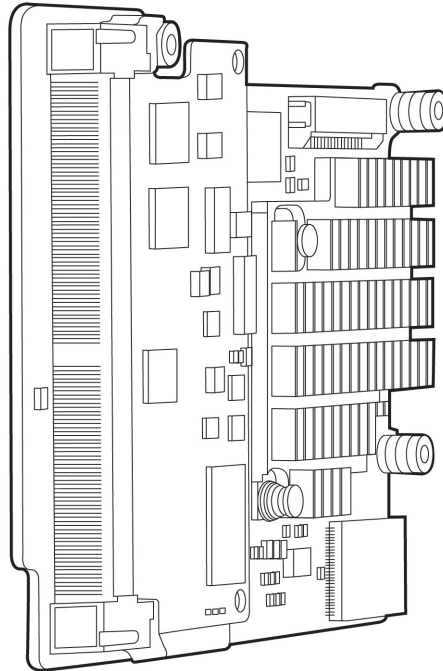


Overview

The HP Smart Array P721m is a PCI-Express (PCIe) 3.0 mezzanine card supporting direct attached SAS Storage for the HP ProLiant Gen8 BladeSystem servers. It is one of the highest performing controllers in the HP 6Gb/s SAS portfolio and provides new levels of reliability connectivity, and storage performance for HP Gen8 Blade servers through its support of the latest SCSI technology and advanced RAID capabilities. Supports up to 227 zoned direct attached SAS or SATA hard drives per HP Smart Array P721m Controller. Supports tape drives, shared storage (up to 4 P2000 G3 Smart Arrays), and direct attach to D2600 and D2700



Models

HP Smart Array P721m/2G FBWC 4-ports Ext Mezzanine SAS Controller

650072-B21

HP Smart Array P721m/512 4-ports Ext Mezzanine SAS Controller

655636-B21

NOTE: HP Smart Array P721m/512M Controller is only for shared storage connect. For connecting D2600/D2700, one must use P721m/2G FBWC controller.

NOTE: HP Smart Array P721m/2G FBWC controller comes with Smart Array Advanced Pack 2.0 license features enabled by default

Standard Features

The Smart Array Advantage

HP's innovative design and integration work within the Smart Array family of products creates customer value that is unmatched in the industry. Use of Smart Array products across multiple applications results in a much lower Total Cost of Ownership (TCO) than any other server storage RAID product. The HP Smart Array family brings an unparalleled return on investment.

Data Compatibility. Data Compatibility with all Serial Smart Array controllers allows simple and easy upgrades any time needs for higher performance, capacity, and availability increase.

Consistent Configuration and Management Tools. All Smart Array products utilize a standard set of management and utility software. These tools minimize Total Cost of Ownership (TCO) by reducing training requirements and technical expertise necessary to install and maintain HP server storage.

Pre-Failure Warranty. Pre-Failure Warranty means Systems Insight Manager not only reports when a drive is going to fail but allows replacement of failing drives prior to actual failure. For complete details, consult the HP Support Center or refer to your HP Server documentation.

Key Features

- Storage interface (SAS/SATA)
 - 6 Gb/s SAS technology delivers up to 600 MB/s per physical link.
 - 6Gb/s SATA technology delivers up to 600 MB/s for directly attached SATA drives.
 - Mix-and-match SAS and SATA drives. Deploy drive technology as needed to fit the computing environment.
 - Support for SAS tape drives, SAS tape autoloaders and SAS tape libraries.
- RAID controller features
 - 512 MB or 2 GB cache
 - RAID 0, 1, 3, 5, 6, 10, 50 on P2000sa
 - RAID 0, 1, 10, 5, 50, 6, 60, RAID 1 (ADM), RAID 1+0 (ADM)
NOTE: RAID for Shared Storage is controlled by the controller of the array.
 - Recovery ROM protects against ROM corruption.
- Smart Array PCIe mezzanine card that connects to a HP 6Gb/s SAS BL Switch through the c-Class enclosure high-speed mid-plane supporting shared SAS storage.
- Eight (8) 6Gb/s SAS physical links distributed across 4 external 2x ports to supports up to 4 6Gb/s SAS Switches
- 2G Flash Backed Write Cache (FBWC) provides indefinite write cache data retention in the case of unexpected power outage.
- Software consistency among all Smart Array family products: Array Configuration Utility, Systems Insight Manager, Array Diagnostic Utility (ADU) and SmartStart

Online Management Features

- Online Array Expansion
- Online RAID Level Migration Online Stripe Size Migration Online Spares (Global)
- User Selectable Expand and Rebuild Priority
- Online Logical Drive Extension Availability

Performance

- Eight (8) 6Gb/s SAS physical links distributed across 4 external 2x ports which supports up to 4 6Gb/s SAS Switches
- 2nd Generation 6Gb/s SAS (600MB/s bandwidth per physical link)
- PCIe 3.0
- Up to 2G Flash Backed Write Cache

Standard Features

Capacity

- Dependent upon attached arrays. See drive enclosure QuickSpecs for details

Availability

Provides increased server uptime by providing advanced storage functionality:

- Online RAID Level Migration (between any RAID level)
- Online Capacity Expansion
- Logical Drive Capacity Extension
- Global Online Spare

Fault Prevention

The following features offer detection of possible failures before they occur, allowing preventive action to be taken:

- S.M.A.R.T.: Self Monitoring Analysis and Reporting Technology first developed at HP detects possible hard disk failure before it occurs, allowing replacement of the component before failure occurs.
- Drive Parameter Tracking monitors drive operational parameters, predicting failure and notifying the administrator.
- Dynamic Sector Repairing continually performs background surface scans on the hard disk drives during inactive periods and automatically remaps bad sectors, ensuring data integrity.
- Smart Array Cache Tracking monitors integrity of controller cache, allowing pre-failure preventative maintenance.

Fault Tolerance RAID Descriptions

Keeps data available and server running while a failed drive is being replaced; two fault tolerance configurations are supported for the internal connections including:

- RAID 0 (striping) provides no extra data protection. Data is striped across all drives in the array to increase performance. RAID 0 requires a minimum of one drive.
- RAID 1 (mirroring) protects against failure of one drive. Data is duplicated on a pair of drives. RAID 1 requires a minimum of two drives.
- RAID 1+0 (mirroring and striping) protects against failure of one drive (and failure of particular multiple drives). RAID 1+0 is a nested RAID method that uses RAID 0 striping across RAID 1 arrays to provide performance and protection. RAID 1+0 requires a minimum of four drives. Also see the Advanced Pack Mirror Splitting and Combining feature.
- RAID 5 (distributed data guarding) protects against failure of one drive. Data protection is provided by parity data distributed across all the drives. When a physical drive fails, data that was on the failed drive can be calculated from the remaining parity data and user data on the other drives in the array. This recovered data is usually written to an online spare drive through a process called a rebuild. RAID 5 requires a minimum of three drives.
- RAID 6 with ADG (Advanced Data Guarding): This is the highest level of 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.
- RAID 50 (RAID 5+0) protects against failure of one drive (and failure of particular multiple drives). RAID 50 is a nested RAID method that uses RAID 0 striping across RAID 5 arrays. RAID 50 tolerates one drive failure in each spanned array without loss of data. RAID 50 requires less rebuild time than single RAID 5 arrays RAID 50 requires a minimum of six drives.
- RAID 60 (RAID 6+0) allows administrators to split the RAID 6 storage across multiple external boxes. RAID 60 requires a minimum of eight drives. RAID 60 is a nested RAID method that uses RAID 0 block-level striping across multiple RAID 6 arrays with dual distributed parity. With the inclusion of

Standard Features

- dual parity, RAID 60 will tolerate the failure of two disks in each spanned array without loss of data.
- RAID 1 ADM (Advanced Data Mirroring) allows customers to create mirrored RAID set using 3 identical hard drives. This provides customers with a 2nd "live spare" for RAID 1(+0) configurations. This allows customers to rebuild a failed drive in a RAID 1(+0) set without the array entering into a degraded state.

NOTE: Please see the HP P2000 G3 Modular Smart Array Systems QuickSpecs for Technical Specifications and additional information regarding RAID levels:

http://h18000.www1.hp.com/products/quickspecs/13551_div/13551_div.html

Fault Recovery

Minimizes downtime, reconstructs data, and facilitates a quick recovery from drive failure:

- Recovery ROM: This feature provides unique redundancy that protects from a ROM image corruption. A new version of firmware can be flashed to the ROM while the controller maintains the last known working version of firmware. If the firmware becomes corrupt, the controller will revert back to the previous version of firmware and continue operating. This reduces the risk of flashing firmware to the controller.
 - DRAM ECC corrects against single bit data and address corruption.
-

Ease of Use

Consistency and Upgradeability make the Smart Array family unique in the industry:

- GUI based configuration, management and diagnostic software tools
- Common data format between generations of products

Compatibility

Supported Servers

HP ProLiant BL420c Gen8
HP ProLiant BL460c Gen8
HP ProLiant BL465c Gen8
HP ProLiant BL660cGen8

NOTE: Some servers listed above may be discontinued.

NOTE: For more information on internal vs external connections, please refer to proper blade QuickSpecs please visit: <http://h18000.www1.hp.com/products/quickspecs/division/12534.html>

Operating Systems and Virtualization Software Support for ProLiant Servers

Microsoft Windows Server 2008 with SP2
Microsoft Windows Server 2008 R2 with SP1
Microsoft Windows Small Business Server 2011
SLES 10 SP4
SLES 11 SP1
Red Hat Enterprise Linux 5
Red Hat Enterprise Linux 6
VMware ESX/ESXi 4.1
VMware ESXi 5.0

NOTE: For more information on HP's Certified and Supported ProLiant Servers for OS and Virtualization Software and latest listing of software drivers available for your server, please visit our Support Matrix at: <http://www.hp.com/go/supportos>.

Software Suite

All Smart Array products share a common set of configuration, management and diagnostic tools, including Array Configuration Utility, Array Diagnostic Utility (ADU), and Systems Insight Manager. This software consistency of tools reduces the cost of training for each successive generation of product and takes much of the guesswork out of troubleshooting field problems. These tools lower the total cost of ownership by reducing training and technical expertise necessary to install and maintain HP server storage

Systems Insight Manager

- Powerful server and server options/storage manager tool
- Monitors over 1200 system wide parameters
- Configuration/Diagnostic Utilities

HP Array Configuration Utility (ACU)

- Powerful Web based configuration utility for all Smart Array controllers
- Provides a graphical view of HP server drive array configurations
- Allows for management of multiple arrays over a secure internet connection from anywhere in the world
- Easy to use Wizards for configuration
- Runs offline (via Smart Start) and online on Windows

HP Option ROM Configuration for Arrays (ORCA)

- An alternative method for easily viewing, creating, and deleting multiple arrays and logical volumes during system power up.
- For advanced array configurations use ACU

HP Storage Management Utility

- Initial System Configuration Wizard is the easiest and simplest method for configuring the storage system initially.
- Command Line Interface (CLI) for command level method of configuring and managing the storage

Compatibility

HP Array Diagnostic Utility (ADU)

- Main User Interface for multi server environments that need customization for creation of storage Luns and targets.
- P2000 G3 Arrays can be configured using Storage Management Utility (SMU) or Command Line Interface (CLI) both of which are embedded in the P2000 G3 Array controller firmware.
- In depth diagnostic and reporting utility for all Smart Array controllers

Service and Support, HP Care Pack, and Warranty Information

Service and Support

HP Technology Services

HP Technology Services offers you technical consultants and support expertise to solve your most complex infrastructure problems. We help keep your business running, boost availability, and avoid downtime.

Protect your business beyond warranty with HP Care Pack Services

When you buy HP Options, it's also a good time to think about what level of service you may need. HP Care Pack services provide total care and support expertise with committed response choices designed to meet your IT and business need.

HP Foundation Care services deliver scalable support-packages for HP industry-standard servers and software. You can choose the type and level of service that is most suitable for your business needs. New to this portfolio is HP Collaborative Support. If you are running business critical environments, HP offers Proactive Care or Critical Advantage. These services help you deliver high levels of application availability through proactive service management and advanced technical response.

Here is the support service recommendation from the Foundation Care and Proactive Care portfolio. For customized support service solution, HP can work with you to tailor a service solution for your unique support requirements using broader services portfolio of Foundation Care and Proactive Care.

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

Recommended Services

3-Year HP 24x7 4 hour Response, Proactive Care

Helps optimize your systems and delivers high levels of application availability through proactive service management and advanced technical response. A skilled Technical Manager will own your query or issue end to end until resolved, delivering a single point of contact for you.

3-Year HP 24x7 4 hour Response, HP Collaborative Support

Provides problem resolution support across the stack of HW, firmware, and HP and 3rd party SW. In case the issue is with 3rd party SW, HP does known issue resolution. If HP cannot solve the issue, it will contact the third-party vendor and create a problem incident on your behalf

<http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA3-8232ENW.pdf>

HP Installation of ProLiant Add On Options Service

This easy-to-buy, easy-to-use HP Care Pack service helps ensure that your new HP hardware or software is installed smoothly, efficiently, and with minimal disruption of your IT and business operations

Service and Support, HP Care Pack, and Warranty Information

Related HP Care Pack Services to enhance your HP product experience

Related Services

3-Year HP 24x7 4 hour Response, Proactive Care

Helps optimize your systems and delivers high levels of application availability through proactive service management and advanced technical response. A skilled Technical Manager will own your query or issue end to end until resolved, delivering a single point of contact for you

3-Year HP 24x7 4 hour Response, Hardware Support Onsite Service

Provides you with rapid remote support and if required an HP authorized representative who will arrive on site any time and day of the year to begin hardware maintenance service within 4 hours of the service request being logged

<http://h20195.www2.hp.com/V2/GetPDF.aspx/5982-6547EEE.pdf>

3-Year HP 6-hour Onsite Call-to-Repair, HP Collaborative Support

Offers customers a single point of contact for server problem diagnosis, hardware problem resolution to return the hardware in operating condition within 6 hours of the initial service request to the HP Global Solution Center, and basic software problem diagnosis, fault isolation, and resolution if available to HP.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA3-8232ENW.pdf>

HP Proactive Select Service

Provides a flexible way to purchase HP best-in-class consultancy and technical services. You can buy Proactive Select Service Credits when you purchase your hardware and then use the credits over the next 12 months. <http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA2-3842ENN.pdf>

Insight Remote Support Provides 24 X 7 remote monitoring, proactive notifications, and problem resolution. Learn more <http://www.hp.com/go/insightremotesupport>

HP Support Center

Personalized online support portal with access to information, tools and experts to support HP business products. Submit support cases online, chat with HP experts, access support resources or collaborate with peers. Learn more <http://www.hp.com/go/hpsc>

HP's Support Center Mobile App* allows you to resolve issues yourself or quickly connect to an agent for live support. Now, you can get access to personalized IT support anywhere, anytime.

HP Insight Remote Support and HP Support Center are available at no additional cost with a HP warranty, HP Care Pack or HP contractual support agreement.

*HP' Support Center Mobile App is subject to local availability

Parts and materials

HP will provide HP-supported replacement parts and materials necessary to maintain the covered hardware product in operating condition, including parts and materials for available and recommended engineering improvements. Supplies and consumable parts will not be provided as part of this service; standard warranty terms and conditions apply. Parts and components that have exceeded their maximum supported lifetime and/or the maximum usage limitations as set forth in the manufacturer's operating manual or the technical product data sheet will not be provided, repaired or replaced as part of this service.

Service and Support, HP Care Pack, and Warranty Information

Warranty / Service Coverage

For ProLiant servers and storage systems, this service covers HP-branded hardware options qualified for the server, purchased at the same time or afterward, internal to the enclosure, as well as external monitors up to 22" and tower UPS products; these items will be covered at the same service level and for the same coverage period as the server unless the maximum supported lifetime and/or the maximum usage limitation has been exceeded. Coverage of the UPS battery is not included; standard warranty terms and conditions apply.

The defective media retention service feature option applies only to Disk or eligible SSD/Flash Drives replaced by HP due to malfunction. It does not apply to any exchange of Disk or SSD/Flash Drives that have not failed. SSD/Flash Drives that are specified by HP as consumable parts and/or that have exceeded maximum supported lifetime and/or the maximum usage limit as set forth in the manufacturer's operating manual or the technical data sheet are not eligible for the defective media retention service feature option

For more information

To learn more on services for HP ESSN Options, please contact your HP sales representative or HP Authorized Channel Partner. Or visit: <http://www.hp.com/services/proliant> or www.hp.com/services/bladesystem

Warranty

The warranty for this device is 3 years parts only.

Pre-Failure Warranty: Drives attached to the Smart Array Controller and monitored under Insight Manager are supported by a Pre-Failure (replacement) Warranty. For complete details, consult the HP Support Center or refer to your HP Server Documentation.

Software Product Services

Standalone telephone support
Rights to new license version
Media and documentation updates

Hardware Product Services

Installation services
On-site maintenance (includes warranty support)
Response time upgrades during the warranty period
Post-warranty coverage
RAID setup and performance consulting via statement of work

Warranty Upgrade Options

Response - Upgrade on-site response from next business day to same day 4 hours

Coverage - Extend hours of coverage from 9 hours x 5 days to 24 hours x 7 days

Duration - Select duration of coverage for a period of 1, 3, or 5 years

Warranty upgrade options can come in the form of Care Packs, which are sold at the HP System level this product attaches too.

Service and Support, HP Care Pack, and Warranty Information

HP Care Pack Information HP Care Pack is defined as an upgrade to the product warranty attribute, available for a specific duration and hours of coverage. Care Packs for this option is sold at the system level this option attaches too. HP Care Pack is not available for less than the product's warranty duration. HP Care Pack is available for sale anytime during the warranty period for most products, but the commencement date will be the same as the Warranty Start Date (delivery date to end user customer). Proof of purchase may be required. HP Care Pack services are prepaid.

NOTE: For additional HP Care Pack (hardware & software) information, as well as orderable part numbers, please refer to the URL: <http://www.hp.com/hps/carepack/>

Related Options

HP Hard Drives

NOTE: Supports attached enclosures.

P2000 Large Form Factor (LFF) SAS drives for P2000 G3 FC and P2000 3.5-inch Disk Enclosure

HP P2000 300GB 6G SAS 15K rpm LFF Dual Port Enterprise Hard Drive AP858/

HP P2000 450GB 6G SAS 15K rpm LFF Dual Port Enterprise Hard Drive AP859/

HP P2000 600GB 6G SAS 15K rpm LFF Dual Port Enterprise Hard Drive AP860/

P2000 Large Form Factor (LFF) SAS MDL DP drives for P2000 G3 FC and P2000 3.5-inch Disk Enclosure

HP P2000 1TB 6G SAS 7.2K LFF (3.5-inch) Dual Port MDL Hard Drive AP861/

HP P2000 2TB 6G SAS 7.2K LFF (3.5-inch) Dual Port MDL Hard Drive AW555/

MSA2 Large Form Factor (LFF) SATA drives for P2000 array head an P2000 disk enclosure

HP MSA2 1TB 7.2K rpm 3.5 inch Dual-port SATA Hard Disk Drive AJ740/

HP P2000 2TB 3G SATA 7.2K LFF MDL Hard Drive AW556/

SAS Hot Plug SFF (2.5-inch) Enterprise (ENT) Drives

NOTE: Supports P2000 G3 Array (24 drive bay) and the D2700 JBOD (25 drive bay).

HP 146GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive 507125-B2

HP 300GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive 507127-B2

HP 450GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive 581284-B2

HP 600GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive 581286-B2

HP 72GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive 512545-B2

HP 146GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive 512547-B2

NOTE: Please see QuickSpecs for Technical Specifications and additional information:

http://h18000.www1.hp.com/products/quickspecs/12244_div/12244_div.html
(Worldwide)

SAS Hot Plug SFF (2.5-inch) Midline (MDL) Drives

NOTE: Supports P2000 G3 Array (24 drive bay) and the D2700 JBOD (25 drive bay).

HP 500GB 6G SAS 7.2K rpm SFF (2.5-inch) Dual Port Midline 1yr Warranty Hard Drive 507610-B2

NOTE: Please see QuickSpecs for Technical Specifications and additional information:

http://h18000.www1.hp.com/products/quickspecs/12244_div/12244_div.html
(Worldwide)

SATA Hot Plug SFF (2.5-inch) Midline (MDL) Drives

NOTE: SFF SATA drives are single ported and therefore do not have a fail-over path intrinsic to their design.

NOTE: Supports P2000 G3 Array (24 drive bay) and the D2700 JBOD (25 drive bay).

HP 500GB 3G SATA 7.2K rpm SFF (2.5-inch) Midline 1yr Warranty Hard Drive 507750-B2

NOTE: Please see the QuickSpecs for Technical Specifications and additional information:

http://h18000.www1.hp.com/products/quickspecs/13021_div/13021_div.html
(Worldwide)

HP SAS Switches

HP StorageWorks 6Gb/s SAS BL Switch - Single Pack BK763/

HP StorageWorks 6Gb/s SAS BL Switch - Dual Pack BK764/



Related Options

NOTE: Please see the QuickSpecs for Technical Specifications and additional information at:

http://h18000.www1.hp.com/products/quickspecs/13960_div/13960_div.html

HP c Class Blade Enclosures	HP BLc7000 CTO 3 IN LCD ROHS Encl	507019-B2
	HP BLc7000 1PH 2PS 4 Fan TL ROHS ICE	507014-B2
	HP BLc7000 1PH 6PS10Fan FI ROHS 16IC Kit	507015-B2
	HP BLc7000 3PH 6PS 10 Fan INT ROHS ICE	507016-B2
	HP BLc7000 3PH 6PS10FanENG ROHS IC Kit	507017-B2

HP Disk Enclosures	HP StorageWorks D2600 Disk Enclosure	AJ940/
	HP StorageWorks D2700 Disk Enclosure	AJ941/
<p>NOTE: Please see the D2000 Disk Enclosure QuickSpecs for additional information including configuration steps and additional options needed for a complete solution at: http://h18000.www1.hp.com/products/quickspecs/13404_div/13404_div.html (Worldwide)</p>		

HP P2000 G3 Modular Smart Array Systems	P2000 G3 SAS Controller	
	HP StorageWorks P2000 G3 SAS MSA Array System Controller (four 6Gb SAS ports per controller)	AW592/
	P2000 Chassis	
	P2000 Controller-less Chassis (AC-powered)	
	HP StorageWorks P2000 Modular Smart Array 3.5-in Drive Bay Chassis (LFF)	AP838/
	NOTE: Will accept one or two controllers or Disk Enclosure I/O modules.	
	HP StorageWorks P2000 Modular Smart Array 2.5-in Drive Bay Chassis (SFF)	AP839/
	NOTE: Will accept one or two controllers, not I/O modules.	
	Configured Units, 6 Gb SAS Systems	
	HP StorageWorks P2000 G3 SAS MSA Dual Controller LFF Array System	AW593/
HP StorageWorks P2000 G3 SAS MSA Dual Controller SFF Array System	AW594/	
Disk Enclosures		
HP StorageWorks P2000 Dual I/O LFF Drive Enclosure, twelve 3.5" drive bays (w/ two .5m mini-SAS to mini-SAS cables. Used with single or dual controller LFF or SFF array head)	AP843/	
HP StorageWorks P2000 LFF Drive Enclosure I/O Module (no cable included. Designed exclusively for use with the LFF chassis AP838A to create a single I/O JBOD)	AJ844/	
HP StorageWorks D2700 SFF Disk Enclosure, twenty-five 2.5" drive bays (w/ two .5m mini-SAS to mini-SAS cables. Used with single or dual controller LFF or SFF array head)	AJ941/	

HP Tape Backup	Tape Autoloaders	
	HP 1/8 G2 LTO-4 Ultrium 1760 SAS Tape Autoloader	AK377/
	HP 1/8 G2 LTO-5 Ultrium 3000 SAS Tape Autoloader	BL536/
	HP 1/8 G2 Ultrium 920 SAS Autoloader	AH558/

Related Options

Tape Libraries

HP MSL2024 1 LTO-4 Ultrium 1760 SAS Tape Library	AK378/
HP MSL2024 Ultrium 920 SAS Tape Library	AH559/
HP MSL2024 1 LTO-5 Ultrium 3000 SAS Tape Library	BL537/
HP MSL4048 2 LTO-4 Ultrium 1760 SAS Tape Library	AK380/
HP MSL4048 2 LTO-5 Ultrium 3000 SAS Tape Library	BL538/
HP MSL8096 2 LTO-4 Ultrium 1760 SAS Tape Library	AK382/
HP MSL8096 2 LTO-5 Ultrium 3000 SAS Tape Library	BL539/

Technical Specifications

Dimensions	4 in x 4.5 in x 0.8 in (10.1 cm x 11.4 cm x 2 cm)
Disk Drive and Enclosure Protocol Support	SAS protocol: 6Gb/s, 3Gb/s, or 1.5Gb/s SATA protocol: 3Gb/s or 1.5Gb/s
SAS Connectors	two (2) 1x connectors for cabled drives, two (2) 2x connections for external connection to SAS switch
Memory Bus Speed	DDR2-800MHz and 40-bit wide bus (256MB module)
SAS Port Link Rate	6Gb/s per physical link
Software Upgradeable Firmware	Yes
Cache Memory	256 MB Read/Write ECC protection and removable
Logical Drives Supported	Up to 2 logical drives internal, 64 logical drives external
Maximum Capacity	Variable depending upon enclosure
Memory Addressing	64-bit, supporting servers memory space greater than 4 GB
RAID Support	Internal drives support RAID 0 (Striping) and RAID 1 (Mirroring) RAID 0, 1, 3, 5, 6, 10, 50 on P2000sa
Upgradeable Firmware	Flashable ROM with redundant firmware images

Environment-friendly Products and Approach	End-of-life Management and Recycling	Hewlett-Packard offers end-of-life HP product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to: http://www.hp.com/go/green . To recycle your product, please go to: http://www.hp.com/go/green or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.
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The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: <http://www.hp.com/go/green>. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.

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