Overview

Models

Computer Interconnect (CI) storage solutions, with CI HSJ80 controller(s), in easy to configure building blocks; provides data protection, high availability, exceptional performance, and OpenVMS Cluster System support for the most demanding storage requirements.

MA8000	MA 8000 - 60 Hz	175992-B21
	MA 8000 (1 Controller shelf & 3 SW4354 device shelves) - 60 Hz - Bundle	253719-001
EMA12000 D14	EMA 12000 D14 - 60 Hz	175990-B21
	EMA 12000 D14 (3 Controller shelves & 9 SW4354 device shelves) - 60 Hz - Bundle	253715-001
EMA12000 S14	EMA 12000 S14 - 60 Hz	175991-B21
	EMA 12000 S14 (1 Controller shelf & 6 SW4314 device shelves) - 60 Hz - Bundle	253717-001
EMA12000 Blue	EMA 12000 Blue - 60 Hz	175993-B21
	EMA 12000 Blue (1 Controller shelf & 3 SW4254 device shelves) - 60 Hz - Bundle	253721-001

NOTE: Please see the Options section for Platform Software, CI Host Adapters, and Disk Options for complete solutions.

NOTE: The Storage Services Bundling takes the existing storage products along with the existing services and creates bundles of storage hardware/software and appropriate services. The increased level of support provides for a higher level of storage system availability for the customer.

Introduction

The MA8000/EMA12000 CI are a family of fully integrated Computer Interconnect storage systems that support the new universal drives in the new StorageWorks enclosure architecture by Compaq with CI HSJ80 controllers for OpenVMS Cluster Systems. They are the outgrowth of years of StorageWorks experience, successfully delivering quality solutions into applications with mission-critical requirements.

The MA8000/EMA12000 CI storage systems with CI HSJ80 controllers will replace the StorageWorks500 and StorageWorks800 storage solutions with the HSJ80 controllers. The new storage systems, while continuing to provide a CI interface with the HSJ80 controller (and associated features), add the benefits of universal drives, higher density of drives per enclosure, flexible configurations and higher capacity per storage system.

In addition to disk RAID controller operations, the CI HSJ80 controllers will also support legacy tape drives mounted in external tape libraries or in external storage systems outside of the MA8000/EMA12000 storage systems. The HSJ80 will "pass through" tape library commands from CI host applications. (See the supported tape drive and tape library list later in this document.) In some cases, SCSI extenders or SCSI extender/translators are required to interconnect to the tape drives and/or tape libraries. (See the configuration information later in this document.)

MA8000/EMA12000 CI is designed for the data center where there is a need to configure high capacity systems with application-specific demands for high performance. MA8000/EMA12000 CI components offer the flexibility to configure solutions to provide high capacity and scalable performance in a small footprint. The solutions include support for OpenVMS Cluster environments, and stringent data center availability requirements. Configure-To-Order is available for the creation of customized solutions using the modular storage components.

For data centers with continuously increasing capacity requirements, high performance demands, increasing business continuance needs, and the need to stay with the CI interface, MA8000/EMA12000 CI is the clear choice.

- Highest storage packaging density in the industry
- Scales from a few Gigabytes to multi Terabytes
- Supports Compaq Universal disk drives and Modular Storage Systems

MA8000/EMA12000 Models are modular, scalable, no single point of failure solutions with disaster tolerance and business continuance support for storage consolidation on OpenVMS Cluster Systems

MA8000 (60 Hz)	1 controller enclosure, 3 Dual Bus 14 bay drive enclosures, 22U Modular Storage System (opal)
EMA12000 D14 (60 Hz)	3 controller enclosures, 9 Dual Bus 14 bay drive enclosures, 42U Modular Storage System (opal)
EMA12000 S10 (60 Hz)	1 controller enclosure, 6 Single Bus 10 bay drive enclosures, 42U Modular Storage System (opal)
EMA12000 S14 (60 Hz)	1 controller enclosure, 6 Single Bus 14 bay drive enclosures, 42U Modular Storage System (opal)
EMA12000 Blue (60 Hz)	1 controller enclosure, 3 Dual Bus 14 bay drive enclosures, 41U Modular Storage System (blue)

NOTE: Controllers are not included in predefined models.

Overview

Key Features

- **Computer Interconnect (CI) Technology**
  MA8000/EMA12000 CI takes advantage of the benefits of the CI (Computer Interconnect) OpenVMS Cluster system. CI flexibility provides many ways to configure cluster systems to maximize both availability and performance. Visit http://www.openvms.digital.com/openvms/WHITEPAPERS/ci_connect/ciconfig_Webpage_contents.html for a white paper titled: "OpenVMS Cluster Computing: Configuring CI-Connected OpenVMS Clusters for Availability and Performance."
- **MA8000/EMA12000 Product Packaging**
  MA8000/EMA12000 solutions are built with the new StorageWorks Enclosure packaging. The packaging consists of a 4U high RAID controller enclosure (StorageWorks Enclosure Model 2200: visit http://h18000.www1.hp.com/products/quickspecs/10531_na/10531_na.HTML for details) and the 3U high 14 bay drive enclosures. The controller and drive enclosures are independent of each other to allow for a wide range of configuration options. The MA8000/EMA12000 models were designed to address medium to high capacity needs, as well as high-performance options. The models are assembled in the Modular Storage Systems.
  The Modular Storage Systems are also available under Configure-To-Order. The systems are completely assembled with side panels, redundant Power Distribution Units (with 16 outlets each) and power cables. The PDUs are 2U high.
- **OpenVMS Platform Support**
  Support for industry leading Alpha and VAX OpenVMS platforms; visit http://h18005.www1.hp.com/storage/index.html for the latest support information.
- **No-Single-Point-of-Failure**
  The eva3000 redundant architecture and value added software eliminate single-points-of-failure from server to storage in clustered or single server configurations with multi-pathing.
- **High Availability**
  All MA8000/EMA12000 models provide redundant cooling, N+1 power redundancy and environmental monitoring. Drives and most solution components are hot pluggable. Each solution can be configured with dual redundant controllers that can operate in dual active mode. Each controller has a pair of CI host ports. In the event of a path failure, the controllers can automatically failover to the remaining path.
- **No Single Point Of Failure**
  The MA8000/EMA12000 CI redundant architecture eliminates no single points of failure from server to storage in clustered or single server configurations. Dual redundant CI controllers, dual CI ports per controller, dual Star Couplers, dual CI host bus adapters, all used in multi-node cluster configurations can provide a high availability configuration with no-single-point-of-failure. See the white paper mentioned above and also: http://www.openvms.digital.com:8000/721final/6318/6318pro.html for the document titled: "Guidelines for OpenVMS Cluster Configurations."
- **OpenVMS Cluster Software Functions**
  The OpenVMS operating system, which runs on each node in the OpenVMS cluster, includes several software components that facilitate resource sharing and dynamic adjustments to changes in the underlying hardware configuration. Mass Storage Control Protocol (MSCP) is one key component, which makes disk drives available to all nodes that do not have direct access to those disk drives. Tape Mass Storage Control Protocol (TMSCP) is another key component, which makes tape drives available to all nodes that do not have direct access to those tape drives.
  Visit http://www.openvms.compaq.com:8000/72final/4477/4477pro.html for a copy of "OpenVMS Cluster Systems" for additional information on these functions.

Product Highlights

Capacity	The MA8000/EMA12000 provides the highest per-enclosure density in the industry. You may choose a 14 or a 10 bay drive enclosure. The 14 bay enclosure supports up to 14 to 1 in (2.54 cm) drives for a maximum enclosure capacity of 504 GB, using 36-GB drives. The 10 bay enclosure supports up to 10 to 1 in (2.54 cm) drives with 0.6 in (1.52 cm) drive extenders or 10 to 1.6 in (4.1 cm) drives for a maximum enclosure capacity of 728 GB using 72.8 GB 1.6 in (4.1 cm) drives. A fully configured storage system supports up to 60 drives installed in one storage system for a maximum capacity of 4.4 TB, using 72.8 GB drives.
72.8-GB Drive Support	Current controller firmware (ACS 8.5) limits the maximum storage set (RAID) size to 512 GB (no more than 7 members per RAID set) - up to 20 sets using RAID 5, up to 30 sets using RAID 5 + 1, and 45 sets using RAID 0, 1, 5 - per controller pair for the single bus 10 bay drive enclosure (Model 4310) when using 72.8-GB drives. This restriction will be relieved with the next release of ACS.
Easy Installation	MA8000/EMA12000 predefined models ship fully configured - inside the storage system! CTO models (configure-to-order) also ship fully configured and shipped in the storage system. The easiest installations ever, simply plug it in.
Performance	The HSJ80 includes two active dual CI ports resident on each controller as opposed to one CI port on earlier HSJ50 and HSJ40 CI controllers. This will have the effect of doubling the performance (data rate) and connectivity (data paths) of the storage system when connected to two separate star couplers. The HSJ80 also has a larger cache size of 512 MB per controller compared to the HSJ50 (128 MB) and the HSJ40 (32 MB). The HSJ80 also has improved caching functionality over the earlier HSJ50 and HSJ40 with: • Mirrored Cache to protect against cache failure on either controller; • Pre-fetch Cache to pre-fetch data from the disk when a sequential I/O stream is detected, • Write-Back Caching which holds write data in cache until a disk is available but signals the server that the write operation is complete when the data gets into cache.
Bandwidth	The MA8000/EMA12000 CI has two CI ports per storage controller. Each port has an A and a B path with a bandwidth of 8.75 MB/sec per path, or 17.5 MB/sec per port. Each dual port controller has a bandwidth of 35 MB/sec. A redundant controller pair provides up to 70 MB/s of data.
Manageability	StorageWorks Command Console (SWCC) provides a graphical user interface (GUI) to set up/configure, monitor, and troubleshoot storage subsystems from a single, centralized, location.
Servers - Single and clustered systems	• VAX Servers • Alphaserver systems Check http://h18005.www1.hp.com/storage/index.html for up to date platform information and specific operating system version support.
Fault Tolerance	Redundant power supplies, fans, controllers, cache battery backup, hot global spare drives and a multi-level RAID architecture (0, 1, 3/5, 1+0) ensure fault tolerance against system outages and data loss.
High Availability	All MA8000/EMA12000 models provide redundant cooling, N+1 power redundancy and environmental monitoring. Drives and most solution components are hot pluggable. Each solution can be configured with dual controllers that operate in dual redundant mode. Each controller has a pair of FC host ports. In the event of a path failure the controllers can automatically fail over to the remaining path.
Hot Pluggable Support	Hot Pluggable SCSI backplane allows drives to be added and removed without powering down the system.

Product Highlights

Manageability

SWCC provides a graphical user interface (GUI) to setup/configure, monitor, and troubleshoot storage subsystems.

Scalability

The 14 bay enclosure supports up to 14 to 1 in (2.54 cm) drives. The EMA12000 D14 features nine 14 bay drive enclosures which house up to 72 drives (1 in (2.54 cm) form factor). A single storage system populated with 72.8-GB Ultra3 SCSI 10K RPM 1 in (2.54 cm) drives gives you 9.1 TB of raw capacity. Unlimited capacity is achieved by adding more subsystems to the SAN.

Rack Density

MA8000/EMA12000 is available in four different rack sizes - 22U Modular Storage System 60 Hz (Opal), 36U Modular Storage System 60 Hz (Opal), 42U Modular Storage System 60 Hz (Opal), and 41U Modular Storage System 60 Hz (blue).

Total Cost of Ownership

The new MA8000/EMA12000 architecture has the highest enclosure density in the industry. Higher enclosure capacity translates into a smaller floor-space footprint. Example: the EMA12000 D14 will house up to 4.5 TB in a single 42U storage system using 36 GB drives.

Family Information

	EMA12000 D14	EMA12000 S14	EMA12000 Blue
Announce Date with HSJ80	Sept 2000	Sept 2000	Sept 2000
Drive Interface	Wide Ultra2/Wide Ultra3	Wide Ultra2/Wide Ultra3	Wide Ultra2/Wide Ultra3
Controller Software	ACS 8.5J-2	ACS 8.5J-2	ACS 8.5J-2
Cache	512 MB	512 MB	512 MB
RAID Support	0,1, 3/5	0,1, 3/5	0,1, 3/5
Channels	6	6	6
Maximum Drives per Model	126	72	42
Maximum Capacity per Model	4.5 TB	2.5 TB	1.5 TB
Redundant Controllers	Yes	Yes	Yes
Drive Capacities	9, 18, 36, 72 GB (10K rpm); 9, 18, 36 GB (15K rpm)		

Service and Support, HP Care Pack and Warranty Information

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

For additional hardware installation and maintenance information please refer to the URL's listed below:
http://h18005.www1.hp.com/services/carepaq/us/install/
http://h18005.www1.hp.com/services/carepaq/us/hardware/

Software Product Services (recommended for all installations)

- Standalone telephone support
- New version update services, including license and media/documentation subscription service

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

HP Care Pack Information

Sample part numbers:

- FM-**XHW-36 3 year, uplift to 5 x 9, Next Day Response
- FM-**4HR-36 3 year, uplift to 5 x 9, 4-hours Response
- FM-**724-36 3 year, uplift to 7 x 24, 4-hours Response

NOTE: ** represents a two digit product specific code.

- HP Care Pack is defined as an upgrade to the product warranty attribute, available for a specific duration and hours of coverage.
- HP Care Pack is not available for less than the products 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.

For additional HP Care Pack (hardware & software) information, as well as, orderable part numbers please refer to the URL listed below:
http://h18005.www1.hp.com/services/carepaq/index.html

Components

The following brick level options/components do not have individual HP Care Pack services. These items will be included in product HP Care Pack services which they are installed into.

Disk Drives	Tape Drives	CD/DVD ROM	SCSI Hubs in SBBs	Adapters
Bus Converters	Backplane RAID Controllers	Power Supplies	Cabling	Fans

NOTE: The Storage Services Bundling takes the existing storage products along with the existing services and creates bundles of storage hardware/software and appropriate services. The increased level of support provides for a higher level of storage system availability for the customer.

Configuration Information

The MA8000/EMA12000 CI is a scalable, no singular point of failure, modular solution with disaster tolerance and business cotinuance for storage consolidation on OpenVMS Cluster Systems.

Step 1: Modular Solutions -Base Configuration

Select one:

Pre-Configured Model	Model Description	Part Number
MA8000 60 Hz	1 Controller enclosure, 3 Dual Bus 14 bay drive enclosures, 22U Modular Storage System (opal)	175992-B21
MA8000 60 Hz - Bundle	MA 8000 (1 Controller shelf & 3 SW4354 device shelves) - 60 Hz - Bundle	253719-001
EMA12000D14 60 Hz	3 Controller enclosures, 9 Dual Bus 14 bay drive enclosures, 42U Modular Storage System (opal)	175990-B21
EMA12000D14 60 Hz - Bundle	EMA 12000 D14 (3 Controller shelves & 9 SW4354 device shelves) - 60 Hz - Bundle	253715-001
EMA12000S14 60 Hz	1 Controller enclosure, 6 Single Bus 14 bay drive enclosures, 42U Modular Storage System (opal)	175991-B21
EMA12000S14 60 Hz - Bundle	EMA 12000 S14 (1 Controller shelf & 6 SW4314 device shelves) - 60 Hz - Bundle	253717-001
EMA12000Blue 60 Hz	1 Controller enclosure, 3 Dual Bus 14 bay drive enclosures, 41U Modular Storage System (blue)	175993-B21
EMA12000Blue 60 Hz - Bundle	EMA 12000 Blue (1 Controller shelf & 3 SW4254 device shelves) - 60 Hz - Bundle	253721-001

Step 2 – Required Options (For Pre-Defined Models)

Controller Model	HSJ80 Controller with 512-MB cache	204305-B21
	External Cache Battery (one required per controller)	135823-B21
	NOTE: One or two required per MA8000/EMA12000 CI package.	
Controller Software	ACS v8.5J-2 Controller CI software	203693-B21
	NOTE: One required per controller: redundant controllers must use the same version of ACS.	
OS Software/Platform Kits	HSJ80 Array Controller OpenVMS Solution Kit, v8.5J-2	203694-B21
	NOTE: One kit required per operating system type.	
StorageWorks Drives	72-GB Ultra3 SCSI 10K RPM 1.6 in drive	176494-B21
	72.8-GB Ultra3 SCSI 10K rpm 1 in (25.4 mm) drive	232432-B22
	36.4-GB Ultra3 SCSI 15K rpm 1 in (25.4 mm) drive	232916-B22
	36-GB Ultra3 SCSI 10K RPM 1 in drive	176496-B22
	18.2-GB Ultra3 SCSI 15K rpm 1 in (25.4 mm) drive	188122-B22
	18-GB Ultra3 SCSI 10K RPM 1 in drive	142673-B22
	9-GB Ultra3 SCSI 10K RPM 1 in drive	142671-B22
	18-GB Ultra2 SCSI 10K RPM 1 in drive	128418-B22
	9-GB Ultra2 SCSI 10K RPM 1 in drive	328939-B22
	18-GB Ultra2 SCSI 7200 RPM 1 in drive	338144-B22
	9-GB Ultra2 SCSI 7200 RPM 1 in drive	123065-B22
	0.6 in (1.52 cm) Drive Extenders (package of 4)	148649-B21
	NOTE: Drive extenders are attached to 1 in (2.54 cm) drives so they can be used in 1.6 in (4.1 cm) drive bays.	

Step 3 – Configure to Order

Configure-to-Order (for customized solutions: full details for creating Configure-to-Order solution can be found in the Configuration Guide at URL: http://www.compaq.com/products/StorageWorks/modulararray/index.html)- requires a rack, Model 2200 controller enclosure, Model 4200 or 4300 drive enclosures, and required options as noted for predefined models.

Configure-To-Order (for customized solutions: full details for creating Configure-To-Order solutions can be found in the Configuration Guide at URL http://www.compaq.com/products/StorageWorks/modulararray/index.html

Indicates that parts on the order are to be assembled at the factory 118102-888

NOTE: Each order represents one customized solution.

Storage Systems	Model Description	Part Number
42U Modular Storage System 60 Hz (opal)	MODULAR STORAGE CAB, 60-Hz PDU, 208-240V, OPAL, REDUNDANT PDU	180311-B21
42U Modular Storage System 60 Hz (opal) - Bundle	42 U Modular Storage Cabinet for MA8000/EMA12000 (60 Hz) - Bundle	253725-001
36U Modular Storage System 60 Hz (opal)	MODULAR STORAGE CAB, 60-Hz PDU, 208-240V, OPAL, REDUNDANT PDU	180313-B21
36U Modular Storage System 60 Hz (opal) - Bundle	36 U Modula Storage Cabinet for MA8000/EMA12000 (60 Hz) - Bundle	253727-001
22U Modular Storage System 60 Hz (opal)	MODULAR STORAGE CAB, 60-Hz PDU, 208-240V, OPAL, REDUNDANT PDU	180315-B21
22U Modular Storage System 60 Hz (opal) - Bundle	22 U Modular Storage Cabinet for MA8000/EMA12000 - Bundle	253729-001
41U Modular Storage System 60 Hz (blue)	MODULAR STORAGE CAB, 60-Hz PDU, 208-240V, BLUE, REDUNDANT PDU	180317-B21
41U Modular Storage System 60 Hz (blue) - Bundle	41 U Modular Storage Cabinet for MA8000/EMA12000 (60 Hz) - Bundle	253731-001
Controller Enclosure	Model 2200	135820-B21
	StorageWorks Enclosure Model 2200 for HSG80 - Bundle	253703-001

Drive Enclosures	Model Description	Part Number
Model 4314R	Single bus 14 bay drive enclosure	190209-001
	StorageWorks Enclosure 4314R - Bundle	253734-001
Model 4354R	Dual bus 14 bay drive enclosure	190210-001
Drive Enclosure Options		
4200 power supply	4214 Redundant power supply, single IEC-320-C13 Plug X NEMA	119826-B21
Ultra3 Single Bus I/O Module		190212-B21
Ultra3 Dual Bus I/O Module		190213-B21
SCSI Cables, Drive Enclosure to Controller Enclosure (for CTO configurations)	1 meter SCSI Cable - VHDCI to VHDCI	168257-B21
	2 meter SCSI Cable - VHDCI to VHDCI	189505-B21
	3 meter SCSI Cable - VHDCI to VHDCI	400983-005
	5 meter SCSI Cable - VHDCI to VHDCI	400983-005
	10 meter SCSI Cable - VHDCI to VHDCI	400985-010

Step 4 – Additional Options

Host Bus Adapters	PCI to CI Host Adapter	CIPCA-AA
	PCI to CI Host Adapter, for Alpha server 4000 series and new systems	CIPCA-BA
	VAX 6000 CI Interface	CIXCD-AB
	XMI to CI Adapter	CIXCD-AC

Configuration Information

Computer Interconnect Cables	CI cable, 10-meter	BNCIA-10
	CI cable, 20-meter	BNCIA-20
	CI cable, 45-meter	BNCIA-45
SCSI Extender/Extender-converter (for external tape drive/tape library connection; max SE cable length is 3 meters	SE Ultra SCSI 68-pin VHDCI to SE Ultra SCSI 68-pin VHDCI	DWZZC-AA
	SE Ultra SCSI 68-pin VHDCI to Differential Ultra SCSI 68-pin VHDCI	DWZZC-DA

Supported Tape Drives and Tape Libraries (All tape drives and libraries are outside of the MA8000/EMA12000)

Tape Drives	4 GB 4 mm DAT	TLZ06-VA
	4/8 GB 4 mm DAT	TLZ07-VA, TLZ09-VA
	1600/6250 bpi PE/GCR reel-to-reel	TSZ07-AA
	25/50-GB AIT	DS-TZS20-VW
	35/70-GB AIT	DS-AIT35-VW
	6-GB DLT	TZ86-VA
	10/20-GB DLT	TZ87-TA, TZ87-VA
	20/40-GB DLT	TZ88N-TA/VA
	35/70-GB DLT	TZ89N-AV
	IBM 3480 Compatible	TKZ60
	IBM 3480 Compatible	TKZ61
	IBM 3490E Compatible	TKZ62
	IBM 3480/3490/3490E Compatible	TKZ63
Tape Drives with Cartridge Loaders	TLZ06 with 4 cartridge loader	TLZ6L-VA
	TLZ07 with 4 cartridge loader	TLZ7L-VA
	TLZ09 with 8 cartridge loader	TLZ9L-VA
	TZ86 with 7 cartridge loader	TZ867
	TLZ87 with 5 cartridge loader	TZ875
	IBM 3480/3490/3490E Compatible with 60 cartridge loader	2T-TKZ64

Tape Libraries	TZ87 with 7 cartridge mini-library	TZ877
	TZ88 with 5 cartridge mini-library	TZ885
	TZ88 with 7 cartridge mini-library	TZ887
	(4) TZ87 - 52 cartridge	TL810
	(4) TZ88 - 52 cartridge	TL812
	(3) TZ87 - 264 cartridge	TL820
	(3) TZ88 - 264 cartridge	TL822
	(6) TZ88 - 176 cartridge	TL826
	Expansion unit for TL891 series - 16 cartridge, no drives	DS-TL890
	(1) TZ89 - 10 cartridge	DS-TL891
	(2) TZ89 - 10 cartridge	DS-TL892
	(3) TZ89 - 264 cartridge	DS-TL893
	(4) TZ89 - 52 cartridge	DS-TL894
	(5) TZ89 - 100 cartridge	DS-TL895
	(6) TZ89 - 176 cartridge	DS-TL896
	(16) TZ89 - 326 cartridge	161268-B21 ESL9362D)
	ESL9000 Pass-Through Kit - Bundle	253713-001

TechSpecs

Model	MA8000/EMA12000 CI	
Controller Model	HSJ80	
Controller Cache	512 MB per controller standard	
Battery Backup for Cache	Standard	
Array Controller Software (ACS)	CI support ACS V8.5J-2	
Host Interface	CI	
Host Ports per Controller	2	
Drive Interface	SE Wide Ultra SCSI, 6 channels	
RAID Levels	0, 1, 0+1, 3/5 and Partitioning	
Maximum Disks Supported	72 per Controller Pair	
Non-RAID JBOD Support	Yes	
Disks	Compaq Universal Drives	
O/S Support	OpenVMS	
Sustained I/O Rate	Over 9K IOPS per Controller Pair	
Redundant Fans	Yes. N+1	
Environmental Monitoring Unit	Yes. Monitors Power and Temperature	
Regulatory approvals	UL, CSA, TUV, FCC, CE MARK, CTICK, BCIQ	
Management Software	StorageWorks Command Console (SWCC)	
Power requirements	AC plug type	3 wire NEMA No L6-30 (208-240V 60Hz 30A)
	Number of phases	Single
	Rated current	30A
	BTU rating	5,113 per hour
	Nominal airflow	400 cubic ft/minute
	Wattage	1,800 Watts maximum (input)
	Nominal Line Voltage	208 or 230V
	Range Line Voltage	202-240V
	Line Frequency	60 Hz
	Typical Input Current	8.9A
Operating environment	Temperature	50° to 95°/10° to 35°C - Reduce rating by 1°F for each 1,000 ft altitude (1.8°C/1,000 m)
	Shipping Temperature	-40° to 151° F (-40° to 66° C)
	Humidity	10% to 90% at maximum wet bulb temp of 90°F/32°C and minimum dew point of 36°F/2°C
	Shipping Humidity	Up to 95% relative humidity
	Altitude	Up to 8,000 ft /2,438.4 m
	Air Quality	Not to exceed 500,000 particles per cubic foot of air at a size of 0.5 micron or larger

TechSpecs

Rack Physical Dimensions

Model	Height in/cm	Width in/cm	Depth in/cm	Max Weight lb/kg	Req. Front Clearance in/cm	Req. Rear Clearance in/cm
MA8000 (22U)	43.0/109.2	23.7/60.2	35.8/90.9	510/231.3	21.3/54.1	22.8/57.9
EMA12000 D14 (42U)	78.7/199.9	23.7/60.2	35.8/90.9	1073/486.7	21.3/54.1	22.8/57.9
EMA12000 S14 (42U)	78.7/199.9	23.7/60.2	35.8/90.9	831/376.9	21.3/54.1	22.8/57.9
EMA12000 Blue (41U)	78.7/199.9	23.7/60.2	35.8/90.9	604/274	21.3/54.1	22.8/57.9
42U Modular	78.7/199.9	23.7/60.2	35.8/90.9	433/197	21.3/54.1	22.8/57.9
36U Modular	68.6/174.2	23.7/60.2	35.8/90.9	390/177	21.3/54.1	22.8/57.9
22U Modular	43.0/109.2	23.7/60.2	35.8/90.9	291/132	21.3/54.1	22.8/57.9
41U Modular	78.75/199.9	23.7/60.2	35.8/90.9	385/175	21.3/54.1	22.8/57.9

Storage Systems Shipping Dimensions

	Height in/cm	Width in/cm	Depth in/cm	Max Loaded Weight (with packaging) lb/kg
MA8000 (22U)	52.25/132.7	32.0/81.3	48/121.9	613/278
EMA12000 D14 (42U)	83.38/211.8	32.0/81.3	48/121.9	1190/540
EMA12000 S14 (42U)	83.38/211.8	32.0/81.3	48/121.9	965/437.7
EMA12000 Blue (41U)	85.0/215.9	32.0/81.3	48/121.9	707/321
42U Modular	83.38/211.8	32.0/81.3	48/121.9	550/249
36U Modular	75.25/191.1	32.0/81.3	48/121.9	501/227
22U Modular	52.25/132.7	32.0/81.3	48/121.9	394/179
41U Modular	85.0/215.9	32.0/81.3	48/121.9	488/221

Models	Pre-Configured Models	UPC Code
	MA8000 60 Hz	720591397487
	EMA12000D14 60 Hz	720591397036
	EMA12000S14 60 Hz	720591397333
	EMA12000Blue 60 Hz	720591397548
	Modular Storage Systems (for CTO)	
	42U Modular Storage System 60 Hz (opal)	720591398378
	36U Modular Storage System 60 Hz (opal)	720591398606
	22U Modular Storage System 60 Hz (opal)	720591398651
	41U Modular Storage System 60 Hz (blue)	720591398880