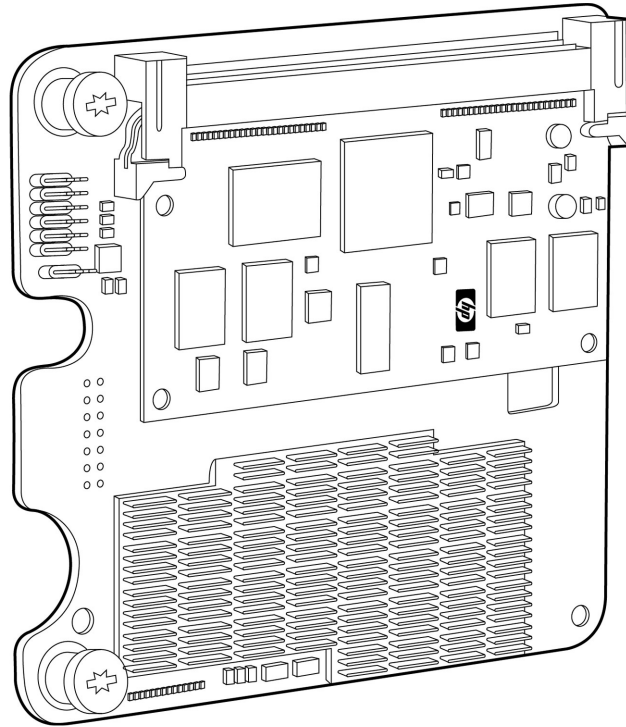


### Overview

The HP Smart Array P711m is a PCI-Express (PCI-E) mezzanine card supporting shared and direct attached SAS Storage. 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 Blade servers through its support of the latest SCSI technology and advanced RAID capabilities. Supports up to 108 zoned direct attached SAS or SATA hard drives per HP Smart Array P711m Controller.



**HP Smart Array P711m Controller**

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### What's New

- Support for MDS600 and D2600/D2700 Disk Enclosures

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### Models

HP Smart Array P711m/1G 6Gb FBWC 4-ports Ext Mezzanine SAS Controller

513778-B21

**NOTE:** For MDS600 host connectivity, P711m firmware 5.32 or higher, 6Gb BL SAS switch firmware 2.0.1.0 or higher and MDS600 firmware 3.44 are required.

**NOTE:** For D2600/D2700 support in Blade configuration, P711m firmware 5.32 or higher, 6Gb BL SAS switch firmware 2.0.1.0 or higher and D2600/D2700 firmware 1.34 or higher are required.

### 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

- 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
- Storage interface (SAS/SATA)
  - 6Gb/s SAS technology delivers up to 600 MB/s per physical link.
  - 3Gb/s SATA technology delivers up to 300 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
  - 1 GB flash-backed write cache (not all of which is available for user data)
  - RAID 0, 1, , 5, 6, 50, 60
  - RAID configuration for shared storage is controlled by the Array Controller of enclosure the array
    - RAID 0.1.3, 5.6.10.50
- License key for Smart Array Advanced Pack (SAAP) included
- Software consistency among all Smart Array family products: Array Configuration Utility, Systems Insight Manager, Array Diagnostic Utility (ADU) and SmartStart
- 1G Flash Backed Write Cache (FBWC) provides indefinite write cache data retention in the case of unexpected power outage.
- Multi-path support available in Smart Array firmware when using zoned direct attached storage. Both direct attached storage paths are load balanced for improved performance when using the enclosure in dual domain mode using SAS HDDs.

#### 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

### Standard Features

#### Performance

- Eight (8) 6Gb/s SAS physical links distributed across 4 external 2x ports which supports up to 4 6Gb/s SAS Switches
- 6Gb/s SAS (600MB/s bandwidth per physical link)
- The P711m supports higher performance between the 6G SAS Switch and MDS600 by attaching 2 SAS cables from any quad of 6G SAS Switch ports to the 2 ports on the MDS600 IO module to create an 8x wide SAS port
- 1G Flash Backed Write Cache

#### Capacity

- Dependent upon attached enclosures and arrays.

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

[http://h18000.www1.hp.com/products/quickspecs/13257\\_div/13257\\_div.html](http://h18000.www1.hp.com/products/quickspecs/13257_div/13257_div.html)  
(HP 600 Modular Disk System)

[http://h18000.www1.hp.com/products/quickspecs/13551\\_div/13551\\_div.html](http://h18000.www1.hp.com/products/quickspecs/13551_div/13551_div.html)  
(HP P2000 G3 Modular Smart Array Systems)

#### 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
- Pre-Failure Warranty

#### Fault Tolerance RAID Descriptions

Keeps data available and server running while a failed drive is being replaced; several fault tolerance configurations are supported 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. Also see the Advanced Pack Mirror Splitting and Combining feature.
- **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

### Standard Features

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 dual parity, RAID 60 will tolerate the failure of two disks in each spanned array without loss of data.

**NOTE:** When the P711m is connected to the MDS600 configured with the HP MDS600 Dual I/O Module Option Kit or to D2600/D2700 with dual domain SAS HDDs, there are multiple physical paths to each HDD, enabling the server to endure P711m port failures, switch failures, cable pulls, cable failures, and MDS600 IO module failures without interruption of normal storage I/O.

**NOTE:** See Enclosure QuickSpecs for descriptions of RAID levels specific to the HP P2000 G3 Arrays at: [http://h18000.www1.hp.com/products/quickspecs/13551\\_div/13551\\_div.html](http://h18000.www1.hp.com/products/quickspecs/13551_div/13551_div.html)

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### 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.
  - **On-Line Spares:** There is no limit to the number of spare drives that can be installed prior to drive failure. If a failure occurs, recovery begins with an On-Line Spare and data is reconstructed automatically.
- 

### 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 Server Blades

HP ProLiant BL280c G6  
HP ProLiant BL460c G6 & G7  
HP ProLiant BL465c G6 & G7  
HP ProLiant BL490c G6 & G7  
HP ProLiant BL620c G7  
HP ProLiant BL680c G5 & G7  
HP ProLiant BL685c G6 & G7

##### HP Integrity Server Blades

HP Integrity BL860c i2  
HP Integrity BL870c i2  
HP Integrity BL870c i4  
HP Integrity BL890c i2  
HP Integrity BL890c i4

**NOTE:** Some servers listed above may be discontinued.

**NOTE:** For more information on supported server options, please refer to appropriate server QuickSpecs

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#### Operating Systems and Virtualization Software Support for ProLiant Servers

Microsoft Windows 2003  
Microsoft Windows 2008 R2  
SLES 10  
SLES 11  
Red Hat Enterprise Linux 5  
Red Hat Enterprise Linux 6  
VMware ESX 4.0  
VMware ESX 4.1  
VMware ESXi 5.0  
HP-UX 11iv3

**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/ossupport>.

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### Compatibility

#### 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
- 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.

#### HP Array Diagnostic Utility (ADU)

- In depth diagnostic and reporting utility for all Smart Array controllers

### Service and Support, HP Care Pack, and Warranty Information

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**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.

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**Software Product Services** Standalone telephone support  
Rights to new license version  
Media and documentation updates

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**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

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**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.

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**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/>

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### Related Options

#### HP Hard Drives

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

[http://h18000.www1.hp.com/products/quickspecs/13257\\_div/13257\\_div.html](http://h18000.www1.hp.com/products/quickspecs/13257_div/13257_div.html)

(HP 600 Modular Disk System)

[http://h18000.www1.hp.com/products/quickspecs/13551\\_div/13551\\_div.html](http://h18000.www1.hp.com/products/quickspecs/13551_div/13551_div.html)

(HP P2000 G3 Modular Smart Array Systems)

#### **SAS Hot Plug LFF (3.5-inch) Enterprise (ENT) Drives**

**NOTE:** Supports the HP 600 Modular Disk System and HP D2600 Disk Enclosure.

HP 600GB 6G SAS 15K rpm LFF (3.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive 516828-B21

HP 450GB 6G SAS 15K rpm LFF (3.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive 516816-B21

HP 300GB 6G SAS 15K rpm LFF (3.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive 516814-B21

#### **SAS Hot Plug LFF (3.5-inch) Midline (MDL) Drives**

**NOTE:** Supports the HP 600 Modular Disk System and HP D2600 Disk Enclosure.

HP 2TB 6G SAS 7.2K rpm LFF (3.5-inch) Dual Port Midline 1yr Warranty Hard Drive 507616-B21

HP 1TB 6G SAS 7.2K rpm LFF (3.5-inch) Dual Port Midline 1yr Warranty Hard Drive 507614-B21

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

[http://h18000.www1.hp.com/products/quickspecs/12244\\_div/12244\\_div.html](http://h18000.www1.hp.com/products/quickspecs/12244_div/12244_div.html)

(Worldwide)

#### **SATA Hot Plug LFF (3.5-inch) Midline (MDL) Drives**

**NOTE:** Supports the HP 600 Modular Disk System and HP D2600 Disk Enclosure.

HP 2TB 3G SATA 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive 507632-B21

HP 1TB 3G SATA 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive 454146-B21

HP 500GB 3G SATA 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive 458928-B21

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

[http://h18000.www1.hp.com/products/quickspecs/13021\\_div/13021\\_div.html](http://h18000.www1.hp.com/products/quickspecs/13021_div/13021_div.html)

(Worldwide)

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

**NOTE:** Supports the HP D2700 Disk Enclosure.

HP 900GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive 619291-B21

HP 600GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive 581286-B21

HP 450GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive 581284-B21

HP 300GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive 507127-B21

HP 146GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive 512547-B21

**NOTE:** HP D2700 Disk Enclosures with 900GB SAS drives are for Direct Attach only. The 900GB SAS drives not supported for HP P2000 G3 Enclosures.

#### **SAS Hot Plug LFF (3.5-inch) Midline (MDL) Drives**

**NOTE:** Supports the HP 600 Modular Disk System and HP D2600 Disk Enclosure.

HP 3TB 6G SAS 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive 625031-B21

HP 2TB 6G SAS 7.2K rpm LFF (3.5-inch) Dual Port Midline 1yr Warranty Hard Drive 507616-B21

HP 1TB 6G SAS 7.2K rpm LFF (3.5-inch) Dual Port Midline 1yr Warranty Hard Drive 507614-B21



### Related Options

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

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

#### **SATA Hot Plug LFF (3.5-inch) Midline (MDL) Drives**

**NOTE:** Supports the HP 600 Modular Disk System and HP D2600 Disk Enclosure.

HP 3TB 3G SATA 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive	628059-B21
HP 2TB 3G SATA 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive	507632-B21
HP 1TB 6G SAS 7.2K rpm SFF (2.5-inch) Dual Port Midline 1yr Warranty Hard Drive	605835-B21
HP 500GB 6G SAS 7.2K rpm SFF (2.5-inch) Dual Port Midline 1yr Warranty Hard Drive	507610-B21
HP 1TB 3G SATA 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive	454146-B21
HP 500GB 3G SATA 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive	458928-B21

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

**NOTE:** Supports the HP D2700 Disk Enclosure.

HP 1TB 3G SATA 7.2K rpm SFF (2.5-inch) Hot Plug Midline 1yr Warranty Hard Drive	625609-B21
HP 500GB 3G SATA 7.2K rpm SFF (2.5-inch) Midline 1yr Warranty Hard Drive	507750-B21

**NOTE:** HP 1TB SATA MDL HDDs are not supported on the P2000 G3 arrays. HP D2700 with 1TB SATA MDL drives are for Direct Attach only.

**NOTE:** SATA drives are single ported and therefore do not have a fail-over path intrinsic to their design. Only Dual Port (DP) SAS drives will work in the Dual Domain environment.

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

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

#### **6G SAS Hot Plug Enterprise Performance Solid State Drive**

**NOTE:** Supports the HP D2700 Disk Enclosure.

HP 400GB 6G SAS SLC SFF (2.5-inch) Enterprise Performance 3yr Warranty Solid State Drive	632494-B21
HP 200GB 6G SAS SLC SFF (2.5-inch) Enterprise Performance 3yr Warranty Solid State Drive	632492-B21

#### **6G SAS Hot Plug Enterprise Mainstream Solid State Drives**

**NOTE:** Supports the HP D2700 Disk Enclosure.

HP 800GB 6G SAS MLC SFF (2.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive	632506-B21
HP 400GB 6G SAS MLC SFF (2.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive	632504-B21
HP 200GB 6G SAS MLC SFF (2.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive	632502-B21

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

[http://h18000.www1.hp.com/products/quickspecs/14038\\_div/14038\\_div.html](http://h18000.www1.hp.com/products/quickspecs/14038_div/14038_div.html)  
(Worldwide)

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<b>HP Disk Storage Systems</b>	HP D2600 Disk Enclosure	AJ940A
	<b>NOTE:</b> Supports 12 LFF drives, and SAS 6 Gb/s and SATA 3 Gb/s.	

### Related Options

HP D2700 Disk Enclosure AJ941A

**NOTE:** Supports 25 SFF drives, and SAS 6 Gb/s and SATA 3 Gb/s.

**NOTE:** Please see the 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](http://h18000.www1.hp.com/products/quickspecs/13404_div/13404_div.html)  
(Worldwide)

HP 600 Modular Disk System with Dual I/O Modules Disk System AJ866A

HP 600 Modular Disk System Dual I/O Module Option Kit AP763A

**NOTE:** Includes all MDS600 supported bundles.

**NOTE:** Please see the QuickSpecs for additional information including configuration steps and additional options needed for a complete solution at:

[http://h18000.www1.hp.com/products/quickspecs/13257\\_div/13257\\_div.html](http://h18000.www1.hp.com/products/quickspecs/13257_div/13257_div.html)  
(Worldwide)

#### Mini SAS to Mini SAS Cables

HP External Mini SAS 2m Cable 407339-B21

#### HP SAS Switches

HP 6Gb SAS BL Switch Single Pack BK763A

HP 6Gb SAS BL Switch Dual Pack BK764A

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

[http://h18000.www1.hp.com/products/quickspecs/13960\\_div/13960\\_div.html](http://h18000.www1.hp.com/products/quickspecs/13960_div/13960_div.html)  
(Worldwide)

#### HP c Class Blade Enclosures

HP BLc7000 Configure-to-order 3 In LCD ROHS Enclosure 507019-B21

HP BLc7000 Enclosure with 1 Phase 2 Power Supply 4 Fan ROHS ICE License 507014-B21

HP BLc7000 Enclosure with 1 Phase 6 Power Supply 10 Fan ROHS ICE License 507015-B21

HP BLc7000 Enclosure with 3 Phase 6 Power Supply 10 Fan ROHS ICE License 507016-B21

HP BLc7000 Enclosure with 3 Phase 6 Power Supply 10 Fan ROHS ICE License 507017-B21

#### HP P2000 G3 Modular Smart Array Systems

##### P2000 G3 SAS Controller

HP P2000 G3 SAS MSA Array System Controller AW592A

**NOTE:** Four 6Gb SAS ports per controller.

##### P2000 Chassis

##### P2000 Controller-less Chassis (AC-powered)

HP P2000 LFF Modular Smart Array Chassis AP838A

**NOTE:** Will accept one or two controllers or Disk Enclosure I/O modules.

HP P2000 SFF Modular Smart Array Chassis AP839A

**NOTE:** Will accept one or two controllers, not I/O modules.

##### Configured Units, 6 Gb SAS Systems

HP P2000 G3 SAS MSA Dual Controller LFF Array System AW593A

HP P2000 G3 SAS MSA Dual Controller SFF Array System AW594A

##### Disk Enclosures

### Related Options

HP P2000 Dual I/O LFF Drive Enclosure	AP843A
<b>NOTE:</b> 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.	
HP P2000 LFF Drive Enclosure I/O Module	AJ844A
<b>NOTE:</b> Cable not included. Designed exclusively for use with the LFF chassis PN AP838A to create a single I/O JBOD.	

### HP Tape Backup

#### Tape Autoloaders

HP 1/8 G2 LTO-5 Ultrium 3000 SAS Tape Autoloader	BL536A
HP 1/8 G2 LTO-4 Ultrium 1760 SAS Tape Autoloader	AK377A
HP 1/8 G2 Ultrium 920 SAS Autoloader	AH558A

#### Tape Libraries

HP MSL2024 1 LTO-4 Ultrium 1760 SAS Tape Library	AK378A
HP MSL2024 Ultrium 920 SAS Tape Library	AH559A
HP MSL2024 1 LTO-5 Ultrium 3000 SAS Tape Library	BL537A
HP MSL4048 2 LTO-4 Ultrium 1760 SAS Tape Library	AK380A
HP MSL4048 2 LTO-5 Ultrium 3000 SAS Tape Library	BL538A
HP MSL8096 2 LTO-4 Ultrium 1760 SAS Tape Library	AK382A
HP MSL8096 2 LTO-5 Ultrium 3000 SAS Tape Library	BL539A

**NOTE:** HP recommends a maximum of 2 tape drives per 6Gb/s SAS BL Switch and 64K transfer sizes. Attaching a library with 4 tape drives requires purchasing a second tape library SAS cable (AN975A or AN976A) and attaching 2 drives to the redundant 6Gb/s SAS BL Switch. Attaching more than 2 tape drives per switch and transfer sizes greater than 64K could result in a failed backup or restore. A future release of firmware on the tape library drives will allow more than 2 tape drives to be attached to a switch.

### Technical Specifications

<b>Dimensions</b>	4 in x 4.5 in x 0.8 in (10.1 cm x 11.4 cm x 2 cm)
<b>Disk Drive and Enclosure Protocol Support</b>	SAS protocol: 6 Gb/s, 3 Gb/s, or 1.5 Gb/s SATA protocol: 3 Gb/s or 1.5 Gb/s
<b>SAS Connectors</b>	Four (4) 2x connectors external
<b>Memory Bus Speed</b>	DDR2-800 (6.4 GiB/s maximum bandwidth)
<b>SAS Port Link Rate</b>	6Gb/s per physical link
<b>Software Upgradeable Firmware</b>	Yes
<b>Cache Memory</b>	1 GB capacity (not all of which is available for user data) 64-bit data width with 8-bit error correcting code (ECC) Flash-backed on power loss Tether to capacitor pack Removable
<b>Logical Drives Supported</b>	512 logical drives external for shared storage 64 logical drives for direct attached storage
<b>Maximum Capacity</b>	Variable depending on attached enclosure
<b>Memory Addressing</b>	64-bit, supporting servers memory space greater than 4 GB
<b>RAID Support</b>	RAID 0, 1, 3, 5, 6, 10, 50 on P2000 SA G3
<b>Maximum Number of Physical Drives</b>	108 for direct attach storage 149 small form factor drives or 96 large form factor for shared storage
<b>Upgradeable Firmware</b>	Flashable ROM with redundant firmware images

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<b>Environment-friendly Products and Approach</b>	<b>End-of-life Management and Recycling</b>	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: <a href="http://www.hp.com/go/green">http://www.hp.com/go/green</a> . To recycle your product, please go to: <a href="http://www.hp.com/go/green">http://www.hp.com/go/green</a> 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.