interoperability gaps

http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-6638EEE

HP MSA Family Disk Array Installation and Startup Service

For smooth startup, HP MSA Family Disk Array Installation and Startup Service -provides you with a custom-tailored deployment of the MSA Array so that it is properly integrated into your storage environment, and helps you realize the maximum benefit from your storage investment. In today's new era of business technology, technology must produce thousands of business outcomes. Today's HP Technology Services portfolio helps customers manage their technology in action-because when technology works, business works.

- Verification that any service prerequisites are met prior to installation
- Delivery of the service at a mutually scheduled convenient time
- Installation of HP MSA and SAN deployment according to product specification
- Availability of an HP service specialist to answer basic questions during the onsite delivery of this service
- Customized installation plan to support unique configuration requirements

http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA0-3048ENW.pdf

HP Proactive Select Service

HP Proactive Select Service improves your IT performance and manageability through the use of cost effective flexible services. HP provides technical expertise and best practices to accelerate ROI of your technology investment. Selectable proactive services span a wide range of technology and process services - a flexible way to purchase proactive services that fit your particular environment and situation.

HP Proactive Select Service is technology agnostic and purchased in addition to your choice of underlying reactive support.

- Access to a list of flexible and customizable proactive service activities
- Enhance customers' in-house IT team with complementary assistance from HP
- Improved time to solution
- Reduce business risk and project costs by accessing HP specialists
- Simplify IT operational procedures by leveraging HP best practices

Service and Support, HP Care Pack, and Warranty Information

http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA2-3842ENN.pdf

Optional HP Care Pack Services that will enhance your HP product experience.

5-Year HP Support Plus 24

As an alternative to our recommended support level, for customers who need to improve uptime with responsive 24x7 product support:

HP Support Plus 24 helps you increase performance and availability with comprehensive, consistent hardware and software services. Working with your IT team, HP Services engineers deliver onsite hardware support and over-the-phone software support around-the-clock 365 days per year. Service coverage encompasses HP products and selected multivendor hardware and software.

In addition, this convenient HP Care Pack packaged service makes software updates available to you at substantial savings.

Choose Support Plus 24 when you need to:

- Improve uptime with responsive hardware and software services available anytime
- Cost-effectively obtain expert 24x7 multivendor hardware and software support
- Enjoy consistent service coverage across geographically dispersed sites
- Update HP and selected third-party software at a predictable cost
- Take advantage of subscription savings on software updates

http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-6638EN.pdf

HP Entry Storage Data Migration Service for Windows

For customers who need to safely migrate Windows data within their TCP/IP networks with minimal impact to their operations:

You have a need to migrate data between Windows servers within your TCP/IP network. Or you have a need to migrate storage for your Windows servers. Or both. And you need to accomplish these migrations efficiently while minimizing risk at the same time.

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 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

HP Insight Remote Support software delivers secure remote monitoring and support for your HP Servers and Storage, 24 X 7, so you can spend less time solving problems and more time focused on your business. You can have your systems remotely monitored for hardware failure using secure technology that's been proven at thousands of companies around the world. In many cases, you can avoid problems before they occur.

Customer Technical Training

HP Education Services

In today's cost-conscious business environment, IT professionals, developers, consultants and users face an interesting challenge: how to keep up with the latest technologies and expand important skills while delivering profitable results on current projects. To help address this challenge, HP offers innovative training solutions that help keep you up-to-date on virtualization, server, storage, Insight Control, Citrix, Microsoft® and open source/Linux-related topics-while spending less time away from business-critical activities.
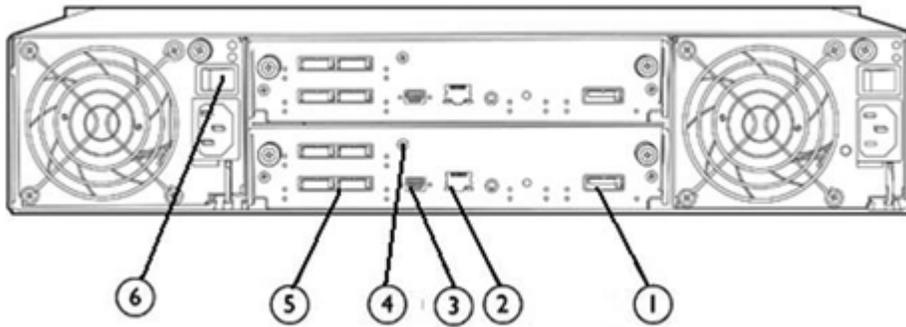
HP Services Awards

HP Technology 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.
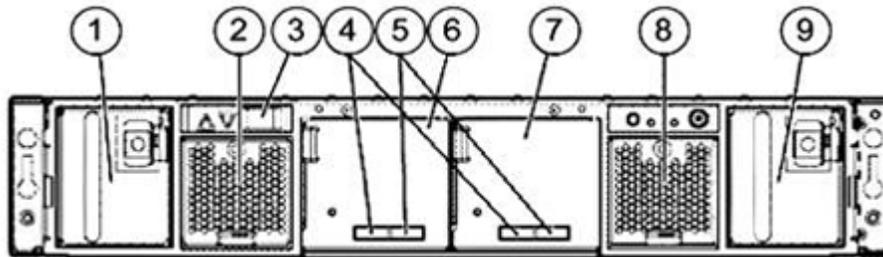
Additional Services Information

To learn more on HP ProLiant servers, HP BladeSystem servers and HP storage products, please contact your HP sales representative or HP Authorized Channel Partner. Or visit: www.hp.com/services/proliant or www.hp.com/services/bladesystem or http://www.hp.com/services/storage

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

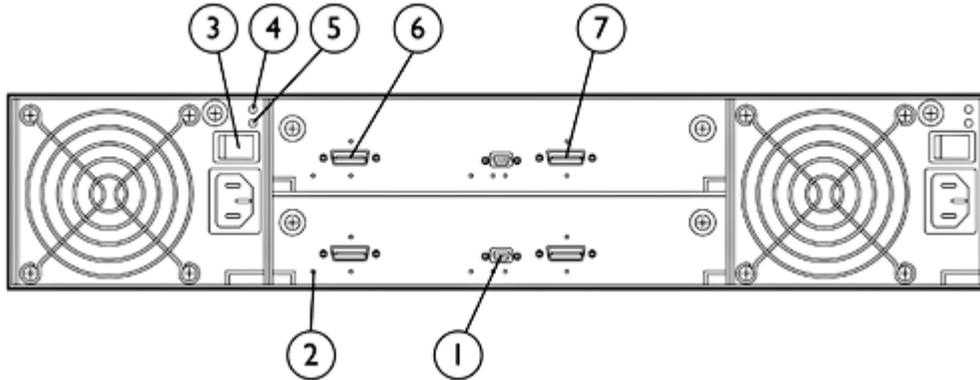**MSA70 Dual I/O 2.5-inch 25 Drive Enclosure**

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

Configuration Information

MSA2000 Dual I/O 3.5 inch 12 Drive Enclosure

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

Step 1 - MSA2000sa G2- Base Configuration

Select one:

Model Name	Model Description:	Part Number
HP 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 2024 Modular Smart Array 2.5-inch Drive Bay Chassis	Controller-less chassis with twenty-four Small Form Factor (SFF) ProLiant drives bays. 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 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

Configuration Information

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 3G Large Form Factor (LFF) SAS drives for MSA2000 3.5-inch Drive Chassis and Enclosure

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

P2000 6G Large Form Factor (LFF) SAS drives for MSA2000 3.5 inch Drive Chassis and Enclosure

HP P2000 300GB 6G SAS 15K LFF (3.5 inch) DP ENT HDD	AP858A#0D1
HP P2000 450GB 6G SAS 15K LFF (3.5 inch) DP ENT HDD	AP859A#0D1
HP P2000 600GB 6G SAS 15K LFF (3.5 inch) DP ENT HDD	AP860A#0D1

P2000 6G Large Form Factor (LFF) SAS Midline (MDL) DP drives for MSA2000 3.5 inch Drive Chassis and Enclosure

HP P2000 1TB 6G SAS 7.2K LFF (3.5 inch) DP MDL HDD	AP861A#0D1
HP P2000 2TB 6G SAS 7.2K LFF (3.5 inch) DP MDL HDD	AW555A#0D1

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

HP MSA2 500GB 7.2K 3.5 inch SATA HDD	AJ738A
HP MSA2 1TB 7.2K rpm 3.5 inch SATA HDD	AJ740A
HP P2000 3G 2TB SATA 7.2K 3.5 inch LFF MDL HDD	AW556A#0D1

NOTE: The 2TB SATA hard drive will be available Spring, 2010

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

3G SFF Serial Attached SCSI (SAS) Hard Drives

HP 146GB 3G 15K 2.5-inch SAS DP HDD	504062-B21
HP 300GB 3G 10K SAS 2.5-inch SFF DP HDD (not supported for rack-level CTO at this time)	492620-B21

6G SFF Serial Attached SCSI (SAS) Hard Drives

HP 72GB 6G SAS 15K 2.5 inch SFF DP ENT HDD	512545-B21
HP 146GB 6G SAS 10K 2.5 inch SFF DP ENT HDD	507125-B21
HP 146GB 6G SAS 15K 2.5 inch SFF DP ENT HDD	512547-B21
HP 300GB 6G SAS 10K 2.5 inch SFF DP ENT HDD	507127-B21
HP 600GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	581286-B21
HP 900GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	619291-B21

6G SFF Serial Attached SCSI (SAS) Midline (MDL) Hard Drives

HP 500GB 6G SAS 7.2K 2.5 inch SFF DP MDL HDD	507610-B21
HP 1TB 6G SAS 7.2K rpm SFF (2.5-inch) Dual Port Midline 1yr Warranty Hard Drive	605835-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 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 MSA2000 Drive Enclosure I/O Module (Use to upgrade the Single I/O model to dual I/O. No cable included)	AJ751A

Configuration Information

HP 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 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 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 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 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.

Description	Quantity	Part Number
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

Please refer to the HP Infrastructure products page for more information on HP racks and rack options:
http://h18004.www1.hp.com/products/servers/platforms/rackandpower.html

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 2012 Modular Smart Array 3.5-in Drive Bay Chassis (LFF)	AJ948A#0D1
HP 2024 Modular Smart Array 2.5-in Drive Bay Chassis (SFF)	AJ949A#0D1
HP 2300sa Modular Smart Array Controller	AJ808A#0D1
HP 2312sa G2 Dual Controller Modular Smart Array (LFF)	AJ805A#0D1
HP 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 2024 Modular Smart Array 2.5-in Drive Bay Carrier-Grade Chassis	AM337A#0D1
HP 2012 Modular Smart Array 3.5-in Drive Bay DC-power Chassis (LFF)	AJ950#A0D1
HP 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

Configuration Information

3G LFF Serial Attached SCSI (SAS) Hard Drives

HP MSA2 300GB 15K 3.5-inch SAS HDD	AJ736A#0D1
HP MSA2 450GB 3G 15K 3.5-inch SAS HDD	AJ737A#0D1

6G LFF Serial Attached SCSI (SAS) Hard Drives

HP P2000 300GB 6G SAS 15K LFF (3.5 inch) DP ENT HDD	AP858A#0D1
HP P2000 450GB 6G SAS 15K LFF (3.5 inch) DP ENT HDD	AP859A#0D1
HP P2000 600GB 6G SAS 15K LFF (3.5 inch) DP ENT HDD	AP860A#0D1

6G LFF Serial Attached SCSI (SAS) Midline (MDL) Dual Port HDD

HP P2000 1TB 6G SAS 7.2K LFF (3.5 inch) DP MDL HDD	AP861A#0D1
HP P2000 2TB 6G SAS 7.2K LFF (3.5 inch) DP MDL HDD	AW555A#0D1

3G LFF SATA Hard Drives

HP MSA2 500GB 7.2K 3.5-inch SATA HDD	AJ738A#0D1
HP MSA2 1TB 7.2K 3.5-inch SATA HDD	AJ740A#0D1
HP P2000 2TB SATA 7.2K 3.5 inch LFF Dual Port HDD	AW556A#0D1

NOTE: The 2TB SATA hard drive will be available Spring 2010

MSA70	Single I/O, single domain 25 Small Form Factor (SFF) drive bays	418800-B21
MSA70 I/O Module	HP 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)	**3G SFF Serial Attached SCSI (SAS) Hard Drives**	
	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
	6G SFF Serial Attached SCSI (SAS) Hard Drives	
	HP 72GB 6G SAS 15K 2.5 inch SFF DP ENT HDD	512545-B21
	HP 146GB 6G SAS 10K 2.5 inch SFF DP ENT HDD	507125-B21
	HP 146GB 6G SAS 15K 2.5 inch SFF DP ENT HDD	512547-B21
	HP 300GB 6G SAS 10K 2.5 inch SFF DP ENT HDD	507127-B21
	6G SFF Serial Attached SCSI (SAS) Midline (MDL) Hard Drives	
	HP P2000 500GB 6G SAS 7.2K 2.5 inch SFF DP MDL HDD	507610-B21

NOTE: 6G SAS drives will only function as 3G drives in a MSA70 or MSA2000sa G2 array.

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

SATA Drives (SFF 2.5-inch)	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 (5oC 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 spectrum0.000089g2/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 (SFF8088) 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