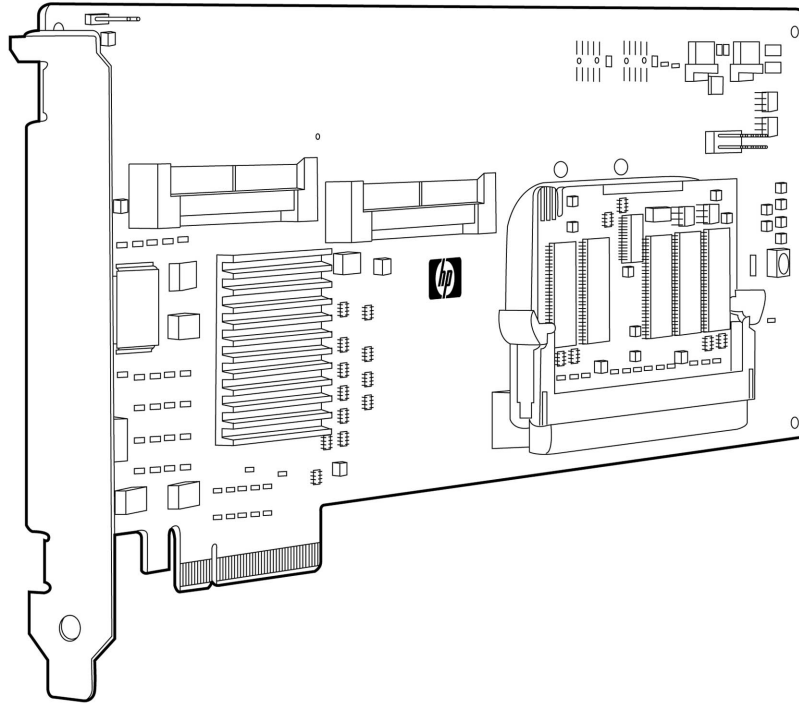# QuickSpecs

Overview

The HP Smart Array E200 is HP's entry level PCI Express (PCIe) Serial Attached SCSI (SAS) RAID controller. The full size card has 8 ports and utilizes DDR1-266 memory. The E200 is ideal for RAID 0/1 and has128 MB battery-backed write cache (BBWC) module for RAID 5.

Models

HP Smart Array E200 Controller	HP Smart Array E200/128 BBWC Controller	411508-B21

QuickSpecs

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/4AA0-6220ENW.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	● Seamless upgrades from past generations and upgrades to next generation HP high performance and high capacity Serial Attached SCSI Smart Array controllers.
	● 3G SAS technology delivers high performance and data bandwidth up to 300 MB\s per physical link and contains full compatibility with 1.5G SATA technology.
	● x4 2.5G PCI Express host interface technology delivers high performance and data bandwidth up to 2 GB/s maximum bandwidth.
	● Addition of the battery backed cache upgrade enables BBWC, RAID 5, Capacity Expansion, 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 up to 2 TB in a single logical drive.
	● Software consistency among all Smart Array family products: Array Configuration Utility (ACU), Option ROM Configuration for Arrays (ORCA), Systems Insight Manager, Array Diagnostic Utility (ADU) and SmartStart. Some of these features are not available with ProLiant 100 series platforms.
	● The SA-E200 controller supports up to 8 drives. The SA-E200i supports 2-8 drives depending on the server implementation.

Online Management Features	● Online Capacity Expansion (with BBWC upgrade)
	● Online RAID Level Migration (with BBWC upgrade)
	● Online Stripe Size Migration (with BBWC upgrade)
	● Mirror splitting and recombining
	● Unlimited Global Online Spares Assignment
	● User Selectable Expand and Rebuild Priority
	● User Selectable RAID Level and Stripe Size
	● User Selectable Read and Write Cache Sizes

Standard Features

Ports	• Eight (8) SAS physical links distributed across 2 internal x4 wide port connectors.

Performance

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

- 3Gb/s SAS (300MB/s bandwidth per physical link)
- x8 3Gb/s SAS physical links (compatible with 1.5G SATA)
- 64 MB or 128 MB DDR1-266 battery-backed cache provides up to 4.2 GB/s maximum bandwidth.
- x4 2.5G PCI Express host interface provides 2 GB/s maximum bandwidth.
- MIPS 32-bit Processor
- Read ahead caching
- Write-back caching (with battery-backed write cache upgrade)

Capacity

Given the increasing need for high performance and rapid capacity expansion, the SA-E200 offers:

- Up to 6TB of total storage with 6 x 1TB SATA MDL hard drives (3.5")
  NOTE: Support for greater than 2TB in a single logical drive.
- Up to 2.4TB of total storage with 8 x 300GB SFF SAS hard drives

Availability

Provides increased server uptime by providing advanced storage functionality:

- Online Capacity Expansion (with BBWC upgrade)
- Online RAID Level Migration (with BBWC upgrade)
- Online Stripe Size Migration (with BBWC upgrade)
- Global Online Spare
- Pre-Failure Warranty

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.

Standard Features

Fault Tolerance
- Keeps data available and server running while a failed drive is being replaced; several fault tolerance configurations are supported including:
- RAID 5 (Distributed Data Guarding): This allocates one set of parity data across drives and allows simultaneous write operations. This level of fault tolerance can withstand a single drive failure without downtime or data loss.
  NOTE: RAID 5 is available with the 128MB BBWC option on the Smart Array E200i.
- RAID 1, 1+0 (Drive Mirroring): 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.

Fault Recovery

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

- 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.
- Battery-backed write cache upgrade provides for up to three days of battery power for data cache retention. The data backup duration could be extended anytime the server's auxiliary power is available during system power down.

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 StorageWorks Modular Smart Array enclosures

Compatibility

Server Compatibility: **HP SA-E200 Controller**	For up to date compatibility, please see the following URL for complete Smart Array E200/E200i Controllers 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. 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
- SIM is only for the HP ProLiant 300, 500 and Blade series servers.

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 offline for all supported Operating Systems on the ProLiant 300, 500 and Blade series and runs online for Windows and Linux. For online configuration of NetWare, use CPQONLIN.

HP Option ROM Configuration for Arrays (ORCA)
- A simple method for managing logical volumes during system power up by pressing F8 during POST
- Allows the ability to create arrays, logical volumes, and assign an online spare drive.
- Allows the ability to view and delete logical volumes
- Allows the ability to select the boot controller
- For advanced array configurations use ACU

HP Array Diagnostic Utility (ADU)

Compatibility

- In depth diagnostic and reporting utility for all Smart Array controllers
- Runs offline for all supported Operating Systems, and runs online for Windows and Linux in HP ProLiant 300, 500 and Blade series servers

Service and Support, HP Care Pack, and Warranty Information

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
NOTE: For additional hardware installation and maintenance information, please refer to the URL: http://www.hp.com/hps/hardware/

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

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

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

Optional Upgrades	128MB Battery-Backed Write Cache	351580-B21
	128MB Battery-Backed Write Cache with Battery Housing	346914-B21

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 Enterprise (ENT) Drives

HP 300GB 6G SAS 10K SFF DP ENT HDD	507127-B21
HP 300GB 3G SAS 10K SFF DP ENT HDD	492620-B21
HP 146GB 6G SAS 15K SFF DP ENT HDD	512547-B21
HP 146GB 3G SAS 15K SFF DP ENT HDD	504062-B21
HP 146GB 6G SAS 10K SFF DP ENT HDD	507125-B21
HP 146GB 3G SAS 10K SFF DP ENT HDD	418367-B21
HP 146GB 3G SAS 10K SFF SP HDD	431958-B21
HP 72GB 6G SAS 15K SFF DP ENT HDD	512545-B21
HP 72GB 3G SAS 15K SFF DP ENT HDD	418371-B21
HP 72GB 3G SAS 15K SFF SP HDD	431935-B21
HP 72GB 3G SAS 10K SFF DP ENT HDD	384842-B21
HP 72GB 3G SAS 10K SFF SP HDD	375861-B21
HP 36GB 3G SAS 15K SFF DP ENT HDD	418369-B21
HP 36GB 3G SAS 15K SFF SP HDD	431933-B21

SAS Non-Hot Plug SFF Enterprise (ENT) Drives

HP 300GB 6G SAS 10K SFF DP NHP ENT HDD	537809-B21
HP 146GB 6G SAS 10K SFF DP NHP ENT HDD	537807-B21
HP 72GB 6G SAS 15K SFF DP NHP ENT HDD	537805-B21

SAS Hot Plug 3.5" Enterprise (ENT) Drives

HP 600GB 6G SAS 15K 3.5" DP ENT HDD	516828-B21
HP 450GB 6G SAS 15K 3.5" DP ENT HDD	516816-B21
HP 450GB 3G SAS 15K 3.5" DP ENT HDD	454232-B21
HP 400GB 3G SAS 10K 3.5" DP ENT HDD	459508-B21
HP 300GB 3G SAS 15K 3.5" SP HDD	431944-B21
HP 300GB 6G SAS 15K 3.5" DP ENT HDD	516814-B21
HP 300GB 3G SAS 15K 3.5" DP ENT HDD	416127-B21
HP 146GB 3G SAS 15K 3.5" SP HDD	375872-B21
HP 146GB 3G SAS 15K 3.5" DP ENT HDD	384854-B21
HP 72GB 3G SAS 15K 3.5" SP HDD	375870-B21
HP 72GB 3G SAS 15K 3.5" DP ENT HDD	384852-B21

SAS Non-Hot Plug 3.5" Enterprise (ENT) Drives

HP 600GB 3G SAS 15K NHP 3.5" DP ENT HDD	516830-B21
HP 450GB 6G SAS 15K NHP 3.5" DP ENT HDD	516826-B21
HP 450GB 3G NHP 15K 3.5" DP SAS ENT HDD	454234-B21

Related Options

HP 400GB 3G NHP 10K 3.5" DP SAS ENT HDD	508232-B21
HP 300GB 6G SAS 15K NHP 3.5" DP ENT HDD	516824-B21
HP 300GB 3G NHP 15K 3.5" DP SAS ENT HDD	417950-B21
HP 300GB 3G SAS 15K NHP 3.5" SP HDD	431950-B21
HP 146GB 3G SAS 15K NHP 3.5" DP ENT HDD	417855-B21
HP 146GB 3G SAS 15K NHP 3.5" SP HDD	432093-B21
HP 72GB 3G SAS 15K NHP 3.5" SP HDD	432095-B21
SAS Hot Plug SFF Midline (MDL) Drives	
HP 500GB 6G SAS 7.2K SFF DP MDL HDD	507610-B21
SAS Hot Plug 3.5" Midline (MDL) Drives	
HP 1TB 3G SAS 7.2K 3.5" DP MDL HDD	461137-B21
HP 750GB 3G SAS 7.2K 3.5" DP MDL HDD	461135-B21
SATA Hot Plug Entry (ETY) Drives	
HP 250GB 3G SATA 5.4K SFF ETY HDD	460355-B21
HP 120GB 1.5G SATA 5.4K SFF ETY HDD	458924-B21
HP 160GB 3G SATA 7.2K 3.5" ETY HDD	458945-B21
SATA Hot Plug SFF Midline (MDL) Drives	
HP 500GB 3G SATA 7.2K 2.5in MDL HDD	507750-B21
HP 160GB 3G SATA 7.2K 2.5in MDL HDD	530888-B21
SATA Non-Hot Plug SFF Midline (MDL) Drives	
HP 500GB 3G SATA 7.2K 2.5in NHP MDL HDD	507753-B21
HP 160GB 3G SATA 7.2K 2.5in NHP MDL HDD	530891-B21
SATA Hot Plug 3.5" Midline (MDL) Drives	
HP 1TB 3G SATA 7.2K 3.5" MDL HDD	454146-B21
HP 750GB 3G SATA 7.2K 3.5" MDL HDD	458930-B21
HP 500GB 3G SATA 7.2K 3.5" MDL HDD	458928-B21
HP 250GB 3G SATA 7.2K 3.5" MDL HDD	458926-B21
SATA Non-Hot Plug 3.5" Midline (MDL) Drives	
HP 750GB 3G SATA 7.2K NHP 3.5" MDL HDD	462595-B21
HP 500GB 3G SATA 7.2K NHP 3.5" MDL HDD	458941-B21
HP 250GB 3G SATA 7.2K NHP 3.5" MDL HDD	458939-B21
SATA Hot Plug SFF Entry (ETY) Drives	
HP 250GB 3G SATA 5.4K SFF ETY HDD	460355-B21
HP 120GB 1.5G SATA 5.4K SFF ETY HDD	458924-B21
SATA Non-Hot Plug SFF Entry (ETY) Drives	
HP 250GB 3G SATA 5.4K NHP SFF ETY HDD	460357-B21
HP 120GB 1.5G SATA 5.4K NHP SFF ETY HDD	459357-B21
SATA Hot Plug 3.5" Entry (ETY) Drives	
HP 160GB 3G SATA 7.2K 3.5" ETY HDD	458945-B21
SATA Non-Hot Plug 3.5" Entry (ETY) Drives	
HP 160GB 3G SATA 7.2K NHP 3.5" ETY HDD	458947-B21
Small Form Factor (SFF) SATA Hot Plug Drives	
HP 60GB 1.5G SATA 5.4K SFF HDD	379306-B21
3.5" SATA Hot Plug Drives	
HP 80GB 1.5G SATA 7.2K 3.5" HDD	349237-B21
3.5" SATA Non-Hot Plug Drives	

Related Options

HP 80GB 1.5G SATA 7.2K NHP 3.5" HDD   383410-B21

NOTE: Go to the HP Hard Drive Compatibility table for complete drive compatibility information (http://www.hp.com/products/harddiskdrives). Using hard drives in unsupported configurations will result in voiding the warranty and could result in damage to the drive and/or loss of data.

Technical Specifications

Dimensions (not including bracket)	31.2 cm x 11.1 cm x 1.5 cm (12.3 in x 4.4 in x 0.6 in)
Disk Drive and Enclosure Interface	3Gb/s SAS (Serial Attached SCSI) 1.5Gb/s SATA (Serial ATA)
SAS Connectors	2 internal (SFF8484) x4 wide port connectors
Cache Memory Speed	DDR-1/266 MHz provides up to 4.2 GB/s maximum bandwidth.
Server Interface	x4 2.5G PCIe provides 2GB/s maximum bandwidth.
SAS Speed	x8 3G SAS provides 2.4GB/s maximum bandwidth.
Cache Memory	40-bit 64MB or 128MB cache: ECC protection, battery-backed, and transportable NOTE: The 64MB cache is not battery-backed or transportable.
Logical Volumes Supported	Up to 32 logical volumes
Maximum Volume Capacity	6TB (6 x 1TB SATA 3.5" MDL HDD) NOTE: Support for greater than 2TB in a single logical drive.
Host Memory Addressing	64-bit, supporting greater than 4GB server memory space
RAID Support	RAID 5 (Distributed Data Guarding) NOTE: The 128MB BBWC upgrade is required to enable RAID 5 support on the Smart Array E200i. RAID 1, 1+0 (Striping & Mirroring) RAID 0 (Striping)
Upgradeable Firmware	Upgradeable Firmware

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. 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.

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