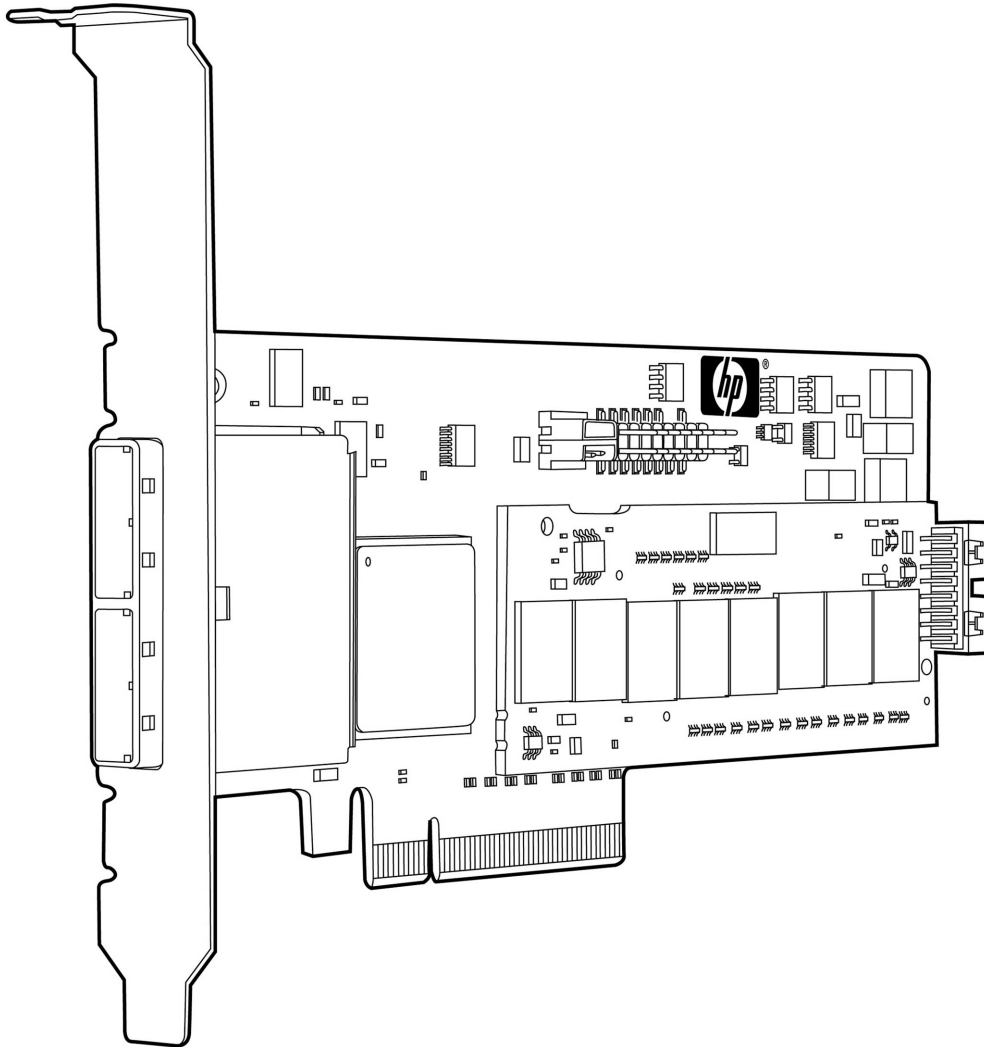


### Overview

The HP Smart Array E500 is HP's external connect only, entry level PCI Express (PCIe) Serial Attached SCSI (SAS) RAID controller. The full size card has 8 ports (2 x4 mini SAS external connectors) and utilizes DDR2-533 memory. The SA-E500 offers RAID 0, 1 and 0+1 and can be upgraded with the battery-backed write cache (BBWC) module for RAID 5. This low-profile card is ideal for customers needing a low-cost external connect for HP ProLiant servers to tape, JBODs, and intelligent Modular Storage Arrays (MSA).



### Models

HP Smart Array E500  
Controller

HP Smart Array E500/256MB Controller  
HP Smart Array E500/256MB Controller for Integrity Servers

435129-B21  
AH226A



### Overview

### Upgrade Options

|                    |   |            |
|--------------------|---|------------|
| HP Upgrade Options | HP SA-P400 and SA-E500 24 In Battery Cable Kit<br><b>NOTE:</b> This option kit contains a 24" battery cable and adhesive material for installing a battery into the following servers if a Smart Array E500 is integrated outside of the factory - HP ProLiant ML310 G3, HP ProLiant ML310 G4, HP ProLiant ML350 G5, HP ProLiant DL380 G5 (installations in a full size slot), HP ProLiant DL385 G2 (installations in a full size slot) and HP ProLiant DL580 G4. For all solutions, please refer to the HP ProLiant QuickSpecs and User's Manual for detailed installation instructions. | 417836-B21 |
|                    | Battery-backed write cache upgrade  | 383280-B21 |



### Standard Features

**NOTE:** For a brief, printer friendly data sheet that describes this product and informs you of the essential capabilities and specifications, please visit: <http://h71028.www7.hp.com/ERC/downloads/4AA1-1149ENW.pdf>.

#### The Smart Array Advantage

HP's innovative design and integration work of 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 through:

**Data Compatibility** among all models of Smart Array controllers allows simple and easy upgrades any time needs for higher performance, capacity, and availability increase. Even successive generations of Smart Array controllers understand the data format of other Smart Array Controllers.

**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 the HP server storage.

**Universal Hard Drive** form factor is for use across multiple HP servers, disk enclosures and storage systems. With compatibility across many enterprise platforms, you are free to deploy and re-deploy these drives to quickly deliver increased storage capacity, migrate data between systems, and easily manage spare drives.

**Pre-Failure Warranty** means HP 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

- The SA-E500 Controller supports up to 100 drives.
- The SA-E500 Controller supports the HP StorageWorks 50 Modular Smart Array, HP StorageWorks 60 Modular Smart Array and HP StorageWorks 70 Modular Smart Array.
- Seamless upgrades to current or next generation HP high performance and high capacity Serial Attached SCSI Smart Array controllers
- 3Gb/s SAS technology delivers high performance and data bandwidth up to 300 MB/s per physical link and contains full compatibility with 1.5Gb/s SATA technology.
- x8 2.5G PCI Express host interface technology delivers high performance and data bandwidth up to 2 GB/s maximum bandwidth.
- Addition of the battery upgrade enables battery backed write cache, RAID 5, array expansion, logical drive extension, RAID migration, and stripe size migration.
- Mix-and-match SAS and SATA hard drives, lets you deploy drive technology as needed to fit your computing environment.
- Support for SAS tape products.
- Software consistency among all Smart Array family products: Array Configuration Utility, Systems Insight Manager, Array Diagnostic Utility (ADU) and SmartStart.
- Support for greater than 2TB in a single logical drive
- 256 MB 40-bit wide DDR2-533 MHz cache module (with optional battery upgrade)
- Low-profile PCI Express form factor - ships with a full size bracket for deployment in either a low-profile or full sized slot



### Standard Features

#### Online Management Features

- Online array expansion (with battery upgrade)
- Online logical drive extension (with battery upgrade)
- Online RAID Level Migration (with battery upgrade)
- Online Stripe Size Migration (with battery upgrade)
- Offline Mirror splitting and recombining
- Unlimited global online spare assignment
- User selectable expand and rebuild priority
- User selectable RAID level and stripe size
- User selectable read and write cache size ratio

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**Ports** ● Eight (8) SAS physical links distributed across 2 external x4 miniSAS connectors.

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**Performance** HP's High Performance Architecture sets new boundaries of industry performance expectations!

- 3Gb/s SAS (300MB/s bandwidth per physical link)
- 8x 3Gb/s SAS physical links (compatible with 1.5G SATA)
- 256 MB 40-bit wide DDR2-533 MHz (optional battery upgrade)
- x8 2.5G PCI Express host interface provides 2 GB/s maximum bandwidth during burst transfers
- 440 PowerPC Processor

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#### Native Command Queuing

Native Command Queuing (NCQ) is a technology designed to increase performance of SATA hard disk drives by allowing the individual hard disk to internally optimize the order in which received read and write commands are executed. This can reduce the amount of unnecessary going back-and-forth on the drive's heads, resulting in increased performance for workloads where multiple simultaneous read/write requests are outstanding, most often occurring in server or storage-type applications. Without NCQ the drive has to process and complete one command at a time. For NCQ to be enabled, it must be supported and turned on in the controller and in the hard drive itself.

**NOTE:** Please see the [SATA Hard Drive QuickSpecs](http://h18000.www1.hp.com/products/quickspecs/11940_na/11940_na.html) for specific SATA hard drive capacities that support NCQ: [http://h18000.www1.hp.com/products/quickspecs/11940\\_na/11940\\_na.html](http://h18000.www1.hp.com/products/quickspecs/11940_na/11940_na.html)

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**Dual Domain Support** Dual domain SAS creates redundant pathways for external drives from servers to storage devices. The redundant paths created by these configurations reduce or eliminate single points of failure within the storage network. This provides increased levels of high availability with redundant paths from the controller to the drives. Dual domain SAS implementations make it possible to tolerate host bus adapter (HBA) or controller failure, external cable failure, expander failure, cable pulls, expander failure and failure in a spanned disk (JBOD) environments.

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**Capacity** Given the increasing need for high performance and rapid capacity expansion, the SA-E500 offers:

- Up to 12TB of external storage per PCI slot with 4x HP StorageWorks 50 Modular Smart Array enclosures and 40 x 300GB SFF SAS hard drives.
- Up to 36TB of external storage per PCI slot with 8x HP StorageWorks 60 Modular Smart Array enclosures and 96 x 600GB 3.5" SAS hard drives.
- Up to 96TB of external storage per PCI slot with 8x HP StorageWorks 60 Modular Smart Array enclosures and 96 x 1TB 3.5" SATA MDL hard drives.
- Up to 30TB of external storage per PCI slot with 8x HP StorageWorks 70 Modular Smart Array enclosures and 100 x 300GB SFF SAS hard drives.



### Standard Features

- Up to 25 TB of external storage per PCI slot with 8x HP StorageWorks 70 Modular Smart Array enclosures and 100 x 250GB SFF SATA hard drives

**NOTE:** Support for greater than 2TB in a single logical drive.

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### 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

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### 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) was first developed by HP which 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.
- Environment Tracking for External Storage System: Monitors fan speed and cabinet temperature of StorageWorks Modular Smart Array Enclosures.

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### Fault Tolerance

Keeps data available and server running while a failed drive is being replaced; several fault tolerance configurations are supported including:

- Distributed Data Guarding (RAID 5): This allocates parity data across multiple drives and allows simultaneous write operations. It is recommended for up to 14 hard drives.
  - RAID5 is available on the SA E500 only if the battery kit option is used
- Drive Mirroring (RAID 1, 1+0): This allocates half of the drive array to data and the other half to mirrored data, providing two copies of every file. It is a high-performance RAID.

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### Fault Recovery

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

- Recovery ROM: This new feature provides a unique redundancy feature 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.
- DRAM ECC corrects against single bit data and address corruption.



### Standard Features

#### 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
  - Data migration between servers and external HP StorageWorks Modular Smart Array enclosures
- 

#### 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.

#### 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



### Compatibility

#### Server Support

For up to date compatibility, please see the following URL for complete Smart Array E500 Controller compatibility and support information:  
<http://h18006.www1.hp.com/products/servers/proliantstorage/arraycontrollers/index.html>

#### Operating Systems

[Microsoft Windows Server](#)  
[Microsoft Windows Server Hyper-V](#)  
[Red Hat Enterprise Linux \(RHEL\)](#)  
[SUSE Linux Enterprise Server \(SLES\)](#)  
[Oracle Enterprise Linux \(OEL\)](#)  
[Solaris 10 for x86/x64 based Systems](#)  
[VMware](#)

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 and Smart Array RAID controller, please visit our Support Matrix at: <http://www.hp.com/go/ossupport>

**NOTE:** For more Linux OS support & certification information, please visit:

- [ProLiant & BladeSystem Server Linux matrix](#)  
<http://h18004.www1.hp.com/products/servers/linux/>
- [Integrity & BladeSystem Server Linux matrix](#)  
<http://h71028.www7.hp.com/enterprise/cache/321101-0-0-0-121.html>

#### Software Suite

All Smart Array products share a common set of configuration, management and diagnostic tools, including Array Configuration Utility (ACU), Array Diagnostic Utility (ADU), and Systems Insight Manager. These software tools reduce 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 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 online on Windows and NetWare (CPQONLIN)

##### 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

**NOTE:** For advanced array configurations use ACU.

##### HP Array Diagnostic Utility (ADU)

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



### Service and Support

#### Service and Support

#### **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](http://www.hp.com/services/servers) and [www.hp.com/services/storage](http://www.hp.com/services/storage)

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

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>





### Service and Support

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

##### Recommended Services **Hardware Options Support**

HP Care Packs provide support for all HP-branded hardware options qualified for inclusion in your server or storage solution. Any additional HP-qualified options installed within the server are covered at the same service level and for the same period as the server and no additional cost.

- Help improve or maintain system uptime
- Convenient onsite support
- Committed response time

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

##### **3-Year HP Hardware Support Onsite Service, 4-hour response, 24x7**

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.

This service provides a trained HP service specialist to perform an installation that meets HP quality standards, for:

- Help improve or maintain system uptime
- Convenient onsite support
- Committed response time

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

##### **HP Installation and Startup of HP ProLiant Servers**

Provides for the installation of your new HP ProLiant server and operating system to assist you in bringing your new HP ProLiant server and operating system into operation in a timely and professional manner.

This service provides a trained HP service specialist to perform an installation that meets HP quality standards, for:

- Delivery of the service at a mutually scheduled time convenient to your organization
- Availability of an HP service specialist to answer basic questions during the onsite delivery of this service
- Custom installation as detailed in "Delivery specifications" or in a Statement of Work (SOW)
- Verification prior to installation that all service prerequisites are met

<http://h20195.www2.hp.com/V2/GetPDF.aspx/5982?7572ENN>



### Service and Support

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

##### Optional Services

##### 3-Year HP Hardware Support Onsite Call-to-Repair (CTR) Service, 6- or 24-hour

As an alternative to our recommended support level, for customers who need committed call-to-repair for server hardware.

Provides your IT manager with a team of support specialists who will quickly begin troubleshooting the system to help return the hardware to operating condition within 6 or 24 hours of the initial service request to the HP Global Solution Center.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-6636ENN>

##### 3-Year HP Support Plus 24

As an alternative to our recommended support level, for customers who need access to responsive 24x7 hardware and software support plus software updates on HP and selected third party products:

For a higher return on your server and storage technology, our 3-year combined reactive support service delivers integrated onsite hardware/software support services available 24x7x365, including access to HP technical resources, 4-hour response onsite hardware support and software updates.

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

##### HP Proactive Select Service

Customer needs on demand access to consulting, technical proactive services and education courses

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>

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#### 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 support for your HP Servers and Storage, 24



### Service and Support

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.

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### Customer Technical Training

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.

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### 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.

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### Additional Services Information

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



### Related Options

**NOTE:** This is a list of supported options. Some may be discontinued.

#### HP Hard Drives

**NOTE:** The components of a storage subsystem (e.g. the drive, the HBA/controller, firmware, and the server backplane) should operate at the same data transfer rate or the system bandwidth will be negotiated down to an acceptable level for all components.

**NOTE:** Hard drives have either a one year or three year warranty; refer to the specific hard drive QuickSpecs for details.

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

|   |            |
|---|------------|
| 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 300GB 3G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive | 492620-B21 |
| HP 146GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive | 512547-B21 |
| HP 146GB 3G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive | 504062-B21 |
| HP 146GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive | 507125-B21 |
| HP 146GB 3G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive | 418367-B21 |
| HP 72GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive  | 512545-B21 |
| HP 72GB 3G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive  | 418371-B21 |
| HP 146GB 10K rpm Hot Plug SAS 2.5 Single Port Hard Drive                            | 431958-B21 |
| HP 72GB 15K rpm Hot Plug SAS 2.5 Single Port Hard Drive                             | 431935-B21 |
| HP 72GB 10K rpm Hot Plug SAS 2.5 Dual Port Hard Drive                               | 384842-B21 |
| HP 72GB 10K rpm Hot Plug SAS 2.5 Hard Drive   | 375861-B21 |
| HP 36GB 15K rpm Hot Plug SAS 2.5 Dual Port Hard Drive                               | 418369-B21 |
| HP 36GB 15K rpm Hot Plug SAS 2.5 Single Port Hard Drive                             | 431933-B21 |

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

|  |            |
|--|------------|
| HP 300GB 6G SAS 10K rpm SFF (2.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive | 537809-B21 |
| HP 146GB 6G SAS 10K rpm SFF (2.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive | 537807-B21 |
| HP 72GB 6G SAS 15K rpm SFF (2.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive  | 537805-B21 |

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

|   |            |
|---|------------|
| 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 |



### Related Options

|  |            |
|--|------------|
| HP 450GB 3G SAS 15K rpm LFF (3.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive              | 454232-B21 |
| HP 400GB 10K rpm Hot Plug SAS 3.5 Dual Port Enterprise Hard Drive                                | 459508-B21 |
| HP 300GB 15K rpm Hot Plug SAS 3.5 Single Port Hard Drive   | 431944-B21 |
| HP 300GB 6G SAS 15K rpm LFF (3.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive              | 516814-B21 |
| HP 300GB 3G SAS 15K rpm LFF (3.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive              | 416127-B21 |
| HP 146GB 15K rpm Hot Plug SAS 3.5 Single Port Hard Drive   | 375872-B21 |
| HP 146GB 3G SAS 15K rpm LFF (3.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive              | 384854-B21 |
| HP 72GB 15K rpm Hot Plug SAS 3.5 Single Port Hard Drive  | 375870-B21 |
| HP 72GB 15K rpm Hot Plug SAS 3.5 Dual Port Hard Drive  | 384852-B21 |
| <b>SAS Non-Hot Plug LFF (3.5-inch) Enterprise (ENT) Drives</b>                                   |            |
| HP 600GB 6G SAS 15K rpm LFF (3.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive | 516830-B21 |
| HP 450GB 6G SAS 15K rpm LFF (3.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive | 516826-B21 |
| HP 450GB 3G SAS 15K rpm LFF (3.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive | 454234-B21 |
| HP 400GB 10K rpm Non Hot Plug SAS 3.5 Dual Port Enterprise Hard Drive                            | 508232-B21 |
| HP 300GB 6G SAS 15K rpm LFF (3.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive | 516824-B21 |
| HP 300GB 3G SAS 15K rpm LFF (3.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive | 417950-B21 |
| HP 146GB 3G SAS 15K rpm LFF (3.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive | 417855-B21 |
| HP 300GB 15K rpm Non Hot Plug SAS 3.5 Single Port Hard Drive                                     | 431950-B21 |
| HP 146GB 3G SAS 15K rpm LFF (3.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive | 417855-B21 |
| HP 146GB 15K rpm Non Hot Plug SAS 3.5 Single Port Hard Drive                                     | 432093-B21 |
| HP 72GB 15K rpm Non Hot Plug SAS 3.5 Single Port Hard Drive                                      | 432095-B21 |
| <b>SAS Hot Plug SFF (2.5-inch) Midline (MDL) Drives</b>  |            |
| HP 500GB 6G SAS 7.2K rpm SFF (2.5-inch) Dual Port Midline 1yr Warranty Hard Drive                | 507610-B21 |
| <b>SAS Hot Plug LFF (3.5-inch) Midline (MDL) Drives</b>  |            |
| 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 |
| HP 1TB 3G SAS 7.2K rpm LFF (3.5-inch) Dual Port Midline 1yr Warranty Hard Drive                  | 461137-B21 |
| HP 750GB 3G SAS 7.2K rpm LFF (3.5-inch) Dual Port Midline 1yr Warranty Hard Drive                | 461135-B21 |
| <b>SATA Hot Plug LFF (3.5-inch) Midline (MDL) Drives</b>   |            |
| 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 750GB 3G SATA 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive                         | 458930-B21 |
| HP 500GB 3G SATA 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive                         | 458928-B21 |
| HP 250GB 3G SATA 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive                         | 458926-B21 |



### Related Options

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

HP 2TB 3G SATA 7.2K rpm LFF (3.5-inch) Non-hot Plug Midline 1yr Warranty Hard Drive 507774-B21

HP 1TB 3G SATA 7.2K rpm LFF (3.5-inch) Non-hot Plug Midline 1yr Warranty Hard Drive 507772-B21

HP 750GB 3G SATA 7.2K rpm LFF (3.5-inch) Non-hot Plug Midline 1yr Warranty Hard Drive 462595-B21

HP 500GB 3G SATA 7.2K rpm LFF (3.5-inch) Non-hot Plug Midline 1yr Warranty Hard Drive 458941-B21

HP 250GB 3G SATA 7.2K rpm LFF (3.5-inch) Non-hot Plug Midline 1yr Warranty Hard Drive 458939-B21

#### SATA Hot Plug SFF (2.5-inch) Entry (ETY) Drives

HP 250GB 3G SATA 5.4K rpm SFF (2.5-inch) Entry 1yr Warranty Hard Drive 460355-B21

HP 120GB 1.5G SATA 5.4K rpm SFF (2.5-inch) Entry 1yr Warranty Hard Drive 458924-B21

#### SATA Non-Hot Plug SFF (2.5-inch) Entry (ETY) Drives

HP 250GB 3G SATA 5.4K rpm SFF (2.5-inch) Non-hot Plug Entry 1yr Warranty Hard Drive 460357-B21

HP 120GB 1.5G SATA 5.4K rpm SFF (2.5-inch) Non-hot Plug Entry 1yr Warranty Hard Drive 459357-B21

#### SATA Hot Plug LFF (3.5-inch) Entry (ETY) Drives

HP 250GB 3G SATA 7.2K rpm LFF (3.5-inch) Entry 1yr Warranty Hard Drive 571230-B21

HP 160GB 3G SATA 7.2K rpm LFF (3.5-inch) Entry 1yr Warranty Hard Drive 458945-B21

#### SATA Non-Hot Plug LFF (3.5-inch) Entry (ETY) Drives

HP 250GB 3G SATA 7.2K rpm LFF (3.5-inch) Non-hot Plug Entry 1yr Warranty Hard Drive 571232-B21

HP 160GB 3G SATA 7.2K rpm LFF (3.5-inch) Non-hot Plug Entry 1yr Warranty Hard Drive 458947-B21

#### Small Form Factor (SFF) SATA Hot Plug Drives

HP 60GB 5.4K rpm Hot Plug SFF SATA 1yr Warranty Hard Drive 379306-B21

#### 3.5" SATA Hot Plug Drives

HP 80GB 7.2K rpm Hot Plug SATA 1yr Warranty Hard Drive 349237-B21

#### 3.5" SATA Non-Hot Plug Drives

HP 80GB 7.2K rpm Non Hot Plug SATA 1yr Warranty Hard Drive 383410-B21

**NOTE:** Go to the [HP Hard Drive Compatibility table](http://www.hp.com/products/harddiskdrives) 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:** There is a known compatibility issue with some early 3.5" SATA HDD that will make them unable to be used with the SA-E500 controller. Customers should verify that they are not using hard drive part number 332649-002/003 (spare 353042-001), 332650-002/003 (spare 353043-001), or 356536-002/003 (spare 353044-001).

**NOTE:** The HP SAS and SATA universal hard drive can be used across multiple HP ProLiant/Integrity servers and disk enclosures.



### Related Options

|                         |  |
|-------------------------|--|
| HP Disk Storage Systems | <p><b>MSA SAN Storage Arrays</b></p> <p>HP StorageWorks 50 Modular Smart Array <span style="float: right;">364430-B21</span></p> <p><b>NOTE:</b> Please see the QuickSpecs for additional options and configuration information at:<br/> <a href="http://h18000.www1.hp.com/products/quickspecs/12245_na/12245_na.html">http://h18000.www1.hp.com/products/quickspecs/12245_na/12245_na.html</a></p> <p>HP StorageWorks 60 Modular Smart Array <span style="float: right;">418408-B21</span></p> <p><b>NOTE:</b> Supports 12 SFF drives, and SAS 3 Gb/s and SATA 1.5 Gb/s.<br/> <b>NOTE:</b> Please see the QuickSpecs for additional options and configuration information at:<br/> <a href="http://h18000.www1.hp.com/products/quickspecs/12627_na/12627_na.html">http://h18000.www1.hp.com/products/quickspecs/12627_na/12627_na.html</a></p> <p>HP StorageWorks 70 Modular Smart Array <span style="float: right;">418800-B21</span></p> <p><b>NOTE:</b> Supports 25 SFF drives, and SAS 3 Gb/s and SATA 1.5 Gb/s.<br/> <b>NOTE:</b> Please see the QuickSpecs for additional options and configuration information at:<br/> <a href="http://h18000.www1.hp.com/products/quickspecs/12652_na/12652_na.html">http://h18000.www1.hp.com/products/quickspecs/12652_na/12652_na.html</a></p> |
|-------------------------|--|

### HP Tape Solutions

#### SAS Tape Drives

|   |        |
|---|--------|
| HP StorageWorks DAT 160 SAS Internal Tape Drive                   | Q1587A |
| HP StorageWorks DAT 160 SAS External Tape Drive                   | Q1588A |
| HP StorageWorks LTO-2 Ultrium 448 SAS Internal Tape Drive         | DW085A |
| HP StorageWorks LTO-2 Ultrium 448 SAS External Tape Drive         | DW086A |
| HP StorageWorks LTO-3 Ultrium 920 SAS Internal Tape Drive         | EH847A |
| HP StorageWorks LTO-3 Ultrium 920 SAS External Tape Drive         | EH848A |
| HP StorageWorks LTO-4 Ultrium 1760 SAS Internal Tape Drive        | EH919A |
| HP StorageWorks LTO-4 Ultrium 1760 SAS External Tape Drive        | EH920A |
| HP StorageWorks 1U SAS Rack-mount kit with one LTO-4 Ultrium 1760 | EH946A |
| HP StorageWorks LTO-4 Ultrium 1840 SAS Internal Tape Drive        | EH860A |
| HP StorageWorks LTO-4 Ultrium 1840 SAS External Tape Drive        | EH861A |

#### Rack-mount Tape Drive Enclosures

|  |        |
|--|--------|
| HP StorageWorks 1U SAS Rack-Mount Kit  | AE459A |
| <b>NOTE:</b> The 1U SAS Rack-Mount Kit can support up to (2) half-height tape drives and is compatible with the DAT 160 SAS, LTO-2 Ultrium 448 SAS, LTO-3 Ultrium 920 SAS and LTO-4 Ultrium 1760 tape drives.  |        |
| HP StorageWorks 3U SAS Rack-mount Kit  | AG576A |
| <b>NOTE:</b> The 3U Rack-mount Kit can support up to (2) full-height or (4) half-height tape drives and compatible with multiple SAS tape drives including DAT 160 SAS, LTO-2 Ultrium 448 SAS, LTO-3 Ultrium 920 SAS, LTO-4 Ultrium 1760 SAS and LTO-4 Ultrium 1840 SAS tape drives. |        |

#### SAS Cables for Tape Drives

|   |        |
|---|--------|
| 2 meter external Mini-SAS (SFF8088) to Mini-SAS (SFF8088) 1x SAS cable  | AE470A |
| <b>NOTE:</b> Use this cable to connect HP StorageWorks SAS external tape devices to HP SAS controllers with external Mini-SAS (SFF8088) connectors. |        |
| 4 meter external Mini-SAS (SFF8088) to Mini-SAS (SFF8088) 1x SAS cable  | AE465A |
| <b>NOTE:</b> Use this cable to connect HP StorageWorks SAS external tape devices to HP SAS controllers with external Mini-SAS (SFF8088) connectors. |        |



### Related Options

|   |        |
|---|--------|
| 4 meter internal Mini-SAS (SFF8087), split to 3 x internal Mini-SAS (SFF8087) + 1x SFF8088  | AG452A |
| <b>NOTE:</b> This split cable connects internally to SAS Hard Drive Cage (3 channels) and externally to the tape drive (1 channel) with other connector attaching to the controller. The external cable, for the drive, requires a PCI slot to exit the server. |        |
| 2 meter external mini-SAS (SFF8088), split to 4x mini-SAS (SFF8088) cable   | AN975A |
| <b>NOTE:</b> One cable is required for every four drives. Use this cable to connect HP StorageWorks MSL SAS Tape Libraries to Mini-SAS (SFF8088) ports.   |        |
| 4 meter external mini-SAS (SFF8088), split to 4x mini-SAS (SFF8088) cable   | AN976A |
| <b>NOTE:</b> One cable is required for every four drives. Use this cable to connect HP StorageWorks MSL SAS Tape Libraries to Mini-SAS (SFF8088) ports.   |        |

### HP Cable Options

#### HP Mini SAS to Mini SAS Cables

**NOTE:** Cables for use connecting the Smart Array E500 Controller with the HP StorageWorks 60 Modular Smart Array.

|                          |            |
|--------------------------|------------|
| Mini SAS 4x 2M Cable All | 407339-B21 |
| Mini SAS 4x 4M Cable All | 432238-B21 |
| Mini SAS 4x 6M Cable All | 432239-B21 |

#### HP SAS to Mini SAS Cables

**NOTE:** Cables for use connecting the Smart Array E500 Controller with the HP StorageWorks 50 Modular Smart Array.

|                                      |            |
|--------------------------------------|------------|
| SAS 4x to Mini SAS 4x 1m,3Gb,CBL All | 419570-B21 |
| SAS 4x to Mini SAS 4x 2m,3Gb,CBL All | 419571-B21 |
| SAS 4x to Mini SAS 4x 4m,3Gb,CBL All | 419572-B21 |
| SAS 4x to Mini SAS 4x 4m,3Gb,CBL All | 419573-B21 |





### Technical Specifications

|   |  |
|---|--|
| Dimensions (excluding bracket)            | 16.8 cm x 7.0 cm x 1.8 cm (6.6 in x 2.8 in x 0.7 in)   |
| Disk Drive and Enclosure Protocol Support | 3Gb/s SAS (Serial Attached SCSI)<br>1.5Gb/s SATA (Serial AT Attachment)  |
| SAS Connectors                            | 2 external (Mini SAS) x4 wide port connectors  |
| Data Transfer Method                      | x8 2.5G PCI Express (2 GB/s maximum bandwidth)   |
| Memory Bus Speed                          | DDR2-533 MHz and 40 bit wide bus   |
| PCI                                       | PCI Express Gen 1  |
| Simultaneous Drive Transfer Ports         | 2 x4 Wide SAS Ports  |
| SAS Port Link Rate                        | 12 Gb/s per x4 wide port connector (4 x 3 Gb/s)  |
| Software upgradeable Firmware             | Yes  |
| Cache Memory                              | 256 MB Read/Write<br>ECC protection, battery-backed, and removable   |
| Logical Drives Supported                  | Up to 32 logical drives  |
| Maximum Capacity                          | 100TB (100 x 1TB)<br><b>NOTE:</b> Support for greater than 2TB in a single logical drive.                                    |
| Memory Addressing                         | 64-bit, supporting servers memory space greater than 4 GB  |
| RAID Support                              | RAID 5 (Distributed Data Guarding) if the battery kit option is used<br>RAID 1+0 (Striping & Mirroring)<br>RAID 0 (Striping) |
| Upgradeable Firmware                      | 4-MB flashable ROM with redundant firmware images  |

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|  |   |   |
|--|---|---|
| Environment-friendly Products and Approach | <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. |
|--|---|---|

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.



### *Technical Specifications*

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

