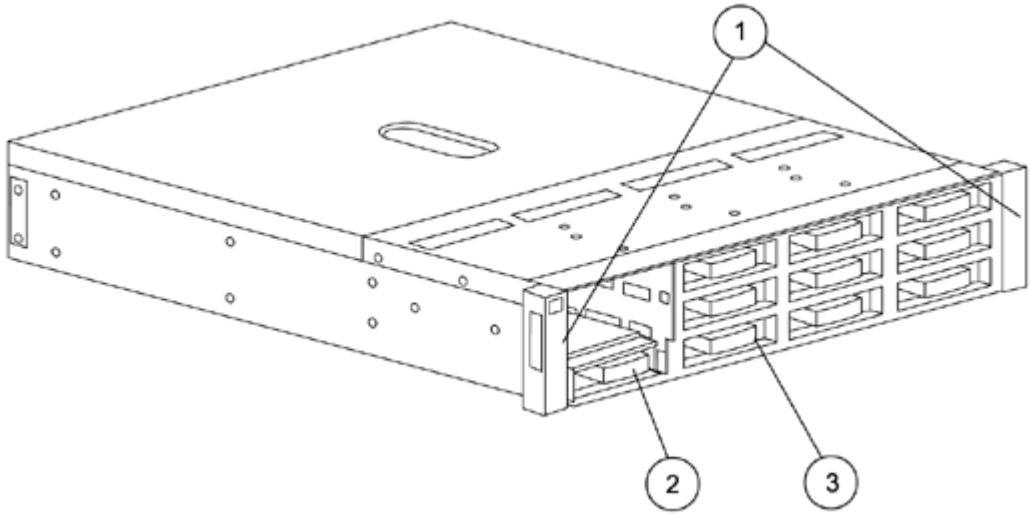
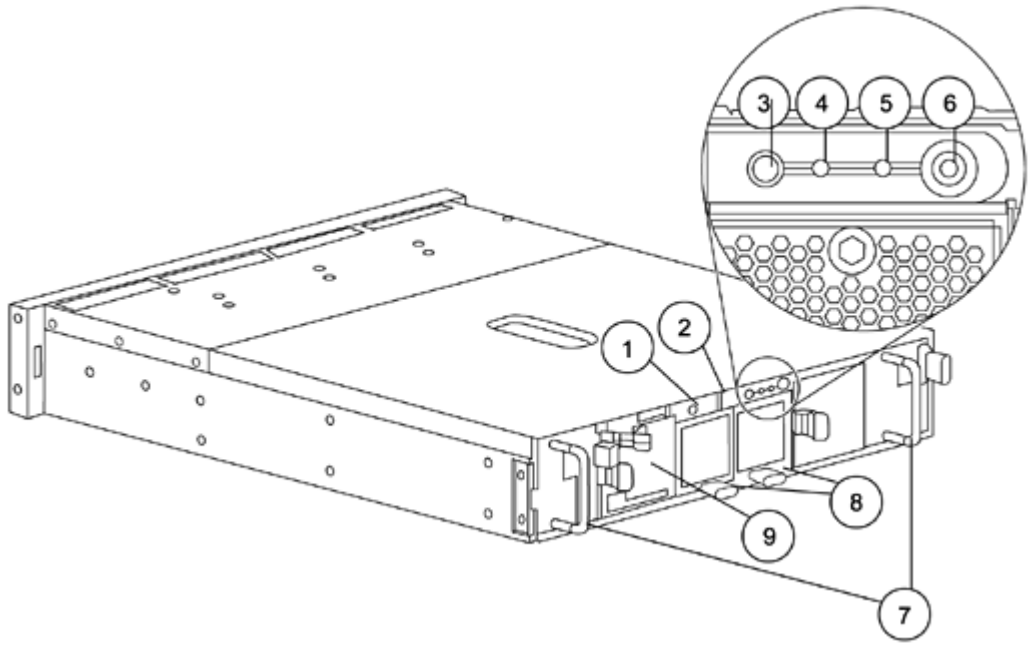
Overview



1. Mounting bracket covers (bezel ears)
2. Disk drive in bay 3
3. Disk drive in bay 6



1. Arrow buttons (for future use)
2. Enclosure ID display - Indicates the ID number assigned to the enclosure during drive configuration
3. Unit Identification button - Causes the blue LED on all drives in the enclosure to illuminate
4. Enclosure Monitor status LED - Glows green to indicate that the enclosure monitor (Global Service Indicator, or GSI) is functional
5. Enclosure fault LED - Glows amber when any other LED in the enclosure is amber, if the GSI is functional
6. Enclosure power button
7. Power supply units
8. Fan assemblies
9. Controller module

At A Glance

- Support for the Smart Array 6404, Smart Array 6402, Smart Array 642 and the Smart Array 6i Controllers
- Supports HP SATA 3G disk drives, with capacities of 250 GB, 500 GB, 750 GB and 1 TB - 1 year warranty
- Total storage capacity of 12TB (with 12 HP SATA 3G 1TB hard drives)
- Ultra320 SCSI host connectivity
- Boot from storage - move all disks to external storage for best capacity utilization
- Redundant hot-plug power supplies and fans standard
- 3 year limited warranty (MSA20 enclosure only)
- Pre-failure warranty that covers SATA disk drives (See note below)

NOTE: Customer must be running Insight Manager in order to get Pre-failure warranty. It is only covered for the warranty period of the drive which is 1 year for SATA drives.
NOTE: When using 750 GB or higher SATA HDD behind a MSA1500 or a MSA1510i, the maximum capacity available is 64 TB, maximum available storage capacity depends on the RAID level being implemented, and is based on maximum number of LUNs (32) and maximum LUN size (2 TB). Support for 750 GB or 1 TB SATA requires minimum firmware V 5.20 on MSA1500 and V1.32 on MSA1510i and V2.02 on MSA20.
NOTE: 3G SATA drives will only function as 1.5G drives in a MSA20

Standard Features

Modular Smart Array Family

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

Modular Smart Array 20

The HP Modular Smart Array 20 Enclosure (hereafter referred to as "MSA20") is a SATA 1.5Gb/s disk drive storage enclosure with Ultra320 SCSI host connectivity. These enclosures deliver industry-leading availability, storage density, and upgradeability to meet customers' demanding and growing storage needs. The MSA20 delivers the ideal mix of low-cost and high capacity, for minimum I/O workloads such as reference data, archival, and disk-to-disk backup.

Key Features

- Serial-ATA 3G - Delivering data transfer rates greater than 100MB/s
- Ultra320 (LVD) host support - Delivering compatibility with 6th generation Smart Array controllers
- 2U rack height
- A common storage platform allows for future storage consolidation to the SAN
- Hot pluggable disk drives, power supplies, and fans
- Redundant fans, and redundant power supplies
- Each MSA20 enclosure comes with dual power supplies that are sufficient to provide power to the enclosure and maintain normal operating levels.
- Integrated Environmental Monitoring - Monitors environmental conditions within the enclosure and components such as the power supply and fans
- Easy removal of parts provides better serviceability. No tools are required!
- Provides storage capacity of up to 12TB per enclosure (using 1TB SATA disk drives). Modular design allows up to 21 enclosures to be mounted in one 42U rack for a single rack storage capacity of up to 189TB of disk storage or up to 8 enclosures in an MSA1500 or a MSA1510i configuration for storage capacity of 64-TB in an entry-level SAN.

NOTE: The MSA20 had an onboard controller module. When the MSA20 is directly attached to a ProLiant server with a Smart Array controller, the MSA20 controller module functions as the array controller and the Smart Array Controller acts as the Host Adapter. When the MSA20 is connected to a MSA1500 controller shelf, the MSA1500 or MSA1510i controller functions as the array controller and present the MSA20 as a JBOD.

NOTE: When using 750 GB or higher SATA HDD behind a MSA1500 or a MSA1510i, the maximum capacity available is 64 TB, maximum available storage capacity depends on the RAID level being implemented, and is based on maximum number of LUNs (32) and maximum LUN size (2 TB). Support for 750 GB or higher SATA requires minimum firmware V 5.20 on MSA1500 and V1.32 on MSA1510i and V2.02 on MSA20.

NOTE: 3G SATA drives will only function as 1.5G drives in a MSA20

Product Highlights

High Levels of Storage Density, Data Protection, and Functionality

- Storage Capacity - The Modular Smart Array 20 cabinet supports up to twelve SATA 3G hard drives, for a maximum of 12 TB of storage capacity using HP 1TB SATA 3G 3.5" hard drives.
  - (3G SATA drives will only function as 1.5G drives in a MSA20)
- Data Protection - Modular Smart Array 20 is designed for a high level of data protection. It includes redundant fans and power supplies (standard), battery-backed cache, and support for various RAID level including RAID ADG (RAID ADG within the enclosure only applies when connected to a SA6402 or SA6404, controller. When connected to a MSA1500 the RAID ADG function is performed in the MSA1500 controller.)
- Storage Manageability - The Smart Array 20 feature familiar configuration and management tools such as Smart Array Configuration Utility and Insight Manager. Online Management Features: Online Capacity Expansion, Online RAID Level Migration, Online Stripe Size Migration, Online Spares (Global), User Selectable Read/Write cache, User Selectable Expand and Rebuild Priority. (These features are available only when connected to a SA6402, SA642 and 6i controller.)
- Choice of Computing Platform - The Modular Smart Array 20 is designed and qualified for ProLiant servers.
- Advanced Data Guarding (RAID 6 with ADG) Fault Tolerance - This is the highest level of RAID fault tolerance. It allocates two sets of parity data across drives and allows simultaneous write operations. This level of fault tolerance can withstand two simultaneous drive failures without downtime or data loss. (Only available when NOT connected to a MSA1500.)

Low Total Cost of Ownership

The modular, scalable design of the Modular Smart Array 20 provides an extremely flexible platform. You can buy what you need today and purchase additional capacity as your data storage needs grow, instead of making a large up-front investment. Additional drives and enclosures can be easily added as your needs dictate.

- Tiered Storage – Improve storage utilization and lower storage management cost by moving low-IO storage applications to the Modular Smart Array 20 allowing you to more effectively utilize mission critical storage where you need it most.
- Universal SATA Hard Drive – Since the Modular Smart Array 20 supports HP Universal SATA drives, your investment in disk drives is protected and cost is minimized as you add new drives. Sharing of a common universal drive form factor between your server and storage can significantly reduce needs for hardware and spare inventory, and offer overall reduction in storage management and business costs. SATA drives carry a 1 year warranty.
- Pre-Failure Warranty – Drives installed in a Modular Smart Array 20 and monitored under Insight Manager are supported by a Pre-Failure (replacement) Warranty (1 year for SATA drives).. Pre-Failure Warranty allows for the replacement of designated drives in Modular Smart Array 20 before they actually fail when using Insight Manager on ProLiant servers. NOTE: Some operating systems may not support all of these features.
- Integrated Configuration and Management Tools – The Modular Smart Array 20 utilizes the standard, integrated set of Smart Array management and utility software. These tools consistently lower the cost of ownership by reducing training and technical expertise necessary to install and maintain HP server storage.

Modular Smart Array 20 Components

Modular Smart Array 20 Enclosure	The 2U array houses up to twelve 3.5 inch Universal hot pluggable SATA 3G drives. Each Modular Smart Array 20 includes the following standard components: • Modular Smart Array 20 Controller Module with Ultra320 SCSI I/O host connectivity • Dual hot pluggable fans/power supplies • Two power cables • One 3' VHDCI SCSI cable
Modular Smart Array 20 Starter Kit	The MSA20 starter kit includes the MSA20 enclosure and a Smart Array SA6402/128
Smart Array Controllers	The Smart Array 6402/6404 offer multiple external Ultra320 SCSI channels for connectivity to the MSA20 systems and internal channels to provide RAID protection to Disk internal to the ProLiant server. The SA-6402 is a 64-bit PCI-X card backward compatible with 64 bit PCI slots. The Smart Array 642 Controller (SA-642) is a 64-bit/133-MHz PCI-X dual SCSI channel PCI array controller for entry level hardware-based fault tolerance. The new Smart Array 6i Controller is an intelligent array controller for entry-level, hardware-based fault tolerance for protection of OS, applications, and logs. A single Ultra320 SCSI channel allows you to support all Ultra320 SCSI internal hard disk drives.
Modular Smart Array 20 Controller Management Features	• Online RAID Level Migration: allows for online post-configuration change to RAID level without destroying data or volume information. • Online Capacity Expansion: allows for adding storage to an operational Modular Smart Array 20 reducing expensive server downtime. • Online Volume Extension: allows for the capacity growth of existing logical volumes. • Logical Drive Capacity Extension: allows the user to increase the size of existing logical drives online under Windows and offline for other operating systems. • Online Stripe Size Migration: allows changing stripe sizing of a logical drive. • User selectable read/write cache size, and allocated cache sizes. • User selectable disk drive expand and rebuild priority with Rapid Drive Rebuild technology
RAID	Several fault tolerant configurations keep data available and servers running while drives are being replaced, including: • Advanced Data Guarding (RAID 6 with ADG): Allocates the equivalence of 2 parity drives across multiple drives and allows simultaneous write operations. • Distributed Data Guarding (RAID 5): Allocates parity data across multiple drives and allows simultaneous write operations. • Drive Mirroring (RAID 1 and 1+0 Striped Mirroring): Allocates half of the drive array to data and the other half to mirrored data, providing two copies of every file.

Modular Smart Array 20 Components

Modular Smart Array 20 Controller Module	NOTE: When the MSA20 is connected to a MSA1500 controller shelf, the MSA1500 controller functions as the array controller and present the MSA20 as a JBOD.	
	Host connectivity	Ultra320 (LVD) single host connectivity.
	Controller Cache	Cache on the Modular Smart Array 20 Controller may not be upgraded. It comes standard with 128 MB of battery-backed cache. NOTE: The Modular Smart Array 20 Controller allows the following cache configurations: 1 x 128 MB
	Fault Recovery	Rapid Drive Rebuild -- minimizes downtime, reconstructs data, and facilitates a quick recovery from drive failure. On-Line Spares: If a failure occurs, recovery begins with an on-line spare and data is reconstructed automatically. One on-line spare can be assigned per array and used across multiple arrays. It is also possible to assign different on-line spares across different arrays. Array Accelerator: Onboard, battery-backed cache memory protects data in the event of a power failure. In the unlikely event of a controller failure, the battery-backed cache will save critical user data for up to three days.

Software Components

The Modular Smart Array 20 utilizes a single, consistent set of utility software for storage and RAID management, setup, configuration and troubleshooting. This consistency reduces the cost of ownership by reducing the training and technical expertise necessary to install and maintain your HP server storage solution.

Configuration Utilities	Array Configuration Utility (ACU) [On-line for Microsoft and Linux, Remote Web-Based & Off-line] Option ROM Configuration for Arrays (ORCA)
Management/Health Utilities	System Insight Manager

Array Configuration Utility (ACU)

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

System Insight Manager

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

Supported Operating Systems

- Microsoft Windows Server 2003 Web Edition
- Microsoft Windows Server 2003 Standard Edition
- Microsoft Windows Server 2003 Enterprise Edition
- Microsoft Windows Storage Server 2003
- Microsoft Windows 2000 Server
- Microsoft Windows 2000 Advanced Server
- Novell NetWare 6.5
- Red Hat Enterprise Linux 2.1
- Red Hat Linux Advanced Server 3.0
- Red Hat Linux Advanced Server 4.0
- SuSE Linux Enterprise 9 (SLES9)
- SCO OpenServer 6.0.0
- SCO UnixWare 7.1.3,
- SCO UnixWare 7.1.4

NOTE: The HBA driver for Smart Array SCO Operating Systems Controllers (6402/6404/642/6i) (ciss) is available in the HBA diskette image which is part of the HP ProLiant Extended Feature Supplement for SCO UnixWare 7 and OpenServer 6. For additional information, please visit: http://h18023.www1.hp.com/support/files/server/us/download/23643.html

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

Service and Support

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

NOTE: The MSA20 has a limited warranty includes 3 year parts, 0 years labor, 0 years on-site support. The SATA drives have a 1 year warranty.

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

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

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

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

NOTE: For more information on HP Care Pack services, contact any of our worldwide sales offices or resellers or visit our worldwide Web site on the internet at: http://www.hp.com/hps/carepack.
NOTE: For more complete information on HP Services offerings, customers and resellers, please visit us at: http://www.hp.com/hps.
NOTE: Additional information regarding worldwide limited warranty and technical support is available at: http://h18004.www1.hp.com/products/servers/platforms/warranty/index.html.

HP Care Pack Information	Flexible Care Packs	1 Year Next Day HW	HA101A1-7GT
		1 Year 4h 13x5 HW	HA103A1-7GT
		1 Year 4h 24x7 HW	HA104A1-7GT
		1 Year 6h CTR HW	HA105A1-7GT
		1 Year Support Plus	HA109A1-7GT
		1 Year Support Plus 24	HA110A1-7GT
		3 Year Next Day HW	HA101A3-7GT
		3 Year 4h 13x5 HW	HA103A3-7GT
		3 Year 4h 24x7 HW	HA104A3-7GT
		3 Year 6h CTR HW	HA105A3-7GT
		3 Year Support Plus	HA109A3-7GT
		3 Year Support Plus 24	HA110A3-7GT
		Installation	HA113A1-564
	Fixed Care Packs	3 Year Next Business Day, 5-Day x 9-Hour Coverage, Electronic	U8128E
		3 Year Four Hour, 5-Day x 13-Hour Coverage, Electronic	U8129E
		3 Year Four Hour, 7-Day x 24-Hour Coverage, Electronic	U8130E
		3 Year Six Hour, Call to Repair, 7-Day x 24-Hour Coverage, Electronic	U8131E
		1 Year Next Business Day, 5-Day x 9-Hour Coverage, Electronic	U8151E
		1 Year Four Hour, 5-Day x 13-Hour Coverage, Electronic	U8152E
		1 Year Four Hour, 7-Day x 24-Hour Coverage, Electronic	U8153E
		1 Year Six Hour, Call to Repair, 7-Day x 24-Hour Coverage, Electronic	U8154E
		Hardware Installation, Electronic	U8132E
	Flexible Care Packs	1 Year Next Day HW	HA101A1-7GT

Step 1: Order Required Items

Model	Shipping Dimensions	Part Number
MSA20	33.0 x 32.0 x 10.8 in (83.8 x 81.3 x 27.4 cm)	335921-B21

	Description	Part Number
Controllers Shelves & Controllers Supported	MSA1500 cs 2U Fibre Channel SAN Attach Controller Shelf	N/A
	HP 1510i Modular Smart Array	N/A
	Smart Array 6404/256 Controller	273914-B21
	Ultra320 Expansion Module for SA-6402	273911-B21
	Smart Array 6402/128 Controller	273915-B21
	Smart Array 642 Controller	291967-B21
	Smart Array 6i Controller	N/A

Step 2: Choose ProLiant Server(s)

Server Compatibility

HP ProLiant ML310
HP ProLiant ML310 G2
HP ProLiant ML310 G3
HP ProLiant ML330 G2
HP ProLiant ML330 G3
HP ProLiant ML350 G3
HP ProLiant ML350 G4
HP ProLiant ML370 G3
HP ProLiant ML370 G4
HP ProLiant ML530 G2
HP ProLiant ML570 G2
HP ProLiant DL320 G4
HP ProLiant DL360 G3
HP ProLiant DL360 G4
HP ProLiant DL380 G3
HP ProLiant DL380 G4
HP ProLiant DL380 G5 Storage Server
HP ProLiant DL380 G5 Data Protection Server
HP ProLiant DL385
HP ProLiant DL560
HP ProLiant DL580 G2
HP ProLiant DL580 G3
HP ProLiant DL585
HP ProLiant DL740
HP ProLiant DL760 G2

NOTE: The MSA20 in only supported with the Smart Array 642, 6402 and 6404 and these are PCI-X based, customers MUST order a PCIe to PCI-X riser card for the DL380G5 server.
HP ProLiant DL380 G5 Unique Options Mixed Riser Cage Option Kit (PCI-E/PCI-X) 410570-B21

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

Step 3: Choose Hard Drives

SATA 3G Drives	HP 1TB 3G 7.2K 3.5 inch SATA MDL HDD	454146-B21
	HP 750GB 3G 7.2K 3.5 inch SATA MDL HDD	458930-B21
	HP 500GB 3G 7.2K 3.5 inch SATA MDL HDD	458928-B21
	HP 250GB 3G 7.2K 3.5 inch SATA MDL HDD	458926-B21

NOTE: When using 750GB or higher SATA HDD behind a MSA1500 or a MSA1510i, the maximum capacity available is 64 TB, maximum available storage capacity depends on the RAID level being implemented, and is based on maximum number of LUNs (32) and maximum LUN size (2 TB). Support for 750GB SATA requires minimum firmware V 5.20 on MSA1500 and V1.32 on MSA1510i and V2.02 on MSA20.

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.

NOTE: 3G SATA drives will only function as 1.5G drives in a MSA20

SCSI Cable Options	Cables for use with Smart Array controllers	
	6 ft VHDCI to VHDCI SCSI Cable	341174-B21
	12 ft VHDCI to VHDCI SCSI Cable	341175-B21
	24-ft VHDCI to VHDCI SCSI Cable	164604-B21
	39-ft VHDCI to VHDCI SCSI Cable	150214-B21

Step 4: Choose Rack Option

HP Rack 5000 Series (Metallic Carbonite)	HP 5642 (42U) Rack Cabinet - Unassembled on Pallet	358254-B21

NOTE: Please see the HP Rack 5642 QuickSpecs for additional part numbers and Technical Specifications such as height, width, depth, weight, and color: http://h18000.www1.hp.com/products/quickspecs/12074_div/12074_div.html (Worldwide)

NOTE: For additional information regarding Rack Cabinets, please see the following URL: www.hp.com/go/rackandpower.

HP Rack 10000 Series (Graphite Metallic)	NOTE: For additional information on the HP 5642 Rack, please visit: http://h18004.www1.hp.com/products/quickspecs/12074_div/12074_div.html	
	Rack, HP Infrastructure 42U (HV)	379005-001
	HP Rack S10614 (14U) Rack Cabinet - Shock Pallet	292302-B22
	HP Rack 10842 (42U, 800mm wide) - Pallet	257415-B21
	HP Rack 10842 (42U, 800mm wide) - Shock Pallet	257415-B22

HP Rack 10647 (47U) - Pallet	245160-B21
HP Rack 10647 (47U) - Crated	245160-B23
HP Rack 10642 G2 (42U) Rack cabinet - Pallet	AF001A
HP Rack 10642 G2 (42U) Rack Cabinet - Shock Pallet*	AF002A
HP Rack 10642 G2 (42U) Rack Cabinet - Crated	AF003A
HP Rack 10642 G2 (42U) Rack Cabinet, with Extension - Shock Pallet*	AF004A
HP rack 10642 G2 (42U) Rack Cabinet - Pallet	AF011A
HP Rack 10636 G2 (36U) Rack Cabinet - Shock Pallet*	AF012A
HP Rack 10636 G2 (36U) Rack Cabinet - Crated	AF013A
HP Rack 10636 G2 (36U) Rack Cabinet - with Extension - Shock Pallet*	AF014A
HP Rack 10622 (22U) - Pallet	245163-B21
HP Rack 10622 (22U) - Shock Pallet	245163-B22
HP Rack 10622 (22U) - Crated	245163-B23
HP Rack 5642 Pallet Unassembled	358254-B21

NOTE 1: In order to configure the MSA20 in a rack, have it cabled and have hard drives added the following part number must be ordered 377473-605 (Not required in North America).

NOTE 2: In order to configure the MSA20 in a rack, with MSA1500, have it cabled and have hard drives added the following part number must be ordered 377473-606.

NOTE 3: -B21 (pallet) used to ship empty racks shipped on a truck
-B22 (shock pallet) used to ship racks with equipment installed (by custom systems, VARs and Channels)
-B23 (crated) used for air shipments of empty racks.

NOTE 4: It is mandatory to use a shock pallet in order to ship racks with equipment installed.

NOTE 5: Please see the Rack 10000 QuickSpecs for additional part number and Technical Specifications such as height, width, depth, weight, and color: http://h18000.www1.hp.com/products/quickspecs/10995_div/10995_div.html (Worldwide)

NOTE: For additional information regarding Rack Cabinets, please see the following URL: http://www.hp.com/go/rackandpower

LED Indicators for Drive Modules (2)	Online (bottom)	
	Drive Failure/ID (top)	
LED Indicators on Rear Panel (7)	Power Supply/Blower Assembly Fault (2)	
	Fan Module (2)	
	Controller Module Fault (1)	
	Enclosure Monitor Status (left)	
	Enclosure Fault (right)	
Interface	SATA 1.5Gb/s to Hard Drives	
	Ultra320 SCSI to Host Servers	
Maximum Number of Drives	12, 1-in SATA 1.5Gb/s Universal SATA Hard Drives (Modular Smart Array 20 cabinet)	
Temperature Range	Operating	50° to 95° F (10° to 35° C)
	Shipping	-40° to 150° F (-40° to 66° C) NOTE: Rated 1°C per 1000 feet of elevation to 10000 ft.
Relative Humidity	Operating	10% to 90%
	Non-operating	Up to 95%
Input Power Requirements	Rated Input Voltage	100 to 240 VAC
	Rated Input Frequency	50 to 60 Hz
	Rated Input Current	3.9 A at110 VAC typical, 6A Maximum
	Input Power (max)	345 W*
Heat Dissipation (maximum)	1175 Btu/hr*	
	*Input Power and Heat Dissipation specifications are maximum values and apply to worst-case conditions at full rated power supply load. The power/heat dissipation for your installation will vary depending on the equipment configuration.	

Smart Array 642 Controllers	Protocol supported	Ultra320, Ultra 3, Ultra 2 SCSI
	SCSI Electrical Interface	Low Voltage Differential (LVD)
	SCSI Port Connectors	One external and one internal SCSI port
	Channel Transfer Rate	640-MB/s total; 320-MB/s per channel
	PCI Bus Speed	64-bit, 133-MHz PCI-X
	Cache	64 MB, upgradeable to 192MB of total memory with the 128MB BBWC Enabler
	RAID supported	0,1, 1+0, 5
Smart Array 6402 controller	Protocol supported	Ultra320, Ultra 3, Ultra 2 SCSI
	SCSI Electrical Interface	Low Voltage Differential (LVD)
	SCSI Port Connectors	Two external and two internal SCSI port (upgradeable to 4 external)
	Channel Transfer Rate	640-MB/s total; 320-MB/s per channel
	PCI Bus Speed	64-bit, 133-MHz PCI-X
	Cache	128 MB BBWC (upgradeable to 512 MB)
	RAID supported	0,1, 1+0, 5, 6 with ADG
Smart Array 6404	Protocol supported	Ultra320, Ultra 3, Ultra 2 SCSI

Technical Specifications

controller	SCSI Electrical Interface	Low Voltage Differential (LVD)
	SCSI Port Connectors	Four external and two internal SCSI port
	Channel Transfer Rate	1280 MB/s total; 320-MB/s per channel
	PCI Bus Speed	64-bit, 133-MHz PCI-X
	Cache	256 MB BBWC (upgradeable to 512 MB)
	RAID supported	0,1, 1+0, 5, 6 with ADG
Modular Smart Array 20 Cabinet	2U Rack Form Factor	
	Dimensions (HxWxD)	3.5 x 19.2 x 23.5 in (8.8 x 48.8 x 59.7 cm)
	Weight (Net)	53 lb (24.0 kg)
	Dimensions (LxWxD)	33.0 x 10.8 x 32.0 in (83.8 x 27.4 x 81.3 cm)
	Weight (Gross)	75 lb (34.0 kg)

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The information contained herein is subject to change without notice.

The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

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