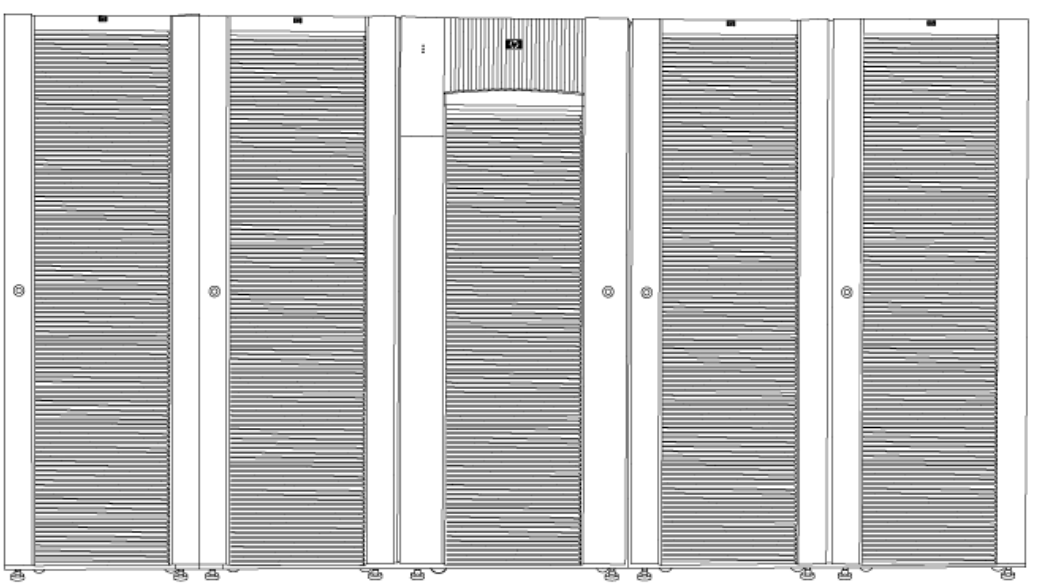
Overview

The HP StorageWorks XP12000 Disk Array is an enterprise class storage system that delivers state-of-the-art reliability and "always-on" availability for mission-critical applications where downtime is not an option. The XP12000 is designed for organizations that demand the most from their storage. Complete redundancy throughout the architecture provides no single-point-of-failure, and non-disruptive online upgrades ensure that data is always available.

Industry-leading random and sequential performance is ideal for database, OLTP, Oracle, SAP, and Exchange workloads. Massive boot-once scalability meets capacity, performance, and heterogeneous connectivity needs today and tomorrow-without ever requiring a forklift upgrade. Advanced virtualization technology simplifies the lifecycle management of data in heterogeneous SAN environments by supporting up to 32 Petabytes of external storage - all of which can be managed from one single pane of glass. Flexible secure array partitioning eases provisioning, while array-to-array local and remote data copying enables multi-site disaster tolerance. World-class service and support for IT environments meets the most demanding needs.

In a world where every business decision triggers an IT event, the XP12000 enables an adaptive enterprise--one that can quickly capitalize on and manage change. The breadth and value of the XP12000 capabilities ensure the ability to demand more agility for adapting to real-time business needs. Information is protected and available by uncompromised simplicity through consolidation and management efficiencies.



Overview

What's New

Functionality Element	XP12000

Faster Host Connectivity	• A 4Gbps Fibre Channel Client Host Interface Processor (CHIP)
	  ○ This offering doubles the communication speed between the array and host. The 4Gbps CHIP option is available on each of the 8, 16, and 32 port FC boards.
	• New 4Gbps Long Wave Transceivers to increase communication speed over long distances.
	  ○ The standard optical transceiver (small form-factor pluggable [SFP]) on the Fibre Channel CHIP is short-wave. Long-wave SFP transceivers can be ordered individually. A single Fibre Channel port can be quickly converted from short-wave to long-wave by swapping a short-wave SFP transceiver for a long-wave SFP transceiver. Both 2Gbps and 4Gbps long-wave transceivers are available.

Larger Parity Groups	• Parity Group Interleaving
	  ○ Interleave 4 groups of RAID 5 (7D+1P)
	  ○ Allows striping across a larger number of disk drives w/o use of a host-based logical volume manager
	  ○ Increases random performance for OLTP applications

Key Features and Benefits

HP StorageWorks XP12000 Disk Array is ideal for enterprise customers requiring the highest level of scalability, availability, disaster recovery, business continuity solutions, and guaranteed uptime service levels. The level of service provided by the XP12000 could be compared to the level of service from HP NonStop severs or high-end Superdome servers. The XP12000 is an excellent solution for customers with applications that cannot afford any downtime -- where business demands this level of service. The XP12000 also supports the largest number of operating systems and offers very robust solutions. Plus you can manage up to 332 TB in one box with one interface that controls it all.

Reliability

- The XP12000 provides always-on reliability with no single-point-of-failure and redundant hot-swappable components, including: disk drives, fans, processors, I/O interfaces, power supplies, batteries and control processors.
- This redundancy is further enhanced by the inherent RAID technology, which includes RAID 5 7D+1P that provides 87.5% efficiency (i.e., only 12.5% overhead required).
- The XP12000 is also connected to HP's "Storage Technology Center" and is constantly being monitored by HP for any potential issues, so they can be proactively addressed before they can cause a problem.

Overview

Availability

Continuous availability is a vital requirement for most companies today. The costs associated with system downtime are skyrocketing. The XP12000 enables 24×7 operation in several ways:

- RAID technology and redundant data paths ensure that there is no single point-of-failure, virtually eliminating the likelihood of unplanned shutdown. If one of the two data paths fails, the other path takes over automatically. HP's "Storage Technology Center" is alerted to any problem, and that problem is quickly fixed with a minimum of stress while all data remains accessible.
- The XP12000 offer a painless growth path; it can be upgraded without ever taking the system down, so you can add capacity as required without disrupting business operations. In addition, HP's management software makes it easy to manage several additional arrays from a single console, so your storage capacity can grow without increasing demands on administrative staff.
- Integration with Business Copy XP and Continuous Access XP/XP Extension/XP Journal data replication software; as well as Cluster Extension XP and many 3rd party clustering software utilities enable continuous operation over multiple sites to protect against a local disaster.
- In case you need to restore data after a physical disaster, data-mirroring techniques of HP's Business Copy XP and Continuous Access XP software with full integration within HP OpenView Data Protector backup management software ensures that you can rapidly restore your data and return to normal operation quickly and efficiently.
- Nickel-Hydride batteries maintain system power for up to one minute during power outages allowing for uninterrupted service.
- If the power outage is longer than one minute, data is destaged to disk or battery protected in Cache and Shared Memory for at least 48 hours.

Scalability

The XP12000 allows you to start with the configuration you need today and scale to the highest usable capacity of any disk array as your needs grow. Scales from 9 drives to 1152 and to over 332 TB of raw storage capacity inside a single array. This scalability permits organizations to accommodate constant growing storage needs without ever having to upgrade the box.

- Online upgrades allow for no interruptions to applications and never require a full-box/forklift upgrade
- 1152 disk drives with 128 drives in the center DKC cabinet and up to 256 drives in each DKU cabinet (4 DKU's max)
- Over 332 TB of internal capacity, 32 PB of external capacity, 256 GB of Cache, and 12 GB of Shared Memory

	MIN	INCREMENT	MAX
Data Drives	8	4	1148
Spare Drives	1	1	40
Capacity	576 GB raw 288 GB usable	-	332 TB raw 290 TB usable
ACP Pairs	1	1	4
CHIP Pairs	1	1	7*
Host Ports	8	8/16/32	128/224*
Cache	4/8 GB	4/8 GB	256 GB
Cache Bandwidth	17 GB/s	17/34 GB/s	68 GB/s
Shared Memory	1 GB	1 GB	12 GB
Shared Memory Bandwidth	7.5 GB/s	7.5 GB/s	13 GB/s
LDEVs	1	1	16,384
Frames	1	1	5

*NOTE: Each CHIP pair over 4 that is installed reduces the maximum number of ACP pairs by 1.

Overview

Low Cost of Ownership

The XP12000 provides a low total cost of ownership when all factors are considered -- great price/performance ratio, increased productivity via higher throughput speeds, zero downtime, compact footprint to conserve floor space, and ease of management. In addition, connectivity to low cost external storage as well as the ability to consolidate proliferated storage allows you to more fully utilize storage assets and improve the quality of storage services that IT offers to the enterprise.

Virtualization

The XP12000 simplifies the management of heterogeneous SAN environments through its ability to support up to 32 PB of external storage-all configured 'behind' a single XP and managed from one single pane of glass. HP StorageWorks External Storage XP software uses advanced virtualization technology to allow storage administrators to host XP12000 Disk Array LUNs on externally attached disk arrays. Any Fibre Channel port from any CHIP pair installed in any slot can be used to connect to external storage.

Instead of seeing a confusing collection of dissimilar arrays, host systems perceive all the data to be stored inside the XP disk array. In effect, the XP disk array becomes the storage controller for a flexible, multi-tiered collection of storage with a range of cost and performance capabilities. By configuring current or legacy storage systems behind a single XP12000, data can be moved back and forth dynamically across tiers, all of which is invisible to the applications.

The XP12000's virtualization feature also reduces the total cost of storage ownership by:

- Exploiting common storage management across multiple vendors' systems
- Easily deploying a dual-vendor policy
- Facilitating simpler and lower cost data migrations
- Increasing storage utilization
- Extending the life of legacy storage

Supported arrays include the HP StorageWorks MSA family of low-cost arrays, the HP EVA family, and many current and legacy arrays from other storage providers, including EMC, IBM, and HDS.

For a complete/up-to-date list of supported arrays and accompanying firmware versions, please contact your HP representative.

Consolidation

Consolidating storage onto the XP12000 allows companies to dramatically reduce the high maintenance of managing proliferated storage. Costs of hardware maintenance decrease by managing only one piece of equipment, not many, and by retiring aging equipment. Management costs, which can be 3 to 4 times the cost of hardware, can be reduced allowing one powerful point of management. And with increased asset utilization and efficiency through management of low-cost external tiered storage (such as an MSA behind an XP), companies can buy less storage.

Performance

The XP12000 offers industry-leading performance at high capacity points through which customers can achieve outstanding levels of random I/O support for database, OLTP, data warehousing and other I/O intensive applications. The performance of the XP12000 surpasses the XP1024 by 2 to 4 times, as shown in the Family Information table found later in this document.

- Max Sequential Performance = 9.9 GB/s
- Max Random Performance Cache = 1,900,000 IOPS
- Max Random Performance Disk = 120,000 IOPS
- Max Data Bandwidth = 68 GB/s
- Max Control Bandwidth 13 GB/s

Overview

Heterogeneous Connectivity

A wide variety of servers and operating systems can be connected to an XP disk array
HP-UX

- HP-UX
- Windows
- LINUX - IA2, Red Hat
- HP OpenVMS
- HP NonStop
- Mainframe
- HP Tru64 UNIX
- IBM AIX
- Sun Solaris
- Dynix PTX, NCR

The XP12000 can be connected through all popular host interconnections

- Fibre Channel
- FICON
- ESCON
- iSCSI

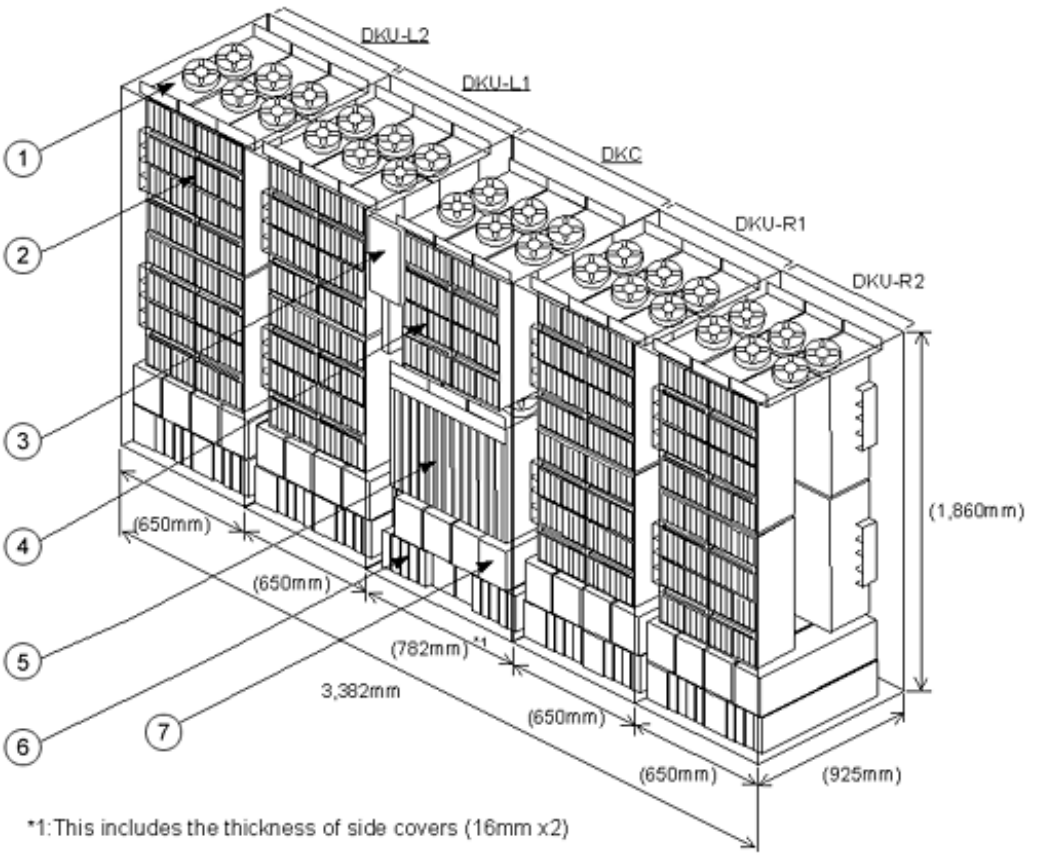
Redundancy

The HP StorageWorks XP12000 Disk Array is designed with no single point of component failure. It has full component and function redundancy, providing full fault tolerance for disk array processors, shared memory, cache, control and data connections, power supplies, cooling fans, and batteries. The XP has redundant power supplies with multiple connections to AC power from different sources, using single-phase or three-phase in 50 or 60 Hz.

Manageability

Multiple arrays and hundreds of terabytes can be managed from a single web-based management station - by existing staff.

Standard Features



1. Fan
2. HDU Box
3. Control Panel
4. HDU-Box (DKU-R0)
5. DKC Box
6. Battery Box
7. Power Supply

XP12000 Hardware

The XP12000 hardware consists of a Disk Control Frame (DKC) that will hold up to 128 disks, and one to four optional Disk Array Frames (DKUs) for the remaining disks.
The DKC contains the control panel, service processor (SVP), Cache modules, Shared Memory modules, crossbar switch, batteries for Cache, and Shared Memory backup, Client-Host Interface Processors (CHIPs), and Array Control Processors (ACPs).
The DKUs hold the majority of the disk drives and can hold up to 256 physical disks each. The XP12000 can be used with only the controller cabinet. Up to four disk cabinets can be added to each XP12000.

XP12000 Software

A full complement of software tools are available for XP12000 Disk Array management, management integration, and to enable a wide range of High Availability solutions. Please see the "HP StorageWorks XP Disk Array Software Products" QuickSpecs for further information:
http://h18000.www1.hp.com/products/quickspecs/12066_div/12066_div.HTML (Worldwide)
http://h18000.www1.hp.com/products/quickspecs/12066_na/12066_na.HTML (North America)

Standard Features

Server connectivity

The XP12000 connects to a variety of servers and operating systems. For details on which servers and operating systems are currently supported, please contact your resellers and your HP technical support to review the supported server and operating system information.

Client Host Interface Processors (CHIPs)

Client Host Interface Processors (CHIPs) provide connections to host or servers that use the XP12000 for data storage (either directly connected to the servers or through SAN switches). The primary function of a CHIP is to process host commands and signal the ACPs to read or write Cache to or from the disk drives. In addition, CHIPs access and update the cache track directory, monitor data access patterns, and emulate host device types. The CHIPs are configured in pairs for redundancy. The XP12000 can have up to seven pairs of CHIPs.*

CHIP pairs available for use in the XP12000 include:

- 8, 16, and 32 port 2 Gbps auto sensing short-wave and long-wave Fibre Channel
- 8, 16, and 32 port 4 Gbps auto sensing short-wave and long-wave Fibre Channel
- 16 port ExSA Channel (ESCON compatible)
- 8 port 2 Gbps auto-sensing FICON in both short-and long-wave versions
- 16 port 2 Gbps auto-sensing FICON in both short-and long-wave versions
- 8 port Gigabit Ethernet iSCSI CHIP pair

The standard optical transceiver (small form-factor pluggable [SFP]) on the Fibre Channel CHIP is short-wave. Long-wave SFP transceivers can be ordered individually. A single Fibre Channel port can be quickly converted from short-wave to long-wave by swapping a short-wave SFP transceiver for a long-wave SFP transceiver. Both 2Gbps and 4Gbps long-wave transceivers are available.

*NOTE: Each CHIP pair over 4 that is installed reduces the maximum number of ACP pairs by 1.

Array Control Processor (ACP)

The Array Control Processor (ACP) performs all data movement between the disks and Cache Memory. The ACP also provides data protection through the use of RAID 1, RAID 5, and RAID 6. Each ACP has eight 2 GB FC-AL loops or 16 loops total per pair, and supports up to 48 disk drives per loop. The ACP is configured in pairs for redundancy. The XP12000 can have one, two, three, or four pairs of ACPs.

Cache Memory

The XP12000 supports up to 256 GB of Cache. Cache Memory is used to temporarily store data from the host until it is written to disk, or to stage data requested by the host from the disk. The XP12000 Cache Memory modules are installed on Cache Platform Boards:

- The basic Cache Platform Board pair supports up to 16 sets of Cache modules (up to 128 GB).
- The optional Additional Cache Board Pair supports up to 16 additional sets of Cache modules (up to an additional 128 GB).

The Cache is configured as two sets of memories, onto which data that is to be written on the disk is mirrored, so the data will not be lost even if a Cache failure occurs.

XP Cache can also be allocated to particular host/port combinations to ensure that those hosts/ports enjoy optimized performance of Cache-oriented I/O. These cache partitions are assigned to specified disk array groups. Up to 32 partitions of at least 4GB can be created in an XP12000. Assigning cache in this way provides another method for tuning performance for data access for performance critical applications. Cache can be partitioned separate from storage partitions.

Standard Features

Shared Memory	Shared Memory of up to 12 GB is independent of the Cache Memory and is used to store tables, side files, and other information, thus freeing up the Cache Memory for user data. Shared Memory is also used to store system configuration information. The configuration information includes system components mapping, LUN maps, Cache pointers, and RAID levels. All Shared Memory is backed up by a fully redundant 48 hour battery.
Switch support details	The XP12000 connects to the leading Fibre Channel switches in the industry today. For detailed information on supported switch configurations, please contact your sales representative.
Batteries	The XP12000's power fail strategy provides for environmental-friendly Nickel-Hydride batteries, which continues array operations for up to one minute. When the duration of the power loss is longer than one minute, the XP12000 executes either the De-stage Mode and moves all data to disk, or the Backup Mode, protecting data in Cache and Shared Memory for at least 48 hours. The base DKC contains sufficient battery back-up for the first 16 sets of Cache modules. The Additional Cache Battery is required when more than 16 sets of Cache modules are installed.
High Storage Density	Consolidating storage onto an XP allows critical data center floor space to be maximized. Having 332 TB (1152 300 GB disk drives) in 3.128 square meters (33.67 square feet) of cabinet floor space provides an incredible density of 106 terabytes per square meter (9.86 terabytes per square foot)!

Software Components

Software Features

When disaster strikes, it can mean much more than a temporary loss of computing power. Work delays, data degradation, and data loss can quickly translate into lost revenue, lost profits, and lost customers. HP provides a range of solutions that address varying degrees of availability and scalability.

These solutions range from

- Consolidation and Virtualization - External Storage XP, Tiered Storage XP, and Disk/Cache Partition XP
- Internal Mirrors, Point-In-Time Copies, and Snapshots - Business Copy XP
- Path Management - Auto Path XP (AIX, Solaris), Secure Path XP (HP-UX, Windows, Linux)
- Clustering - Local Cluster Solutions
- Remote Replication - Continuous Access XP/XP Extension/XP Journal
- Long Distance Clusters - Cluster Extension XP
- Worldwide Clusters - Continental clusters

The XP12000 disk array family also provides unique local and remote replication capabilities for the IBM eServer zSeries and for IBM z/OS, z/VM and VSE environments.

A full complement of software tools are available for XP12000 Disk Array management, management integration, and to enable a wide range of High Availability solutions. Please see the "HP StorageWorks XP Disk Array Software Products" QuickSpecs for further information:
http://h18000.www1.hp.com/products/quickspecs/12066_div/12066_div.HTML (Worldwide)
http://h18000.www1.hp.com/products/quickspecs/12066_na/12066_na.HTML (North America)

Service and Support

HP Care Pack Services offer upgraded service levels to extend and expand your standard product warranty with easy to buy, easy to use support packages that help you make the most of your hardware and software investments. They let you choose the support levels that meet your business requirements, from basic to mission-critical. They help you contain total cost of ownership.

HP Care Pack warranty extensions can be purchased along with HP products to cost-effectively upgrade or extend your warranty. For many products, post-warranty HP Care Pack Services are available when your original warranty has expired.

Why purchase an HP Care Pack service?

- Your standard warranty protects against product defects. HP Care Pack Services help you guard against unplanned downtime, which can reduce your productivity and profitability. These convenient service packages:
- Protect your investment in HP products
- Provide consistent, predictable levels of support across your entire department or business
- Ease budget planning with fixed-cost support that includes parts and labor
- Give you direct access to proven technical and problem-solving expertise
- Offer a choice of response-time and repair-time commitments
- Deliver prompt, measurable results
- Are available whenever and wherever you do business
  NOTE: HP Care Pack availability may vary by country and product.

Supporting your Adaptive Enterprise journey

HP Services helps you make the Adaptive Enterprise real for your organization. The breadth, depth, and quality of HP hardware and software support services can help you **improve the performance** of your IT support processes and resolve the complex software and hardware problems that tax user productivity. HP Care Pack services help you **increase IT environment stability, efficiency, and agility** from the desktop to the data center, and improve the productivity of your employees.

Warranty and Services Included with the Product

Services included with the XP12000:

- Hardware site preparation.
- Array installation and start up.
- Warranty level of hardware reactive support is 2 years, 24×7, 4 hour response on critical repairs. Next calendar day response for all other repairs.
- Proactive 24 proactive services
- Software support-1 year of 24×7 support services, which includes LTU, right to new versions, documentation, phone in assistance and access to the IT Resource Center
- Software enablement is bundled in with each individual software title.

HP Proactive 24 Service is an integrated hardware and software support solution designed to help you get more from your IT investment. It combines industry-leading preventive assistance with responsive support that helps you address problems quickly and effectively.

- Assigned account manager who is your primary contact for proactive services and access to HP's diverse technical resources
- Your account manager works closely with your IT staff to understand your environment and goals; document all the components of your infrastructure; recommend changes to improve availability, performance, and stability; and monitor ongoing operations using state-of-the-art remote tools
- Comprehensive 24 x 7 assistance
- 1 year 2-hour response for software issues, includes phone-in assistance, License to Use, rights to new versions, documentation and access to the IT Resource Center
- 2 years onsite response for hardware problems; 4-hour response for critical problems, next calendar day response for all other repairs.

HP warrants only that the Software media will be free of physical defects for a period of ninety (90) days from delivery.

For more information about HP's Global Limited Warranty and Technical Support, visit ftp://ftp.compaq.com/pub/products/storageworks/warranty/EN_321708-008.pdf

Recommended Services

- 3 Years - HP Proactive 24 Service
  - Easily extends support of your environment to three full years
- HP Support Plus 24 Service is recommended to cover any devices used as external storage that will appear as a LUNs on the XP12000
- Data Replication service
  - Accelerate your time-to-ROI with HP implementation and integration expertise
  - Enjoy rapid results when you deploy industry-leading HP Data Replication technologies
  - Provides optimal solution to meet your IT and business needs via flexible scalable services

Available HP Care Pack Services

Extend your product warranty with a wide choice of cost-saving support packages.

HP Care Pack Services are sold by HP and HP authorized enterprise and commercial resellers. Services for customers purchasing via direct and enterprise resellers are quoted using HP order configuration tools. Additional information about HP Care Pack Service features and benefits is available at http://www.hp.com/hps/carepack/services/.

HP Care Pack Services Deployment and Per Event Services	Service Available
HP Installation & Startup	Included with HW
HP Implementation	Included with most SW titles
HP Data Replication Solution Service	Available
HP Care Pack Services Deployment and Per Event Services	Service Available

For more information about Deployment and Per Event Services for HP Storage, visit http://www.hp.com/hps/storage/.

HP Care Pack Services Availability Services	1 yr	3 yr	4 yr	5 yr
HP Proactive 24 Service	Included	Available	Available	Available
HP Critical Service	Available	Available	Available	Available

Deployment and Per Event Service Descriptions

- XP Performance Tuning and Optimization
  - Ongoing analysis and tuning designed to keep your array running efficiently.
- XP Performance Analysis
  - Provides data collection, detailed I/O analysis, and enhancement recommendations for the XP Disk Array.
- High Availability Storage Assessment
  - Identify potential risks to business success that may exist in your XP Storage/SAN environment.
- Availability Assessment for SANs
  - Recommendations for reducing or eliminating risks to the availability of your SAN infrastructure.
- SAN Solution Service
  - You get a powerful network storage solution up-and-running quickly and efficiently, with minimal disruption and rapid returns on your SAN investment.
- HP Open Systems Data Migration
  - Transfers your critical information to a new or reconfigured storage array in an open systems environment - across a data center or around the world.
- HP Open Systems Data Migration Extension
  - Accommodates additional capacity to be migrated beyond what is included in the base HP Open Systems Data Migration Service.
- HP Mainframe Data Migration
  - Transfers your critical information to a new or reconfigured storage array in a mainframe environment - across a data center or around the world.
- HP Mainframe Data Migration Extension
  - Accommodates additional capacity to be migrated beyond what is included in the base HP Data Migration Mainframe Service.
- HP Mixed Environment Data Migration
  - Transfers your critical information to a new or reconfigured storage array in a mixed mainframe and open systems environment - across a data center or around the world.
- HP Mixed Environment Data Migration Extension
  - Accommodates additional capacity to be migrated beyond what is included in the base HP Data Migration Mixed Environment Service.
- LUN Implementation for XP
  - When redeploying your storage array, this service maximizes effectiveness by providing the necessary activities to implement a new LUN or Virtual Disk (Vdisk) configuration.
- Data Replication Solution Service
  - Ensures a timely, cost-effective deployment of your data replication solution that cuts risk and shortens your time-to-results.

Service and Support, HP Care Pack, and Warranty Information

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

Instant Support Enterprise Edition (ISEE)
HP Instant Support Enterprise Edition (ISEE) provides a single remote monitoring and support solution for your IT data center. ISEE uses continuous hardware event monitoring and automated notification to identify and prevent potential critical problems.

ISEE is a feature of HP Hardware Support Onsite Service with Next-Day response or better, Proactive Essentials, Proactive 24, Critical Service and warranty support for the selected products.

For more information or to download ISEE, visit http://www.hp.com/go/instantsupport

HP Education Services

Managing The HP StorageWorks XP Disk Array H6773s
http://education.hp.com/datasheets/h6773s.pdf
For more information about HP Education Services for Storage and SAN, visit
http://education.hp.com/curr-storsan.htm

Additional Services Information

For more information about Deployment, Per Event, Consulting and Education services for HP Storage, visit: http://www.hp.com/hps/storage/
For more information about HP Care Pack Services for Storage, visit:
http://www.hp.com/hps/carepack/storage/cp_networked.html
For more information about HP Storage Software, services and updates, visit:
http://h18006.www1.hp.com/storage/software.html
If you have specific questions, contact your local HP representative. Contact information for a representative in your area can be found at "Contact HP" http://www.hp.com

Functionality Element	XP12000	XP10000	XP1024	XP128
Max Sequential Performance	9.9 GB/s	1.3 GB/s	2.1 GB/s	1.2 GB/s
Max Random Performance Cache	1,900,000 IOPS	700,000 IOPS	544,000 IOPS	272,000 IOPS
Max Random Performance Disk	120,000 IOPS	16,000 IOPS	66,000 IOPS	33,000 IOPS
Max Data Bandwidth	68 GB/s	8.5 GB/s	10 GB/s	5 GB/s
Max Control Bandwidth	13 GB/s	3.6 GB/s	5 GB/s	2.5 GB/s
Max Raw Capacity	332 TB + 32 PB External Storage	69 TB + 16 PB External Storage	149 TB	36 TB
Max Cache	256 GB	64 GB	128 GB	64 GB
Host System Interface	2 Gbps FC 4 Gbps FC ESCON 2 Gbps FICON iSCSI	2 Gbps FC 4 Gbps FC ESCON 2 Gbps FICON iSCSI	2 Gbps FC ESCON 2 Gbps FICON iSCSI	2 Gbps FC ESCON 2 Gbps FICON iSCSI
RAID levels supported	RAID 1 (2D + 2D) RAID 1 (4D + 4D) RAID 5 (3D + 1P) RAID 5 (7D + 1P) RAID 5 (14D + 2P) RAID 5 (28 D + 4P) RAID 6 (6D + 2P)	RAID 1 (2D + 2D) RAID 1 (4D + 4D) RAID 5 (3D + 1P) RAID 5 (7D + 1P) RAID 5 (14D + 2P) RAID 5 (28 D + 4P) RAID 6 (6D + 2P)	RAID 1 (2D + 2D) RAID 1 (4D + 4D) RAID 5 (3D + 1P) RAID 5 (7D + 1P)	RAID 1 (2D + 2D) RAID 1 (4D + 4D) RAID 5 (3D + 1P) RAID 5 (7D + 1P)
Drive Interface	2 Gbps FC-AL Dual Active Ports	2 Gbps FC-AL Dual Active Ports	1 Gbps FC-AL Dual Active Ports	1 Gbps FC-AL Dual Active Ports
Drive Capacity	73 GB 15K rpm 146 GB 10K rpm 146 GB 15K rpm 300 GB 10K rpm	73 GB 15K rpm 146 GB 10K rpm 146 GB 15K rpm 300 GB 10K rpm	36 GB 15K rpm 73 GB 10K rpm 73 GB 15K rpm 146 GB 10K rpm 300 GB 10K rpm	36 GB 15K rpm 73 GB 10K rpm 73 GB 15K rpm 146 GB 10K rpm 300 GB 10K rpm
Disk Drives	1152	240	1024 (512 300 GB disks)	128
External storage capability	XP1024, XP128, XP 512, XP48, XP256, EVA8000, EVA6000, EVA4000, EVA5000, EVA3000, MSA1500, MSA1000, EMC, IBM, and HDS arrays*	XP1024, XP128, XP 512, XP48, XP256, EVA8000, EVA6000, EVA4000, EVA5000, EVA3000, MSA1500, MSA1000, EMC, IBM, and HDS arrays*	None	None
Online firmware update	One CHIP processor at a time keeps all ports operating with no host port interruption	One CHIP processor at a time keeps all ports operating with no host port interruption	One CHIP blade at a time keeps the other blade operating, may interrupt a host with a single connection	One CHIP blade at a time keeps the other blade operating, may interrupt a host with a single connection

Family Information

Battery Type	Nickel-Hydride batteries maintain system power for up to one minute during power outages allowing for uninterrupted service. After one minute data is either destaged or Cache and Shared Memory is battery protected.	Nickel-Hydride batteries that maintain Cache and Shared Memory during outages.	Batteries maintain cache and Shared Memory during outages	Batteries maintain cache and Shared Memory during outages
*NOTE For a complete/up-to-date list of supported arrays and accompanying firmware versions, please ask your HP representative.				

An extensive list of accessories is available for this product. For more information, please contact your reseller or authorized HP representative to work with the requirements to configure the product correctly.

Base Configurations - HP StorageWorks XP12000 Disk Array SSP AE001A

NOTE: The XP12000 is a Structured Solution Product (SSP). This product number (AE001A) is a zero-price ordering mechanism that is used as an "umbrella" product to indicate to the ordering system that this is a new XP order. This product number (AE001A) is a zero-price ordering mechanism that is used as an "umbrella" product to indicate to the ordering system that this is a new XP order.

XP12000 DKC

XP12000 Disk Control Frame - DKC AE002A

(Supports up to 128 disk drives. Contains Basic Redundant Power Supplies, base batteries for up to 64GB Cache and up to 64 disk drives, HP microcode, HP Continuous Track XP, Modem and pcAnywhere. Does not include ACP) (1 required per XP system). Must select one power option.

3-Phase 30A/60Hz for XP12000 DKC		AE002A#001
	Power Cable Kit 3-Phase/30A/60Hz DKC-DKU	
	AC Box Kit, 3-Phase/30A, DKC-DKU	
3-Phase 30A/50Hz for XP12000 DKC		AE002A#002
	Power Cable Kit 3-Phase/30A/50Hz DKC-DKU	
	AC Box Kit, 3-Phase/30A, DKC-DKU	
1-Phase 50A/60Hz for XP12000 DKC		AE002A#003
	Power Cable Kit 1-Phase/50A/60Hz DKC-DKU	
	AC Box Kit, 1-Phase/50A, DKC-DKU	
1-Phase 50A/50Hz for XP12000 DKC		AE002A#004
	Power Cable Kit 1 Phase/50A/50 Hz DKC-DKU	
	AC Box Kit, 1-Phase/50A, DKC-DKU	
1-Phase 30A/60Hz for Std XP12000 DKC		AE002A#005
	Power Cable Kit 1-Phase/30A/60Hz DKC-DKU	
	AC Box Kit, 1-Phase/30A, DKC-DKU	
1-Phase 30A/50Hz for Std XP12000 DKC		AE002A#006
	Power Cable Kit 1-Phase/30A/50Hz DKC-DKU	
	AC Box Kit, 1-Phase/30A, DKC-DKU	
1-Phase 30A/60Hz for Min XP12000 DKC		AE002A#007
	Power Cable Kit 1-Phase/30A/60Hz DKC-DKU	
	AC Box Kit, 1-Phase/30A, DKC-DKU	
1-Phase 30A/50Hz for Min XP12000 DKC		AE002A#008

Configuration Information

NonStop Server Connectivity		AE002A#010
	Power Cable Kit 1-Phase/30A/50Hz DKC-DKU	
	AC Box Kit, 1-Phase/30A, DKC-DKU	
SVP High Reliability Support Kit (min 0, max 1)		AE003A
	XP12000 SVP High Reliability Sup. Kit	
Power Control Interface Kit for Mainframe Kit (min 0, max 1)		AE004A
	XP12000 Power Control I/F Kit for MF	

Client-Host Interface Processor pairs (Min 1 pr, Max 7 pr)

HP XP12000/10000 16 -port 2 -Gb FC CHIP	AE006A
HP XP12000/10000 32 -Port 2 -Gb FC CHIP	AE007A
HP XP12000/10000 FC 2Gb LW Transceiver	AE008A
HP XP12000/10000 FC 4Gb LW Transceiver	AE011A
HP XP12000/10000 8 -Port FICON SW CHIP	AE013A
HP XP12000/10000 8 -Port FICON LW CHIP	AE014A
HP XP12000/10000 16 -Port FICON SW CHIP	AE015A
HP XP12000/10000 16 -Port FICON LW CHIP	AE016A
HP XP12000/10000 16 -Port EXSA CHIP	AE017A
HP XP12000/10000 8 Port Gb iSCSI CHIP	AE019A
HP XP12000/10000 8 Port 2Gb FC CHIP	AE020A
HP XP12000/10000 8 Port 4Gb FC CHIP	AE021A
HP XP12000/10000 16 Port 4Gb FC CHIP	AE022A
HP XP12000/10000 32 Port 4Gb FC CHIP	AE023A

Additional DKC Power Supply (Min 0, Max 1)	XP12000 DKC Power Supply NOTE: Required when CHIPs plus ACPs = 4 or more, or, when 68GB or more Cache, or, when 65 or more disk drives are installed)	AE024A

Cache Memory (Min 4GB, Max 256 GB)	HP XP12000/10000 4-GB Cache Memory	AE025A
	HP XP12000/10000 8 GB Cache Memory	AE026A
	NOTE: Must order Cache Data Path Expansion kit AE027A for high performance Cache configurations, or, for Cache greater than 64GB. Must configure Cache in increments of 8 GB when Expansion kit AE027A is installed.	

Cache Data Path Expansion kit (Min 0, Max 1)	XP12000 Cache Platform Board	AE027A
	HP XP12000 256 Cache Platform Board	AE027B
	NOTE: Required for all high performance Cache configurations or required for Cache above 64GB.	

Configuration Information

DKC-DKU Additional Battery (Min 0, Max 2 for DKC, Max 2 per DKU Frame)	XP12000 DKC-DKU Battery NOTE: 1 required for DKC when 68GB or more Cache or with 65 or more disk drives installed. 2nd required for DKC under any of the 3 following conditions: CHIPs plus ACP is 4 or greater, or, AE027A/AU is installed. 2 required for DKU with 129 or more disk drives.	AE028A
Shared Memory (Min 1GB, Max 12GB)	HP XP12000/10000 1 -GB Shared Memory Shared Memory Path Expansion kit (Min 0, Max 1) NOTE: Required for high performance SM path access or with more than 6 Shared Memory modules or with Snapshot software enabled.	AE030A
HP XP12000 SM Platform Board	DKC Data Path Expansion kit (Min 0, Max 1) NOTE: 1 required if installing 3rd or 4th CHIP pairs, or, if installing CHIPs or ACPs in 3rd or 4th ACP locations.	AE032B
XP12000 Cache Switch	Array Control Processor (Min 0, Max 4) NOTE: No intermixing. Max ACP is reduced by 1 for every CHIP pair above 4.	AE033A
XP12000 Standard Performance ACP Pair		AE034A

DKC-DKU and DKU-DKU Frame Interconnect Cables

XP12000 Cable set for DKU R1- Basic	AE040A
XP12000 Cable set for DKU R1- High Perf	AE041A
XP12000 Cable set for DKU L1 - Basic	AE042A
XP12000 Cable set for DKU L1- High Perf	AE043A
XP12000 Cable Set for DKU R2 or L2	AE044A

XP12000 Disk Array Frame (DKU) AE045A

Disk Array Frame (Min 0, Max 4) Must select one option and must match Power option of DKC (except DKU#005 and #006 are compatible with DKC #007 and #008 respectively, otherwise, no intermixing of power options). Base DKU includes batteries for up to 128 disk drives.

3-Phase 30A/60Hz for XP12000 DKU	Power Cable Kit 3-Phase/30A/60Hz DKC-DKU AC Box Kit, 3-Phase/30A, DKC-DKU	AE045A#001
3-Phase 30A/50Hz for XP12000 DKU	Power Cable Kit 3-Phase/30A/50Hz DKC-DKU AC Box Kit, 3-Phase/30A, DKC-DKU	AE045A#002
1-Phase 50A/60Hz for XP12000 DKU	Power Cable Kit 1-Phase/50A/60Hz DKC-DKU AC Box Kit, 1-Phase/50A, DKC-DKU	AE045A#003
1-Phase 50A/50Hz for XP12000 DKU	Power Cable Kit 1 Phase/50A/50 Hz DKC-DKU AC Box Kit, 1-Phase/50A, DKC-DKU	AE045A#004
1-Phase 30A/60Hz for XP12000 DKU	Power Cable Kit 1-Phase/30A/60Hz DKC-DKU AC Box Kit, 1-Phase/30A, DKC-DKU	AE045A#005

1-Phase 30A/50Hz for XP12000 DKU	Power Cable Kit 1-Phase/30A/50Hz DKC-DKU AC Box Kit, 1-Phase/30A, DKC-DKU	AE045A#006

Disk Data Path Sets

NOTE: Min 0, Max 1 per DKU frame

XP12000 High Perf FC-AL Disk Path	AE046A

XP Disk Drives Array Groups. Qty (2) DKC-DKU

NOTE: Additional Battery (AE028A) required for each DKU with more than 32 Array Groups.

XP12000 73GB 15k rpm Array Group-4 disks	AE050A
XP12000 146GB 10k rpm Array Group-4 disks	AE051A
HP XP12000 146GB 15k rpm Array Group	AE052A
XP12000 300GB 10k rpm Array Group-4 disk drives	AE053A

Spare Disk Drives

NOTE: Min of one required for each Array Group type

XP12000 73GB 15k rpm Spare Disk	AE050AS
XP12000 146GB 10k rpm Spare Disk	AE051AS
HP XP12000 146GB 15k rpm Spare Disk	AE052AS
XP12000 300GB 10k rpm Spare Disk	AE053AS

Upgrades

HP StorageWorks XP12000/10000 Upgrade	AE070A

NOTE: This product number (AE070A) is a zero-price ordering mechanism that is used as an "umbrella" product to indicate to the ordering system that this is an upgrade XP order.

HP StorageWorks XP12000 DKC upgrade components

XP12000 1-Phase 30A/60Hz DKC Pwr upgd Power Cable Kit 1-Phase/30A/60Hz DKC-DKU	AE068AU
XP12000 1-Phase 30A/50Hz DKC Pwr upgd Power Cable Kit 1-Phase/30A/50Hz DKC-DKU	AE069AU
XP12000 SVP High Reliability Kit, upgd	AE003AU
XP12000 Pwr Control I/F Kit for MF, upgd	AE004AU
HP XP12000/10000 Upgr 16port 2Gb FC CHIP	AE006AU
HP XP12000/10000 Upgr 32port 2Gb FC CHIP	AE007AU
HP XP12000/10000 Upgr 2Gb LW Transceiver	AE008AU
HP XP12000/10000 Upgr 2Gb SW Transceiver	AE009AU
HP XP12000/10000 Upgr 4-Gb LW Transceiver	AE011AU
HP XP12000/10000 Upgr 8 FICON SW CHIP	AE013AU
HP XP12000/10000 Upgr 8 FICON SW CHIP	AE014AU
HP XP12000/10000 Upgr 16 FICON SW CHIP	AE015AU
HP XP12000/10000 Upgr 16 FICON LW CHIP	AE016AU
HP XP12000/10000 Upgr 16 -Port EXSA CHIP	AE017AU
HP XP12000/10000 Upgr 8-Port Gb iSCSI CHIP	AE019AU

Configuration Information

HP XP12000/10000 Upgr 8 Port 2Gb FC CHIP	AE020AU
HP XP12000/10000 Upgr 8 Port 4Gb FC CHIP	AE021AU
HP XP12000/10000 Upgr 16 Port 4Gb FC CHIP	AE022AU
HP XP12000/10000 Upgr 32 Port 4Gb FC CHIP	AE023AU
XP12000 DKC Power Supply, upgd	AE024AU
HP XP12000/10000 Upgr 4 -GB Cache Memory	AE025AU
HP XP12000/10000 Upgr 8 GB Cache Memory	AE026AU
XP12000 Cache Platform Board, upgd	AE027AU
HP XP12000 Upgr 256 Cache Platform Board	AE027BU
XP12000 DKC-DKU Battery, upgd	AE028AU
HP XP12000/10000 Upgr 1 -GB Shared Memory	AE030AU
XP12000 Shared Memory Platform Board, upgd	AE032BU
XP12000 Cache Switch, upgd	AE033AU
XP12000 Standard Performance ACP Pair, upgd	AE034AU
XP12000 Cable set for DKU R1-Basic, upgd	AE040AU
XP12000 Cable set, DKU R1-High Perf, upgd	AE041AU
XP12000 Cable set for DKU L1-Basic, upgd	AE042AU
XP12000 Cable set, DKU L1-High Perf, upgd	AE043AU
XP12000 Cable Set for DKU R2 or L2, upgd	AE044AU

HP StorageWorks XP12000 DKU upgrade components

XP12000 Disk Array Frame (DKU), upgd		AE045AU
3-Phase 30A/60Hz for XP12000 DKU, upgd	Power Cable Kit 3-Phase/30A/60Hz DKC-DKU AC Box Kit, 3-Phase/30A, DKC-DKU	AE045AU#001
3-Phase 30A/50Hz for XP12000 DKU, upgd	Power Cable Kit 3-Phase/30A/50Hz DKC-DKU AC Box Kit, 3-Phase/30A, DKC-DKU	AE045AU#002
1-Phase 50A/60Hz for XP12000 DKU, upgd	Power Cable Kit 1-Phase/50A/60Hz DKC-DKU AC Box Kit, 1-Phase/50A, DKC-DKU	AE045AU#003
1-Phase 50A/50Hz for XP12000 DKU, upgd	Power Cable Kit 1 Phase/50A/50 Hz DKC-DKU AC Box Kit, 1-Phase/50A, DKC-DKU	AE045AU#004
1-Phase 30A/60Hz for XP12000 DKU, upgd	Power Cable Kit 1-Phase/30A/60Hz DKC-DKU AC Box Kit, 1-Phase/30A, DKC-DKU	AE045AU#005

Configuration Information

1-Phase 30A/50Hz for XP12000 DKU, upgd	Power Cable Kit 1-Phase/30A/50Hz DKC-DKU	AE045AU#006

XP12000 High Perf FC-AL Disk Path, upgd	AE046AU
XP12000 73GB 15k Arry Grp-4 disks, upgd	AE050AU
XP12000 146GB 10k Arry Grp-4 disks, upgd	AE051AU
HP XP12000 146GB 15k Upgr Array Group	AE052AU
XP12000 300GB 10k Arry Grp-4 disk drives, upgd	AE053AU
XP12000 73GB 15k Spare Disk, upgd	AE050AT
XP12000 146GB 10k Spare Disk, upgd	AE051AT
HP XP12000 146GB 15k Upgr Spare Disk	AE052AT
XP12000 300GB 10k Spare Disk, upgd	AE053AT

Technical Specifications

Model	HP StorageWorks XP12000 Disk Array
Number of Disk Drives	9 -1152 in 1 to 5 cabinets (Disk Control Frame holds 128 disks and the Disk Array Frames hold 256 disks each)

Disk Drives, Interface

Disk Drives, Capacity and Spindle Speed	73 GB - 15K rpm	146 GB - 10K rpm	146 GB 15K rpm	300 GB - 10K rpm
Rotational latency	2.01 ms	2.99 ms	2.01 ms	2.99 ms
Average Read/Write Seek Time	3.8/4.2 ms	4.9/5.4 ms	3.8/4.1 ms	4.7/5.1 ms
Internal data transfer rate	74.5 to 111.4 MB/sec	57.3 to 99.9 MB/sec	76.13 to 113.78 MB/sec	57.3 to 99.9 MB/sec

Capacity	576 GB - 332 TB raw 288 GB - 290 TB usable	
RAID Level	RAID 1 (2D + 2D) RAID 1 (4D + 4D) RAID 5 (3D + 1P) RAID 5 (7D + 1P) RAID 5 (14D + 2P) RAID 5 (28 D + 4P) RAID 6 (6D + 2P)	
Maximum number of Logical Devices (LDEVs)	16,834	
Cache Memory	4 GB - 256 GB	
Shared Memory	1 GB to 12 GB	
Battery backup time	48 hours minimum	
Operating Systems	HP-UX, Tru64, Open VMS, NonStop, Solaris, AIX, Windows, NetWare, IRIX, Linux, Mainframe	
Host Interface	Fibre Channel, ESCON, FICON, and iSCSI	
Host Ports	8 to 224 by increments of 8/16/32	
Drive Interface	Dual ported 2 Gbps Fibre Channel Arbitrated Loop (FC-AL)	
Regulatory Approvals	This product meets all applicable safety and regulatory specifications	
Physical Dimensions - Disk control frame (DKC)	Width x Depth x Height	30.8 x 36.4 x 73.2 in (78.2 x 92.5 x 186.0 cm)
	Max Weight	1930 lb (877 kg)
Physical Dimensions - Disk array frame (DKU)	Width x Depth x Height	25.6 x 36.4 x 73.2 in (65.0 x 92.5 x 186.0 cm)
	Max Weight	1630 lb (741 kg)
Shipping Dimensions - Disk control frame (DKC)	Width x Depth x Height	37.4 x 43.7 x 79.9 in (95.0 x 111.0 x 203.0 cm)
	Max Weight	2180 lb (988.8 kg)
Shipping Dimensions - Disk array frame (DKU)	Width x Depth x Height	37.4 x 43.7 x 79.9 in (95.0 x 111.0 x 203.0 cm)
	Max Weight	1880 lb (852.7 kg)

Heat Dissipation and Power Consumption Specifications

Parameter	DKC	Each DKU	Full Array (4 DKUs and 1 DKC)
Power consumption (kVA)	8.45	7.50	38.45
Heat dissipation (kW)	8.02	6.75	35.02
BTUs per hour	27370	23036	119514
Kcal per hour	6897	5805	30117

DKC AC line voltage requirements

50 amp, 50 or 60 Hz, Single phase DKC operation

	Nominal Rated Voltage (VAC)				
Parameter	200	208*	220	230	240
Minimum operating voltage (VAC)	184	191	202	212	221
Maximum operating voltage (VAC)	212	220	233	244	254
Rated line current per power cord (Arms)	8.0	7.7	7.2	7.0	6.6
Number of power cords	2	2	2	2	2
Number of circuit breakers	2	2	2	2	2
Recommended circuit breakers	50A	50A	50A	50A	50A
Dropout carry-through time at minimum line voltage (ms)	30	30	30	30	30

* 60 Hz only

30 amp, 50 or 60 Hz, Single phase DKC operation

	Nominal Rated Voltage (VAC)				
Parameter	200	208*	220	230	240
Minimum operating voltage (VAC)	184	191	202	212	221
Maximum operating voltage (VAC)	212	220	233	244	254
Rated line current per power cord (Arms)	4.0	3.9	3.6	3.5	3.3
Number of power cords	4	4	4	4	4
Number of circuit breakers	4	4	4	4	4
Recommended circuit breakers	30A	30A	30A	30A	30A
Dropout carry-through time at minimum line voltage (ms)	30	30	30	30	30

* 60 Hz only
** Units with only two power cords require only two circuit breakers

30 amp, 50 or 60 Hz, Three phase DKC operation

Parameter	Nominal Rated Voltage (VAC)							
	200	208*	220	230	240	380	400	415
Minimum operating voltage (VAC)	184	191	202	212	221	350	368	382
Maximum operating voltage (VAC)	212	220	233	244	254	403	424	440
Rated line current per power cord (Arms)	5.2	5.0	4.7	4.6	4.3	2.7	2.6	2.5
Number of power cords	2	2	2	2	2	2	2	2
Number of circuit breakers	2	2	2	2	2	2	2	2
Recommended circuit breakers	30A	30A	30A	30A	30A	30A	30A	30A
Dropout carry-through time at minimum line voltage (ms)	30	30	30	30	30	30	30	30
* 60 Hz only								

DKU AC line voltage requirements

50 amp, 50 or 60 Hz, Single phase DKU operation

Parameter	Nominal Rated Voltage (VAC)				
	200	208*	220	230	240
Minimum operating voltage (VAC)	184	191	202	212	221
Maximum operating voltage (VAC)	212	220	233	244	254
Rated line current per power cord (Arms)	22.3	21.6	20.3	19.4	18.6
Number of power cords	2	2	2	2	2
Number of circuit breakers	2	2	2	2	2
Recommended circuit breakers	50A	50A	50A	50A	50A
Dropout carry-through time at minimum line voltage (ms)	30	30	30	30	30
* 60 Hz only					

30 amp, 50 or 60 Hz, Single phase DKU operation

Parameter	Nominal Rated Voltage (VAC)				
	200	208*	220	230	240
Minimum operating voltage (VAC)	184	191	202	212	221
Maximum operating voltage (VAC)	212	220	233	244	254
Rated line current per power cord (Arms)	13.5	13.0	12.3	11.7	11.2
Number of power cords	4	4	4	4	4
Number of circuit breakers	4	4	4	4	4
Recommended circuit breakers	30A	30A	30A	30A	30A
Dropout carry-through time at minimum line voltage (ms)	30	30	30	30	30
* 60 Hz only ** Units with only two power cords require only two circuit breakers					

30 amp, 50 or 60 Hz, Three phase DKU operation

Parameter	Nominal Rated Voltage (VAC)							
	200	208*	220	230	240	380	400	415
Minimum operating voltage (VAC)	184	191	202	212	221	350	368	382
Maximum operating voltage (VAC)	212	220	233	244	254	403	424	440
Rated line current per power cord (Arms)	15.0	14.4	13.6	13.0	12.5	8.8	8.4	8.1
Number of power cords	2	2	2	2	2	2	2	2
Number of circuit breakers	2	2	2	2	2	2	2	2
Recommended circuit breakers	30A	30A	30A	30A	30A	30A	30A	30A
Dropout carry-through time at minimum line voltage (ms)	30	30	30	30	30	30	30	30
* 60 Hz only								

Environmental Specifications

Item	Condition		
	Operating[1]	Non-operation[2]	Shipping & Storage[3]
Temperature (°C)	16 to 32	-10 to 43	-25 to 60
Relative Humidity (%)[4]	20 to 80	8 to 90	5 to 95
Max. Wet Bulb (°C)	26	27	29
Temperature Deviation (°C/hour)	10	10	20
Vibration[5]	5 to 10Hz: 0.25mm 10 to 300Hz: 0.05G	5 to 10Hz: 2.5mm 10 to 70Hz: 0.5G 70 to 99Hz: 0.05mm 99 to 300Hz: 1.0G	0.5G, 5min. At the resonant frequency with the highest displacement found between 3~100Hz
Shock	—	8G, 15ms	Horizontal: Incline Impact 1.22m/s
			Vertical: Rotational Edge 0.15m
Acoustic Level[6]	65dB	—	—

NOTES:

1. Environmental specification for operating condition should be satisfied before the disk subsystem is powered on. Maximum temperature of 32°C should be strictly satisfied at air inlet portion. Recommended temperature range is 21 to 24°C.
2. Non-operating condition includes both packing and unpacking conditions unless otherwise specified.
3. On shipping/storage condition, the product should be packed with factory packing.
4. No condensation in and around the drive should be observed under any conditions.
5. The above specifications of vibration apply to all three axes.
6. Measurement Condition: The point 1m far from floor and surface of the product.

Technical Specifications

Accessories	An extensive list of accessories is available for this product; for more information, please contact your HP sales representative
Safety	This product meets all applicable safety and regulatory specifications
Software	HP StorageWorks Command View XP Advanced Edition HP StorageWorks XP Tiered Storage Manager HP StorageWorks XP Provisioning Manager HP StorageWorks XP Replication Monitor HP StorageWorks LUN Configuration & Security Manager XP HP StorageWorks Performance Advisor XP HP StorageWorks Performance Control XP HP StorageWorks Auto LUN XP HP StorageWorks Data Exchange XP HP StorageWorks Business Copy XP/Snapshot XP HP StorageWorks Continuous Access XP/XP Extension/XP Journal HP StorageWorks External Storage XP HP StorageWorks RAID Manager XP HP StorageWorks Flex Copy XP HP StorageWorks Secure Path XP/Auto Path XP HP StorageWorks Cluster Extension XP HP StorageWorks XP Data Shredder HP StorageWorks XP Disk/Cache Partition HP StorageWorks Fast Recovery Solution XP HP Storage Essentials The HP StorageWorks XP Disk Array family also provides unique capabilities for the IBM eServer zSeries and for IBM z/OS, z/VM and VSE environments. XP mainframe capabilities include local and remote replication (hardware and host based) of mainframe volumes, DB2 cloning, mainframe array based partitioning, advanced cache, security and archive functions and multiple concurrent I/O handling.

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