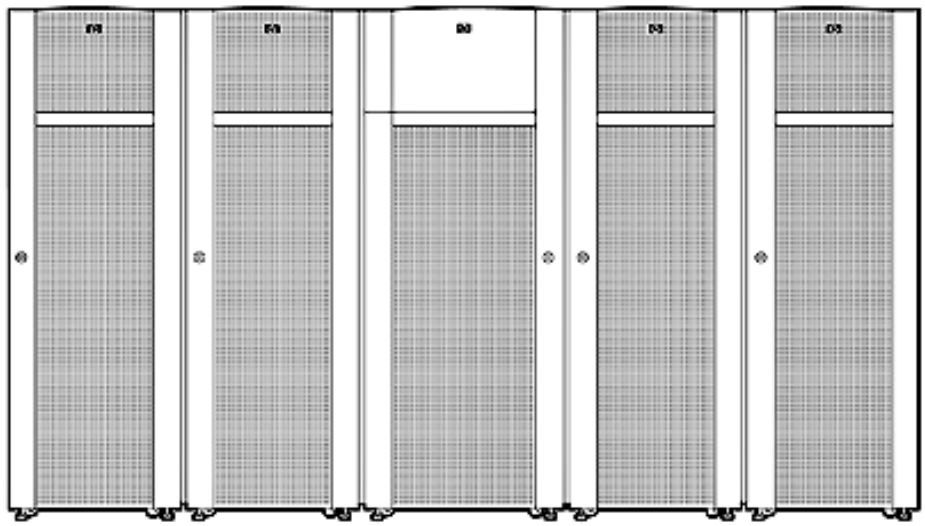
Overview

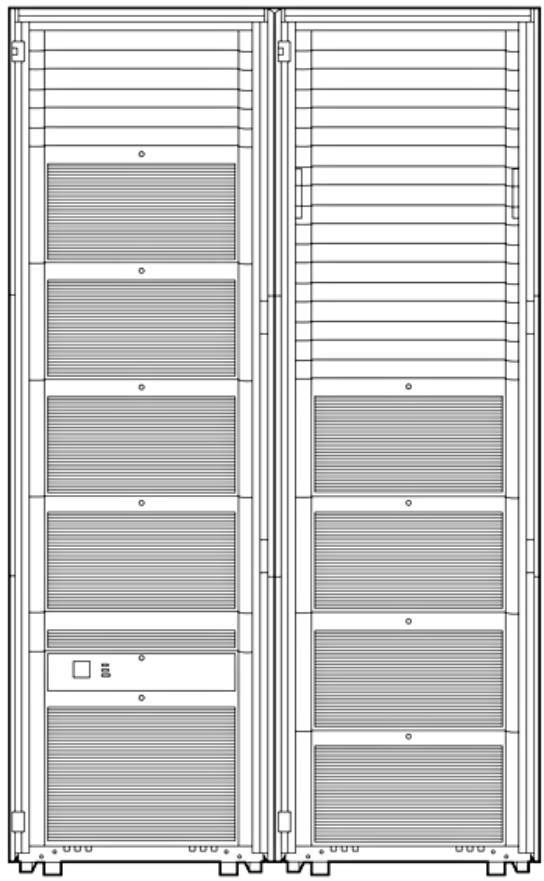
The HP StorageWorks XP24000/XP20000 Disk Arrays are large enterprise-class storage systems designed for organizations that simply cannot afford any downtime or tolerate any data loss. The XP mitigates the risk of business downtime by providing a bulletproof platform with complete hardware redundancies, hot-swappable components, and non-disruptive online upgrades. Data replication and tightly integrated clustering solutions, along with disaster recovery support, enable a multi-site disaster tolerant design to achieve complete business continuity. And with enhanced data protection and security features, you can decrease exposure to data loss.

The XP24000 and XP20000 also decrease the costs and complexities of data management with a broad portfolio of software. Through thin provisioning, organizations can reduce power and cooling costs by supplying storage capacity to applications from a virtualized pool and reducing unused storage that consumes power, requires cooling, and takes up space. As a virtualization platform, the XP enables important functions such as heterogeneous data migration, array repurposing, and storage tiers. The XP also eliminates contention for valuable storage resources through array partitioning. Partitioning enhances the success of storage consolidation efforts by assigning array resources to certain applications and administrators. And by consolidating multiple hosts running diverse operating systems to an XP, you can reduce the time it takes to manage diverse environments and simplify the implementation of backups and disaster recovery solutions.

Additionally, with thin provisioning automatically allocating resources when needed and the XP's ability to scale seamlessly, you'll be able to accelerate the growth of your business. With an XP disk array, you can feel confident that the business information your people need is available to them-wherever and whenever they need it.



Overview



What's New

Functionality Element	XP24000/XP20000
750 GB SATA 7.2K rpm disk drives	The XP24000 and XP20000 disk arrays now support a 750 GB 7.2K rpm Serial Advanced Technology Attachment (SATA) disk drive that fits into any existing XP disk drive slot. SATA drives offer a higher capacity/lower cost per gigabyte and an energy savings option compared to the FC disk drives. These SATA disk drives provide a lower cost tiered storage solution within the array.
Bring the benefits of thin provisioning to your external storage	Thin provisioning pools can now be located on external storage devices, adding another virtualization element to the XP disk array.

Key Features and Benefits

HP StorageWorks XP24000/XP2000 Disk Arrays are uncompromising storage solutions designed for organizations who demand constant data availability. With the XP's ability to allocate capacity when needed, virtualize a variety of disk arrays, partition storage resources, and connect to many hosts, IT managers can now consolidate their data centers and operate them more efficiently. Combined with HP's disaster proof solutions, the XP disk arrays provide unfailing data protection when needed most.

Overview

Mitigate business risk with constant data availability

BULLETPROOF DESIGN

Boot the XP24000/XP20000 once and never worry about it going down

When operating a business that demands constant uptime, the risk of data loss or downtime is always at the forefront. That risk is mitigated with the XP24000/XP20000. All components are redundant, hot-swappable, and can be upgraded online, including: disk drives, processors, I/O interfaces, power supplies, batteries, fans, and control processors, to provide extreme reliability and availability. Additionally, the XP24000/XP20000 can upgrade firmware one microprocessor at a time, so no downtime is experienced.

Redundant data paths ensure that there is no single point-of-failure, minimizing the likelihood of unplanned shutdown. If one of the two data paths fails, the other path takes over automatically. You are then alerted to the problem, and can fix it quickly with a minimum of stress because the data is still accessible while the problem is being addressed.

DISASTER PROOF SOLUTIONS

Configurations that provide continuous access to your data despite disaster

After the August 2003 Northeastern North America blackouts, 93% of the companies that lost their data center for more than ten days filed for bankruptcy within a year.[1]

If you experience a large-scale disaster, you need to not only have high levels of data protection but also business continuance. Maintaining operations in times of crisis can mean the difference between the continued success of business and its failure. In addition to the protection built-in to the XP24000/XP20000, HP offers various products and solutions around the XP24000/XP20000 for your ultimate protection.

HP StorageWorks XP Continuous Access Software provides reliable array-to-array replication for the most demanding requirements. The remote replication capability provided by XP Continuous Access provides assurance that even if access to a site is lost, the business can continue operations by using the storage systems and data located at another site. Replication solutions, such as XP Continuous Access Journal, can save money on telecommunication costs and improve availability. XP Continuous Journal allows the link between sites to be sized for the average I/O rate rather than for the peak I/O rate, resulting in large telecommunication cost savings.

HP StorageWorks XP Cluster Extension clustering solutions allow remote replication to be tightly integrated with high availability server clustering to provide true multi-site server/storage disaster recovery. XP Cluster Extension with the XP24000/XP20000 offers disaster tolerance against application downtime from fault, failure, or site disaster by extending clusters between data centers. It resurrects your critical applications at a remote site within minutes after an event. XP Cluster Extension works seamlessly with your open-system clustering software, XP Continuous Access and your XP24000/XP20000 storage system to automate fail-over and fail-back between sites making your business Disaster Proof.

HP Metroclusters with XP Continuous Access seamlessly integrates the XP24000/XP20000 disk array remote replication capabilities with HP Serviceguard on HP-UX. It provides automatic and bi-directional failover/failback of business critical data and applications between data centers.

HP Continental Cluster Software provides the highest levels of disaster tolerance by eliminating the cluster itself as a single point of failure. It uses data replication technologies to provide application recovery across multiple widely-separated HP-UX Serviceguard clusters. The HP Continental Cluster product provides the ability to monitor a Serviceguard cluster and recover mission critical applications to a remote Serviceguard cluster, should the monitored cluster become unavailable or if there is a disaster at the cluster site.

The 3 Data Center Solution (3DC) allows you to keep your business online, no matter what happens. XP disk arrays on two sites replicate data synchronously, while the XP on a third site many miles away protects against a regional disaster that hits the first two. Lose any one site and the other two keep going. Implementation of the 3DC solution combines the data consistency of synchronous replication and the long-distance capability of journal replication to protect against local and wide-area disasters. This technology provides other benefits, including:

- Maintaining high performance: Using synchronous replication over a short distance in a campus or metropolitan area cluster provides the highest level of data currency without significant impact to application performance.
- Permitting swift recovery: Campus/metropolitan cluster implementation allows for fast automated failovers after a local area disaster occurred.
- Eliminating transaction loss in the case of localized disasters caused by synchronous replication implementation.
- Permitting recovery even when a disaster exceeds traditional regional boundaries or extended duration: A wide-area disaster could disable both data centers 1 and 2, but with some manual interaction operations can be shifted to data center 3 and continue unaffected by the disaster.
- Staffing the remote data center with people living outside the disaster area: A wide-area disaster affects people located within the disaster area, both professionally and personally. By moving operations out of the region to a remotely located recovery data center, operational responsibilities shift to people not directly affected by the disaster.

[1] National Archives and Records Administration in Washington, D.C.

UNFAILING DATA PROTECTION

Protect against data loss with built-in safety measures

Relax, knowing that data is protected. If power goes out, the XP batteries can continue operations and then write cache data to disk. RAID 6 adds an extra layer of fault tolerance. Continuous Track checks your XP for unseen issues, and the end-to-end checksum confirms data integrity from port to disk and back.

Battery DeStage Mode

The XP gives you two ways to protect your data if you experience a power outage.

- Battery back-up mode: Fast restart with battery backup mode that protects Cache and Shared Memory for at least 36 hours. This mode works for both the XP24000 and XP20000.
- De-stage mode: De-stage mode keeps the entire system running for 1 min and then flushes Cache to final destination disk. This mode works only on the XP24000.

RAID 6 Configuration

Protect your data even if two disk drives fail at the same time in a parity group! The XP24000/XP20000 redundancy is further enhanced through a RAID 6 (6D+2P) configuration that allows up to two disk drives out of eight to fail and still maintain data availability. RAID 6 uses block level striping and two independently calculated distributed parity blocks across 8 disk drives. RAID 6 is an excellent combination of performance, extra redundancy, and storage efficiency.

Continuous Track

With the rapid increase of e-commerce, data warehousing, and data mining, storage has become a strategic resource within an enterprise. Businesses must access their data instantly and continuously. The criticality of data availability dictates that the storage systems must be up and running all the time. IT departments need the ability to continuously monitor their storage services and resolve their problems

proactively and immediately.

With leading diagnostic technology, HP StorageWorks Continuous Track provides 24 x 7 around-the-clock worldwide service capabilities for the XP24000/XP20000 to achieve the highest level of availability. Continuous Track utilizes HP's Instant Support Enterprise Edition (ISEE), a proactive, remote support service that provides the highest level of support services available anywhere. This market-leading support capability is designed to provide a single, secure interface into your data center to deliver proactive, reactive, and multi-vendor environment support services for your entire IT infrastructure.

Continuous Track with ISEE allows the XP disk array to be continuously monitored 24 hours a day by expert systems and engineers at HP Response Centers over either a phone line or the internet. Service events are reported instantly. Hardware failures are detected immediately. Potential problems can be investigated and resolved proactively by HP engineers before your business is affected. The Continuous Track support service substantially eliminates unplanned downtime and increases the availability of storage, applications, and data access.

End-to-end Checksum

The XP24000/XP20000 end-to-end checksum feature is used when moving data from cache to disk. It protects data against corruption while it is in transit inside the array and confirms data integrity from port to disk and back.

Services and Support for comprehensive planning and implementation support

HP Proactive 24 Service (P24)

HP Proactive 24 is included standard with your XP24000/XP20000. HP Proactive 24 is an integrated hardware and software support solution designed to help you get more from your IT investment. HP Proactive 24 Service combines industry-leading technical assistance with proactive account services to cover the stability, availability, and operational effectiveness of your XP.

HP Proactive 24 Service provides you with access to the global technical skills of HP. An assigned Account Support Consultant will serve as your primary proactive services contact within the HP support organization and can coordinate additional specialized resources if necessary. Your Account Support Consultant begins by forming a close working relationship with you and by developing an understanding of your IT infrastructure and goals in order to assist you in identifying gaps in supportability.

HP Critical Service (CS)

HP Critical Service is a recommended service upgrade for to consider for your XP24000/XP20000. HP Critical Service is a comprehensive support solution designed for businesses that run mission-critical applications and that cannot tolerate downtime without significant business impact. HP Critical Service provides the right combination of proactive and reactive services designed to maximize availability and performance across your IT infrastructure. With fewer interruptions and less downtime, you will lower costs and gain competitive advantages in the marketplace.

HP Critical Service maximizes your infrastructure's availability and performance through an IT Infrastructure Library (ITIL)-based framework of proven, integrated processes and HP best practices. HP's assigns a support team of HP-certified specialists, peaked in complex computing environments. This team begins by conducting an assessment of your infrastructure. The results of the assessment are used to design a strategy to align your IT commitments and business goals. Subsequently your support team will meet with you quarterly to discuss progress and ongoing alignment with your goals. Working closely

with your IT staff and management, your HP Account Support Consultant-the leader of your assigned team-will further assist you by identifying and managing the delivery of state-of-the-art technical services for improvements in areas such as high availability, capacity management, change planning, and security.

See the section covering Service and Support, HP Care Pack, and Warranty Information later in this document for more information on HP service and support offerings.

ENHANCED SECURITY FEATURES

Decrease exposure to data loss through the security features of XP Array Manager Software

HP StorageWorks XP Array Manager Software protects your data by controlling access, preventing unauthorized alteration, and securely deleting data when it is no longer required. Configure security to prevent unauthorized servers from accessing the data. Protect the XP Disk Array from accidental modification by setting up partition administrators who only have access to the partition. Control access to critical data, for purposes such as archiving and data retention. Set read and write access permissions, create read-only volumes, and protect data from being replicated. And when the data is no longer needed, securely delete it with successive overwrites to minimize the likelihood that it can be restored.

Lower costs through efficient data management

POWER & COOLING SAVINGS AND STORAGE EFFICIENCY

Reduce environmental impact and accelerate application deployment

XP Thin Provisioning Software

Through XP Thin Provisioning, organizations can reduce storage costs. As an IT manager, you can now configure all the capacity you will need for the future, but only buy what you need today. XP Thin Provisioning will automatically allocate capacity as applications need it.

HP StorageWorks XP Thin Provisioning Software allows you to supply disk storage capacity to your applications from a pool of virtualized storage. By enabling you to allocate your anticipated future storage capacity needs from virtual disk storage, HP XP Thin Provisioning Software reduces the amount of physical disk capacity initially required. As utilization of physical disk space increases over time, you can purchase more disk capacity as it is needed, and install it without affecting your applications. By removing the guessing from capacity planning, HP XP Thin Provisioning reduces the cost of volume management. By using XP Thin Provisioning, you can lower power and cooling costs by supplying storage capacity to applications from a virtualized pool and reducing unused storage that consumes power, requires cooling, and takes up space.

SATA Disk Drives

The SATA drives address the need for businesses to cost-effectively store infrequently accessed information in a more economical fashion and with performance that is faster than traditional tape. SATA drives on an XP offers you a higher capacity/lower cost per gigabyte and more energy efficient option compared to the Fibre Channel (FC) disk drives, thereby providing a cheaper tiered storage solution within the array.

By using SATA disk drives and XP Thin Provisioning Software, you can enjoy the green effect of reduced floor space, reduced power usage, and reduced cooling requirements in your data center.

VIRTUALIZATION

Reduce costs and simplify management of multi-vendor storage

Simplify data management in a complex, multi-vendor environment. Virtualization enables important functions such as data migration, array repurposing, and storage tiers. XP External Storage Software

virtualizes heterogeneous disk arrays, so that hosts see the capacity, but not the physical attributes of the external storage devices.

The XP24000/XP20000 simplifies the management of heterogeneous SAN environments through its ability to support up to 247 PB/ 96 PB respectively of external storage-all configured 'behind' a single XP. XP External Storage software uses advanced virtualization technology to allow storage administrators to host XP Disk Array LUNs on externally attached disk arrays. Any Fibre Channel port from any CHA 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 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 XP24000/XP20000, data can be moved back and forth dynamically across tiers, all of which is invisible to the applications.

The XP'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 disk array family, the HP XP disk array 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.

PARTITIONING

Deliver predictability and quality of service

Make certain your critical applications have the resources they demand with partitioning. The dynamic partitioning solution prevents inadvertent administrator errors from affecting the entire array and allows storage consolidation, even when you have applications that can't tolerate performance loss, by allocating XP resources to individual hosts or departments.

As businesses strive to improve operational efficiency, consolidation of servers and storage becomes an attractive option. Partitioning enables storage administrators in large consolidated storage environments to host multiple diverse user groups on one XP while maintaining appropriate isolation between applications. Partitioning allows storage administrators to subdivide a large XP disk array into smaller independently configured and managed storage segments. Applications that would normally compete for resources can share a single disk array without impacting each other. Departments can share a single disk array confident that administrators cannot affect portions of the disk array that belong to someone else.

The XP24000 can be divided up into 32 partitions, while the XP20000 can be divided up into 16 partitions. Partitions can be dynamically reconfigured as needs change.

CONSOLIDATION

Standardize and simplify storage through consolidation

Simplify your operations and reduce costs by consolidating multiple applications onto a single XP disk array. By having multiple hosts running diverse operating systems connected to an XP, you can reduce the time it takes to manage various environments and simplify the implementation of backups and disaster recovery solutions.

By consolidating multiple SANs into a single XP disk array, four important functions can happen:

1. Backups can be done using a simpler framework and common devices
2. Administration of the total environment can be done with a single set of software
3. Buffer storage for growth can be consolidated and allocated to the hosts as needed. The amount of idle storage awaiting allocation can be reduced. The customer saves money by postponing purchases through minimized waste.
4. With all the enterprise storage consolidated into a single array, the user can implement Disaster Recovery solutions in a much easier and less expensive fashion.

These above four areas are some of the key drivers that make storage consolidation a primary way to reduce costs in the data center.

Supported Hosts - A wide variety of servers and operating systems can be connected to an XP24000/XP20000 disk array, including:

- HP-UX
- Microsoft Windows
- IBM AIX
- Sun Solaris
- VMware
- LINUX - IA2, Red Hat
- HP OpenVMS
- HP Tru64 UNIX
- HP NonStop
- Mainframe

For more 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.

Accelerate Business Growth with swift adaptability

THIN PROVISIONING — React quickly to new business demands

Thin provisioning also provides the flexibility you need to respond quickly to new demands. You can now configure all the capacity you will need for the future, but only buy what you need today. XP Tin Provisioning will automatically allocate capacity as applications need it.

HP XP Thin Provisioning Software simplifies and accelerates storage provisioning by allowing you to create volumes without the need for physical installation and formatting time. Because your applications only see the virtual capacity that is allocated to them, there is no need for downtime when you install new physical disk capacity. And with simplified storage provisioning, you will be able to manage your storage with confidence knowing that the risk of human error has been reduced.

Accelerate your return on investment and enhance storage consolidation by using the virtualized storage pool to deploy more applications and servers per storage system. Deploy your applications faster because HP XP Thin Provisioning Software makes it easier to plan and size storage.

Thin provisioning pools can also be located on external storage devices, adding another virtualization element to the XP disk array.

SEAMLESS SCALABILITY — Start with the configuration you need today and add additional capacity as your needs change

Overview

The CIO dilemma of either overbuying capacity today or planning for a costly "forklift" upgrade tomorrow is now history. The XP24000 can scale from 9 to 1152 disk drives. The XP20000 scales from 0 to 240 disk drives. And all main components like host ports and cache can be added--without shutting down critical operations. Simply buy what you need today and grow as your needs change.

The charts below highlights the XP24000 and XP20000 scalability:

Scalability of the XP24000			
	MIN	INCREMENT	MAX
Data Drives	8	4	1148
Spare Drives	1	1	40
Capacity	576 GB raw 288 GB usable	-	851 TB* raw 745 TB* usable
Disk Adapter (DKA) Sets	1	1	4
Channel Adapter (CHA) Pairs	1	1	14**
Host Ports	8	8/16	128/224**
Cache	4/8 GB	4/8 GB	256 GB
Cache Bandwidth	17 GB/s	17 GB/s	68 GB/s
Shared Memory	1 GB	1 GB	24 GB
Shared Memory Bandwidth	19.2 GB/sec	19.2 GB/sec	38.4 GB/sec
LDEVs	1	1	64k
Frames	1	1	5

* The capacity of disk drives, and therefore the data capacity of the disk array, is based on 1K = 1000, not 1024. These means that 1 GB = 1,000,000,000 bytes and 1 TB = 1,000,000,000,000 bytes. Configuring an XP24000 entirely with SATA drives gives an internal storage capacity of 851 TB, although this configuration is not recommended in high-performance/high-availability environments.

** A fully loaded XP24000 hold up to 8 CHA pairs where all 4 DKA sets are installed

Scalability of the XP20000				
	MIN	INCREMENT	MAX 1 Rack	MAX 2 Rack
Data Drives	0	4	116	236
Spare Drives	0	1	16	
Capacity	0 GB raw 0 GB usable	-	88.6 TB* raw 77.5 TB* usable	177 TB* raw 155 TB* usable
Disk Adapter (DKA) Pair	1	0	1	
Channel Adapter (CHA) Pairs	1	1	3	
Host Ports	8	8/16	48	
Cache	4/8 GB	4/8 GB	64 GB	
Cache Bandwidth	4.25 GB/s	4.25 GB/s	8.5 GB/s	
Shared Memory	1 GB	1 GB	14 GB	
Shared Memory Bandwidth	2.4 GB/sec	2.4 GB/sec	4.8 GB/sec	
LDEVs	1	1	64k	

Overview

* The capacity of disk drives, and therefore the data capacity of the disk array, is based on 1K = 1000, not 1024. These means that 1 GB = 1,000,000,000 bytes and 1 TB = 1,000,000,000,000 bytes. Configuring an XP20000 entirely with SATA drives gives an internal storage capacity of 177 TB, although this configuration is not recommended in high-performance/high-availability environments.

HIGH-END PERFORMANCE

Your round-the-clock environment demands the ultimate in performance to deliver critical data at break-neck speed.

The XP24000 was designed with specific changes to improve performance*.

Function		Enhancement to XP12000
8KB Read Hit - Single Port	IOPS	1.33 X
512B Read Hit - System	IOPS	1.4 X
8KB Read Miss - Single Port	IOPS	3.1 X
8KB Read Miss - System	IOPS	1.33 X
8KB Write Hit - Single Port	IOPS	3.6 X
8KB Write Miss - Single Port	IOPS	6.2 X
8KB Write Miss - System	IOPS	1.6 X
XP Continuous Access Synchronous Link	IOPS	2.7 X
XP Continuous Access Journal Group	IOPS	4.8 X
XP Business Copy - Data Copy	MB/s	8.8 X
External Storage Port	IOPS	6.0 X

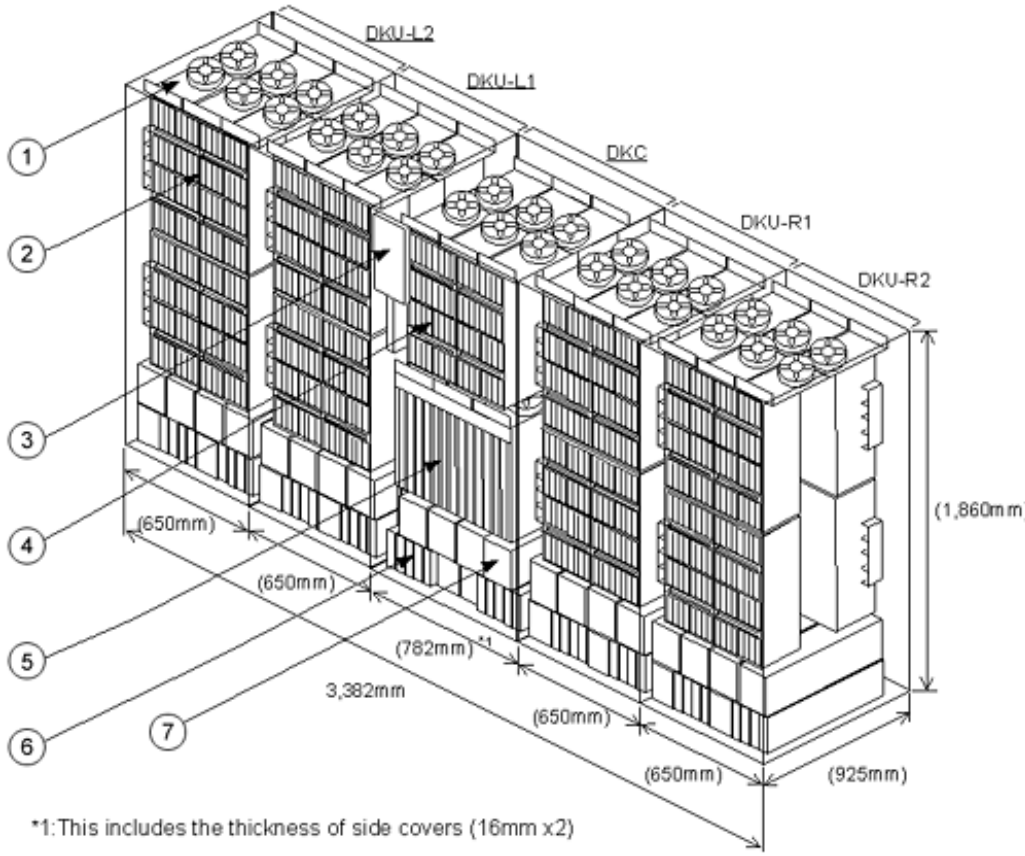
The XP20000 also offers industry-leading performance through which customers can achieve outstanding levels of random I/O support for database, OLTP, data warehousing and other I/O intensive applications.

* HP Care Pack Services are available to help you to conduct a detailed performance analysis of your environment and to provide recommendations to optimize performance for your XP24000/XP20000. See the section covering Service and Support, HP Care Pack, and Warranty Information later in this document for more information on HP's Performance Analysis service.

FLEXIBLE CONFIGURATION

Have the flexibility you need to meet your performance and availability objectives

The granular design of the XP24000 gives flexibility to customize for your particular need. The XP24000 can have 224 FC, 112 FICON, or 112 ESCON connections, or a mixture of each, while the XP20000 can have 48 FC, 24 FICON, or 24 ESCON connections, or a mixture of each. RAID types can be mixed to achieve performance or efficiency. And, tiered storage of different disk drive speeds and external storage devices gives you the flexibility to tune capacity and manage system costs.



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

XP24000 Hardware

The XP24000 hardware consists of a Disk Control Frame (DKC) that holds up to 128 disk drives, and one to four optional Disk Array Frames (DKUs) for the remaining disk drives. An outline of frame components of the XP24000 disk array is shown above.

Disk Controller (DKC)

The DKC consists of :

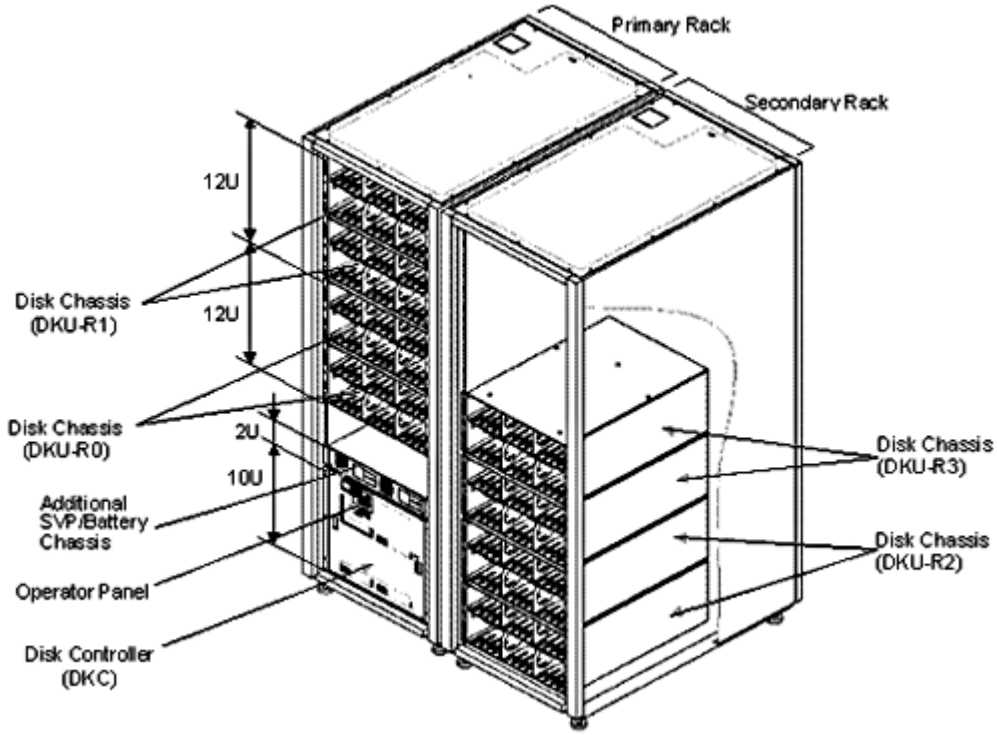
- DKC box in which the channel adapters (CHAs), disk adapters (DKAs), cache memory adapter (CMA), shared memory adapter (SMA), and cache switches;
- The HDU box in which disk drives are installed; and
- The power supplies and battery boxes that supply power to the components above.

The control unit in the DKC is equipped with a Service Processor (SVP), which is used to service the subsystem, monitor its running condition, and analyze faults. Connecting the SVP with HP StorageWorks Continuous Track enables remote maintenance of the subsystem.

Disk Unit (DKU)

The DKU consists of the four HDU boxes in each of which 64 disk drives can be installed. Each DKU can

hold up to 256 disk drives and have redundant power supply systems and cooling fans included. Battery boxes that supply power to the disk drives are also held in the DKUs.



XP20000 Hardware

The XP20000 hardware consists of a primary rack that will hold up to 120 disk drives. This primary rack also contains the control panel, service processor (SVP), Cache Memory, Shared Memory, Crossbar Switch, Batteries, Channel Adapters (CHAs) and the Disk Adapters (DKAs). A second rack can be added that can hold up to 120 more disk drives.

XP24000/XP20000 Software

A full complement of software tools is available for managing the XP24000/XP20000, and to enable a wide range of high availability solutions. The XP24000/XP20000 also provides local and remote replication capabilities for the IBM eServer zSeries and for IBM z/OS, z/VM and VSE environments.

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

Server connectivity

The XP24000/XP20000 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.

Standard Features

Disk Drive Support

The number and type of disk drives installed in an XP24000/XP20000 array is flexible. Disk drives must be added in groups of four. Additional capacity can be installed over time as capacity needs grow. All disk drives use the industry standard dual ported Fibre Channel Arbitrated Loop (FC-AL) interface. Each disk drive is connected to both blades pairs of the redundant DKA set by separate FC-AL loops. Spare disk drives are automatically used in the event of a disk drive failure.

Fibre Channel (FC) Disk Drives

The XP24000, XP20000, XP12000, and XP10000 disk arrays support the following Fibre Channel (FC) disk drives:

- 73 GB 15K rpm 4 Gb/s Fibre Channel Arbitrated Loop (FC-AL)
- 146 GB 15K rpm 4 Gb/s Fibre Channel Arbitrated Loop (FC-AL)
- 300 GB 15K rpm 4 Gb/s Fibre Channel Arbitrated Loop (FC-AL)
- 300 GB 10K rpm 2 Gb/s Fibre Channel Arbitrated Loop (FC-AL)

The FC drives should be used in mission-critical, high input/output workload environments typically running 24 hours a day. They offer a medium capacity/high performance storage option within the array. FC drives are designed for high priority/Tier 1 applications such as:

- OLTP
- Oracle
- SAP
- Exchange workloads

Serial Advanced Technology Attachment (SATA) disk drives

The XP24000 and XP20000 disk arrays also support a 750 GB 7.2K rpm dual ported Serial Advanced Technology Attachment (SATA) disk drive. SATA drives offer a higher capacity/lower cost per gigabyte option compared to the FC disk drives. This provides a cheaper tiered storage solution within the array.

With the attractive low cost and high capacity points of SATA disk drives, it is important to understand the appropriate applications where SATA disk drives should be used. Proper usage will lessen the probability of drive failure.

SATA disk drives are designed for non-mission critical, lower duty cycle applications that are "near on-line" or infrequently accessed, such as:

- data replication for back-up
- email archives
- medical records
- imaging archives
- financial compliance archives
- test environments

The SATA drives, with their 4Gb/s FC interface, address the need for businesses to cost-effectively store infrequently accessed information in a more economical fashion and with performance that is faster than traditional tape.

NOTE: FC and SATA disk drives should not be used together when doing Business Copy, Continuous Access, or Thin Provisioning. For example, in the case of Thin Provisioning, you should only use SATA disk drives in virtualized pools where the entire virtualized volume is made up of SATA disk drives.

Software ideally suited with SATA disk drives

Standard Features

- HP StorageWorks XP Tiered Storage Manager Software
  XP Tiered Storage Manager allows you to non-disruptively migrate data between tiers of storage while your applications remain on line. Using this software will simplify the creation of new storage tiers when the SATA drives are implemented. XP Tiered Storage Manager Software is a plug-in application for XP Command View Advanced Edition Software.
- HP StorageWorks XP Auto LUN Software
  XP Auto LUN Software provides automatic monitoring and load balancing for your XP Disk Arrays. AutoLUN allows you to move high-priority tasks to underutilized volumes, replicate volumes for backup and recovery, and view the health of your arrays. It also proposes a migration plan and even estimates how much your storage performance will improve when it's done. Using this software in combination with the SATA drives will allow you to make migration decisions based on disk array performance criteria.
- HP StorageWorks XP Business Copy Software
  XP Business Copy Software is a local replication solution that provides data copies within a single XP Disk Array. Using Business Copy, you can do disk-to-disk backups to the SATA drives and use those backups for testing, archiving, etc. Backing up to SATA disks provides a cheaper alternative per gigabyte than traditional backup to FC disks.

Channel Adapter (CHA) Pairs

Channel Adapters (CHAs) provide connections to host or servers that use the XP24000/XP20000 for data storage (either directly connected to the servers or through SAN switches). The primary function of a CHA is to process host commands and signal the DKAs to read or write Cache to or from the disk drives. In addition, CHAs access and update the cache track directory, monitor data access patterns, and emulate host device types. The CHAs are configured in pairs for redundancy.

The XP24000 can have up to 14 pairs of CHAs.*
The XP20000 can have up to 3 pairs of CHAs.

CHA pairs available for use in the XP24000 include:

- 8 and 16 port 4 Gbps auto sensing Fibre Channel**
- 8 port ExSA Channel (ESCON compatible)
- 8 port 4 Gbps auto-sensing FICON in both short-and long-wave versions

* Up to 8 CHA pairs if 4 DKA sets are installed.
** The standard optical transceiver (small form-factor pluggable [SFP]) on the Fibre Channel CHAs 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. 4Gbps long-wave transceivers are available.

Disk Adapter (DKA) Sets

The Disk Adapters (DKAs) perform all data movement between the disk drives and Cache Memory. The DKA also provides data protection through the use of RAID 1, RAID 5, and RAID 6. Each DKA set has eight 4 Gbps FC-AL loops or 16 loops total per set, and supports up to 48 disk drives per loop. The DKA is configured in sets (2 DKA pairs) for redundancy. The XP24000 can have one, two, three, or four sets of DKAs. The XP20000 can have one DKA pair providing four 4 Gbps FC-AL loops or 8 loops total per set, and supports up to 60 disk drives per loop.

Standard Features

Cache Memory

The XP24000 supports up to 256 GB of Cache while the XP20000 supports up to 64 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 XP24000/XP20000 Cache Memory modules are installed on Cache Memory Adapters (CMA):

- The basic CMA pair supports up to 16 sets of Cache modules (up to 128 GB).
- The optional additional CMA 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.

Cache Partitions

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 XP24000. UP to 16 partition of at least 4 GB can be created in an XP20000. 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.

Shared Memory

The XP240000 can have up to 24 GB of Shared Memory, while the XP20000 can have up to 14 GB. Shared Memory 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 36 hour battery.

Switch support details

The XP24000 and XP20000 connect to the leading Fibre Channel switches in the industry today. For detailed information on supported switch configurations, please contact your sales representative.

Batteries & Power Supplies

Batteries

The XP24000 has two different kinds of batteries 56V & 12V

- 12V batteries backup Cache and Shared Memory
- 56V batteries supply power to disk drives
- 12V batteries backup data in Cache and Shared Memory for at least 36 hours
- 56V batteries are only required for De-Stage Mode*
  - De-Stage Moe will continue array operations for 1 minute uninterrupted operation, then will move all data to disk

*The De-Stage mode is only available on the XP24000.

The XP20000 only has the 12V battery

- 12V batteries backup Cache and Shared Memory
- 12V batteries backup data in Cache and Shared Memory for at least 36 hours

Power Supplies

The XP24000 and XP24000 contain duplicate AC power reception so that it continues its operation

when a trouble occurs in one of the power systems.

Software Components

Software Features

HP offers numerous software titles along with the XP24000/XP24000. These software titles can be broken down into five categories: 1) Device configuration and management, 2) Performance management, 3) High availability and replication, 4) Business continuity solutions, and 5) Mainframe tools.

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

Service and Support

The XP24000/XP20000 comes standard with industry-leading technical assistance and proactive account services to cover the stability, availability and operational effectiveness of your XP24000/XP20000. In addition to this standard service offering, HP offers many additional services, some examples of which include: performance analysis, assistance in migrating data, and extending proactive and reactive support to your entire Storage Area Network.

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.

Warranty and Services Included with the XP24000/XP20000

Services included with the XP24000/XP20000 are:

- Hardware site preparation.
- Array installation and start up.
- Warranty level of hardware reactive support is 2 years, 24×7, 4 hour response time
- 1 year of 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 (P24) 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 support manager who is your primary contact for proactive services and access to HP's diverse technical resources
- Assigned remote support account advocate to help monitor your support calls and works with you to develop and routinely review a mutually agreed upon support plan
- Your account team 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

- Some key features of Proactive 24 include:
  - Comprehensive 24 x 7 assistance with 4-hour onsite response for hardware technical assistance
  - Standard response for software technical assistance
  - Operational and technical advice
  - Account support plan
  - Quarterly support activity review
  - Semi-annual support planning and review
  - Semi-annual analysis and recommendations for firmware and software updates
  - Annual storage high-availability technical evaluation
  - Annual system health check

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 http://www.hp.com/products/storageworks/warranty

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Recommended Services Upgrades

Upgrades to service offerings for your XP24000/XP20000 Disk Array are available through HP Care Pack Services. Here are some recommended upgrades to consider:

- HP Critical Service (CS)
  - HP Critical Service is a comprehensive support solution designed for businesses running mission critical applications which cannot tolerate downtime without significant business impact. It is a recommended service upgrade from HP Proactive 24 for your XP24000 Disk Array. On top of the features provided by HP Proactive 24 Service, HP Critical Service includes:
    - A dedicated HP Mission Critical Solution Center 800#
    - A named hardware support specialist
    - 6-hour call to repair (CTR) commitment
    - XP 100% data availability guarantee
    - Quarterly analysis and recommendations for firmware and software updates. Onsite installation is provided for all recommended firmware and storage device-resident software.
- Proactive 24 Service (P24)
  - Additional years of Proactive 24 Service are available for your Disk Array
- HP Support Plus 24 Service
  - Support Plus 24 Service is recommended to cover any devices used as external storage that will appear as a LUNs on the Disk Array
- HP Mission Critical Partnership (MCP)
  - HP Mission Critical Partnership is a flexible level of Mission Critical Support available from HP. MC Partnership is designed to ensure that an IT department meets its most demanding commitments, and supports key mission-critical applications or critical IT services. It is appropriate for customers who need to deliver IT service excellence, show value to their organization, want to continually improve IT service delivery and are striving to optimize their resources. MCP helps IT organizations meet and improve upon specific service-level agreements (SLAs) or requirements. HP Mission Critical Partnership is ideal where any disruption to the IT infrastructure would have an impact on the financial position or market credibility of your company or IT department.

    As a Mission Critical Partnership Customer, you get a service solution tailored to your business needs. MCP is based on industry-recognized IT service management (ITSM)

principals to confirm that IT is effective and efficient in its use of people, process, and technology. An HP service relationship manager (SRM) will form and lead a team of HP support personnel required to help you deliver quality IT services.

MCP can be combined with HP Proactive 24 (P24) or HP Critical Service (CS), and would include additional deliverables such as:

- An assigned service relationship manager (SRM) who conducts regular business/IT discussions with your service management team
- An assigned business critical consultant (BCC), an expert on availability and ITSM, who will work closely with your IT staff on availability, security and quality of critical IT services
- Comprehensive ITSM gap analysis or benchmark
- Continuous service improvement plan to help you meet your service level commitments and mature your service management processes
- Proactive focus to maximize IT service availability

With some 5,000 storage service professionals in 160 countries, HP Services offers an outstanding combination of global resources and network support know-how.

For more information on HP Care Pack Services, see the section on Available HP Care Pack Services below, or go to: http://www.hp.com/hps/carepack/services/

Optional Services

A more complete list of Deployment and Per Event Services are listed below. Here are some key optional services to consider for your XP24000/XP20000 Disk Array:

- The Performance Analysis for the StorageWorks XP/EVA Disk Arrays Service provides automated data collection, detailed I/O analysis, and expert recommendations for throughput enhancement. It offers a quick, convenient way to:
  - Increase XP performance, stability, and availability by identifying potential bottlenecks and effective solutions for avoiding them
  - Establish a baseline for future performance analysis and change management
  - Make sound proactive decisions on XP system capacity planning
  - Minimize the need for costly reactive upgrades
  - Transfer HP knowledge and skills to your storage management staff
- Data Replication. Depending upon your needs, HP's Data Replication service can implement a solution ranging from a real-time, disaster-tolerant connection between HP StorageWorks arrays to local replication capabilities for easy cloning and snapshots of business data. Regardless of the solution you implement, the Data Replication service will help you:
  - Accelerate your time-to-ROI with HP implementation and integration expertise
  - Enjoy rapid results when you deploy industry-leading HP Data Replication technologies
  - Provide an optimal disaster tolerant solution to meet your IT and business needs
- The SAN Solution Service has three different levels to help you plan, design and deploy your Storage Area Networks whether they be:
  - Basic SAN deployments. This level focus on entry-level SAN solutions.
  - Heterogeneous SAN integrations. This level focuses on integrating your SAN into a complex, heterogeneous storage environment.
  - Integrations of Key Business Applications. In addition to integrating your SAN into a complex, heterogeneous environment, this level smoothly and efficiently integrations key business applications such as SAP, Oracle or Exchange.

Service and Support, HP Care Pack, and Warranty Information

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

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 Analysis (HA208A1)
  - Provides data collection, detailed I/O analysis, and enhancement recommendations for the XP24000.
- SAN Solution Service (See http://www.hp.com/hps/storage for more information)
  - 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 (HA309A1)
  - 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 (HA310A1)
  - Accommodates additional capacity to be migrated beyond what is included in the base HP Open Systems Data Migration Service.
- HP Mainframe Data Migration (HA311A1)
  - 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 (HA312A1)
  - Accommodates additional capacity to be migrated beyond what is included in the base HP Data Migration Mainframe Service.
- HP Data Migration Capacity/Server Extension (HA315A1/AE)
  - Adds (1) 8-Hour increment of Data Migration Engineer Time for additional servers (mainframe or open system), additional TB to be moved, or to accommodate migration on multiple sites or over distance, scaled as defined in the ordering and configuration rules.
- LUN Design and Implementation for XP (HA124A1-5KA)
  - 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 (See http://www.hp.com/hps/storage for more information)
  - Ensures a timely, cost-effective deployment of your data replication solution that cuts risk and shortens your time-to-results.

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 Financial Services

HP Financial Services offers financial solutions that help customers manage to the lowest total cost of ownership - from planning and acquiring technology all the way to retiring and replacing it.

We tailor financing options to meet the needs of individual customers - from small and mid-sized companies to global enterprises with locations around the world.

With leasing, customers can maximize the return on their IT investment by aligning expenses with their expected use of the equipment. We provide financial management for IT solutions through the entire lifecycle and often offer customers the ability to upgrade or renew technology as their needs change.

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

Service and Support, HP Care Pack, and Warranty Information

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

Family Information

Functionality Element	XP24000	XP20000	XP12000	XP10000
Max Raw Capacity	851 TB* + 247 PB External Storage	177 TB* + 96 PB External Storage	332 TB* + 32 PB External Storage	69 TB* + 16 PB External Storage
Max Cache	256 GB	64 GB	256 GB	64 GB
Host System Interface	4 Gbps FC ESCON 4 Gbps FICON	4 Gbps FC ESCON 4 Gbps FICON	4 Gbps FC ESCON 4 Gbps FICON iSCSI	4 Gbps FC ESCON 4 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 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)
Drive Interface	4 Gbps FC-AL Dual Active Ports	4 Gbps FC-AL Dual Active Ports	2 Gbps FC-AL Dual Active Ports	2 Gbps FC-AL Dual Active Ports
Drive Capacity	73 GB FC 15K rpm 146 GB FC 15K rpm 300 GB FC 10K rpm 300 GB FC 15K rpm 750 GB SATA 7.2K rpm	73 GB FC 15K rpm 146 GB FC 15K rpm 300 GB FC 10K rpm 300 GB FC 15K rpm 750 GB SATA 7.2K rpm	73 GB FC 15K rpm 146 GB FC 10K rpm 146 GB FC 15K rpm 300 GB FC 10K rpm 300 GB FC 15K rpm	73 GB FC15K rpm 146 GB FC 10K rpm 146 GB FC 15K rpm 300 GB FC 10K rpm 300 GB FC 15K rpm
Disk Drives	1152	240	1152	240
External storage capability	XP12000, XP10000 XP1024, XP128, XP512, XP48, XP256, EVA8000, EVA6000, EVA4000, EVA5000, EVA3000, MSA1500, MSA1000, EMC, IBM, and HDS arrays**	XP12000, XP10000 XP1024, XP128, XP512, 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**	XP1024, XP128, XP 512, XP48, XP256, EVA8000, EVA6000, EVA4000, EVA5000, EVA3000, MSA1500, MSA1000, EMC, IBM, and HDS arrays**
Online firmware update	One CHA processor at a time keeps all ports operating with no host port interruption	One CHA 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 processor at a time keeps all ports operating with no host port interruption

* The capacity of disk drives, and therefore the data capacity of the disk array, is based on 1K = 1000, not 1024. These means that 1 GB = 1,000,000,000 bytes and 1 TB = 1,000,000,000,000 bytes.
** 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 XP24000 Disk Array SSP — AE130A

NOTE: The XP24000 is a Structured Solution Product (SSP). This product number (AE130A) is a zero-price ordering mechanism that is used as an "umbrella" product to indicate to the ordering system that this is a new XP24000 order.

HP XP24000 DKC

XP24000 Disk Control Frame - DKC — AE0131A

(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 StorageWorks Continuous Track Modem and pcAnywhere. Does not include DKA - 1 required per XP system). Must select one power option.

3P/30A/60Hz 3760PDG/115J-AP8508 2 Cords	Power Cable Kit 3-Phase/30A/60Hz DKC-DKU AC Box Kit, 3-Phase/30A, DKC-DKU	AE131A#001
3P/30A/50Hz No Plugs 2 Cords	Power Cable Kit 3-Phase/30A/50Hz DKC-DKU AC Box Kit, 3-Phase/30A, DKC-DKU	AE131A#002
1P/50A/60Hz 9P53U2 2 Cords	Power Cable Kit 1-Phase/50A/60Hz DKC-DKU AC Box Kit, 1-Phase/50A, DKC-DKU	AE131A#003
1P/50A/50Hz No Plugs 2 Cords	Power Cable Kit 1 Phase/50A/50 Hz DKC-DKU AC Box Kit, 1-Phase/50A, DKC-DKU	AE131A#004
1P/30A/60Hz Std Config 3750DP 4 Cords	Power Cable Kit 1-Phase/30A/60Hz DKC-DKU AC Box Kit, 1-Phase/30A, DKC-DKU	AE131A#005
1P/30A/50Hz Std Config No Plugs 4 Cords	Power Cable Kit 1-Phase/30A/50Hz DKC-DKU AC Box Kit, 1-Phase/30A, DKC-DKU	AE131A#006
NonStop Server Connectivity	XP24000 option to connect to NonStop Server	AE131A#010
SVP High Reliability Support Kit (min 0, max 1)	HP XP24000/20000 SVP Reliability Kit	AE132A
Power Control Interface Kit for Mainframe Kit (min 0, max 1)	HP XP24000 Power Control I/F MF Kit	AE133A

Channel Adapter (CHA) pairs (Min1 pr, Max 14) [Less 2 CHA prs per 2nd, 3rd or 4th DKA set (AE164A) installed]		
	HP XP24000/20000 8 Port 4 Gb FC CHA	AE135A
	HP XP24000/20000 16 Port 4 Gb FC CHA	AE136A
	HP XP24000/20000 8 Port 4Gb FICON SW CHA	AE137A
	HP XP24000/20000 8 Port 4Gb FICON LW CHA	AE138A
	HP XP24000/20000 8 Port EXSA CHA	AE139A
	NOTE: FC CHA Long Wave Transceiver - Converts 1 SW FC port to 1 LW FC port. Must order in quantities of 2 for failover capability.	
	HP XP24000/XP20000 4 Gb LW Transceiver	AE146A

Additional 12V DKC Power Supply (Min 0, Max 2)	HP XP24000 12V DKC Power Supply NOTE: 1st required with any of the following: • Install 5 or more CHA pr + DKA pr (note AE164A consists of 2 DKA prs). • Install 2 or more of Cache Adapter AE151A • Install 2 Shared Memory Adapter AE155A 2nd required with any of the following: • Install 11 or more CHA prs + DKA prs. • Install 3 or more Cache Adapter AE151A.	AE150A
Cache Memory Adapter (Min 1, Max 4)	HP XP24000/XP20000 Cache Memory Adapter NOTE: Max 8 cache modules (64GB) per Cache adapter	AE151A
Cache Memory (Min 1 module, Max 32 modules)	HP XP24000/XP20000 8 GB Cache Memory HP XP24000/XP20000 4 GB Cache Memory NOTE: Must configure 1 Cache Adapter per 8 cache modules (per 64GB cache).	AE152A AE153A
Shared Memory Adapter (Min 1, Max 2)	HP XP24000 Shared Memory Adapter NOTE: Max 4 SM modules per SM Adapter	AE155A
Shared Memory (Min 1, Max 8)	HP XP24000/XP20000 2 GB Shared Memory HP XP24000/XP20000 4 GB Shared Memory NOTE: Max 4 SM modules per SM Adapter	AE156A AE157A
Additional DKC 12V Battery (Min 0, Max 3)	HP XP24000 DKC 12V Battery NOTE: 1st set required if any: • Cache Memory Capacity is 56GB or more.	AE160A

- Shared Memory Capacity is 14GB or more.
- When the 1st set of DKC 12V Power Supply AE150A is installed.

2nd set required if either:

- CM Capacity is 72GB or more.
- When the 2nd set of the DKC 12V Power Supply AE150A is installed

3rd set required if:

- CM Capacity is 104GB or more.

Additional DKC-DKU 56V Battery (Min 0, Max 1 per DKC and each DKU)	HP XP24000 DKC/DKU 56V Battery
	NOTE:
	1 set for DKC required if either condition:
	• When De-stage mode is selected
	• When memory backup mode is selected and when CM is 136GB or more.
	Additional 56V Battery for DKU:
	• When the De-stage mode is selected then:
	  ○ 1 set required for each DKU without DKU Expansion Kit AE174A installed
	  ○ 2 sets required for each with DKU Expansion Kit AE174A installed
		AE161A

HP XP24000 Cache Switch	DKC Data Path Expansion kit (Min 0, Max 3) NOTE: 1 set required if either: • When installing 3rd or 4th CHA pr • When installing 2nd AE64A/AU DKA Set 2nd set required if either: • When installing 5th or 6th CHA pr • When installing 3rd AE164A/AU DKA Set 3rd set required if either: • When installing 7th or 8th CHA pr • When installing 4th AE164A/AU DKA Set	AE162A
HP XP24000 DKA Disk Adapter Set	Disk Adapter Set (DKA) (Min 1, Max 4)	AE164A

Configuration Information

DKC-DKU and DKU-DKU Frame Interconnect Cables

HP XP24000 DKU R1 Base Cable Set	AE168A
HP XP24000 DKU R1 Expansion Cable Set	AE169A
HP XP24000 DKU L1 Base Cable Set	AE170A
HP XP24000 DKU L1 Expansion Cable Set	AE171A
HP XP24000 DKU R2 or L2 Cable Set	AE172A

HP XP24000 DKU Disk Unit Frame — AE173A

Disk Unit (DKU) Frame (Min 0, Max 4)
Must select one option and must match Power option of DKC (no intermixing of power options). Base DKU does not include batteries

3P/30A/60Hz 3760PDG/115J-AP8508 2 Cords	Power Cable Kit 3-Phase/30A/60Hz DKC-DKU AC Box Kit 3-Phase/30A DKC-DKU	AE173A#001
3P/30A/50Hz No Plugs 2 Cords	Power Cable Kit 3-Phase/30A/50Hz DKC-DKU AC Box Kit 3-Phase/30A DKC-DKU	AE173A#002
1P/50A/60Hz 9P53U2 2 Cords	Power Cable Kit 1-Phase/50A/60Hz DKC-DKU AC Box Kit 1-Phase/50A DKC-DKU	AE173A#003
1P/50A/50Hz No Plugs 2 Cords	Power Cable Kit 1 Phase/50A/50 Hz DKC-DKU AC Box Kit 1-Phase/50A DKC-DKU	AE173A#004
1P/30A/60Hz 3750DP 4 Cords	Power Cable Kit 1-Phase/30A/60Hz DKC-DKU AC Box Kit 1-Phase/30A DKC-DKU	AE173A#005
1P/30A/50Hz No Plugs 4 Cords	Power Cable Kit 1-Phase/30A/50Hz DKC-DKU AC Box Kit 1-Phase/30A DKC-DKU	AE173A#006

Configuration Information

HP XP24000 DKU Disk Expansion Kit	AE174A
NOTE: DKU Expansion Kit (Min 0, Max 1 per DKU frame) Required for connecting upper HDU boxes to 2nd and 4th DKA set AE164A/AU	
XP Array Groups (min 1 max 287) 4 disk drives per group	
HP XP24000 73GB 15k rpm Array Group	AE176A
HP XP24000 146GB 15k rpm Array Group	AE177A
HP XP24000 300GB 10k rpm Array Group	AE178A
HP XP24000 300GB 15k rpm Array Group	AE179A
HP XP24000 750GB 7.2k SATA Array Group	AE180A
Spare Disk Drives (Min 1 max 40): Recommend 1 spare per 32 disk drives	
HP XP24000 73GB 15k rpm Spare Disk	AE176AS
HP XP24000 146GB 15k rpm Spare Disk	AE177AS
HP XP24000 300GB 10k rpm Spare Disk	AE178AS
HP XP24000 300GB 15k rpm Spare Disk	AE179AS
HP XP24000 750GB 7.2k SATA Spare Disk	AE180AS

Upgrades

Upgrade Configurations - HP StorageWorks XP24000/XP20000 Upgr Disk Array	AE130AU
NOTE: This product number (AE130AU) 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 XP24000 DKC upgrade components

NonStop Server Connectivity	AE130AU#010
HP XP24000/XP20000 Upgr SVP High Reliability Kit SVP High Reliability Sup. Kit / XP24000 Modem Card	AE132AU
HP XP24000 Upgr Power Control I/F MF Kit	AE133AU
HP XP24000/XP20000 Upgr 8 Port 4 Gb FC CHA	AE135AU
HP XP24000/XP20000 Upgr 16 Port 4 Gb FC CHA	AE136AU
HP XP24000/XP20000 Upgr 8 Port 4 Gb FICON SW CHA	AE137AU
HP XP24000/XP20000 Upgr 8 Port 4 Gb FICON LW CHA	AE138AU
HP XP24000/XP20000 Upgr 8 Port EXSA CHA	AE139AU
HP XP24000/XP20000 Upgr 4 Gb LW Transceiver	AE146AU
HP XP24000 Upgr 12V DKC Power Supply	AE150AU
HP XP24000 Upgr Cache Memory Adapter	AE151AU
HP XP24000/XP20000 Upgr 8 GB Cache Memory	AE152AU
HP XP24000/XP20000 Upgr 4 GB Cache Memory	AE153AU
HP XP24000 Upgr Shared Memory Adapter	AE155AU
HP XP24000/XP20000 Upgr 2 GB Shared Memory	AE156AU
HP XP24000/XP20000 Upgr 4 GB Shared Memory	AE157AU
HP XP24000 Upgr DKC 12V Battery	AE160AU

Configuration Information

HP XP24000 Upgr DKC/DKU 56V Battery	AE161AU
HP XP24000 Upgr Cache Switch	AE162AU
HP XP24000 Upgr DKA Disk Adapter Set	AE164AU
HP XP24000 Upgr DKU R1 Base Cable Set	AE168AU
HP XP24000 Upgr DKU R1 Exp Cable Set	AE169AU
HP XP24000 Upgr DKU L1 Base Cable Set	AE170AU
HP XP24000 Upgr DKU L1 Exp Cable Set	AE171AU
HP XP24000 Upgr DKU R2 or L2 Cable Set	AE172AU

HP StorageWorks XP24000 DKU upgrade components

HP XP24000 Upgr DKU Disk Unit Frame		AE173AU
3P/30A/60Hz 3760PDG/115J-AP8508 2 Cords	Power Cable Kit 3-Phase/30A/60Hz DKC-DKU AC Box Kit 3-Phase/30A DKC-DKU	AE173AU#001
3P/30A/50Hz No Plugs 2 Cords	Power Cable Kit 3-Phase/30A/50Hz DKC-DKU AC Box Kit 3-Phase/30A DKC-DKU	AE173AU#002
1P/50A/60Hz 9P53U2 2 Cords	Power Cable Kit 1-Phase/50A/60Hz DKC-DKU AC Box Kit 1-Phase/50A DKC-DKU	AE173AU#003
1P/50A/50Hz No Plugs 2 Cords	Power Cable Kit 1 Phase/50A/50 Hz DKC-DKU AC Box Kit 1-Phase/50A DKC-DKU	AE173AU#004
1P/30A/60Hz 3750DP 4 Cords	Power Cable Kit 1-Phase/30A/60Hz DKC-DKU AC Box Kit 1-Phase/30A DKC-DKU	AE173AU#005
1P/30A/50Hz Std Config No Plugs 4 Cords	Power Cable Kit 1-Phase/30A/50Hz DKC-DKU AC Box Kit 1-Phase/30A DKC-DKU	AE173AU#006

Configuration Information

HP XP24000 Upgr DKU Disk Expansion Kit	AE174AU
HP XP24000 Upgr 73GB 15k rpm Array Group	AE176AU
HP XP24000 Upgr 146GB 15k Array Group	AE177AU
HP XP24000 Upgr 300GB 10k Array Group	AE178AU
HP XP24000 Upgr 300GB 15k Array Group	AE179AU
HP XP24000 Upgr 750GB SATA Array Group	AE180AU
HP XP24000 Upgr 73GB 15k rpm Spare Disk	AE176AK
HP XP24000 Upgr 146GB 15k rpm Spare Disk	AE177AK
HP XP24000 Upgr 300GB 10k rpm Spare Disk	AE178AK
HP XP24000 Upgr 300GB 15k rpm Spare Disk	AE179AK
HP XP24000 Upgr 750GB SATA Spare Disk	AE180AK

Base Configurations - HP StorageWorks XP20000 Disk Array SSP AE189A

NOTE: The XP20000 is a Structured Solution Product (SSP). This product number (AE189A) is a zero-price ordering mechanism that is used as an "umbrella" product to indicate to the ordering system that this is a new XP20000 order.

HP XP20000 DKC

HP XP20000 Rack Assembly (min 1, max 2)	AE190A
4.5M power cord w/Nema L6-20P plug	#001
4.5M power cord with stripped ends	#002
4.5M power cord w/ IEC309 plug	#003
4.5M power cord w/ CEE7/7 plug	#004
4.5M power cord w/Nema L6-30P plug	#005

HP XP20000 DKC Disk Control Unit

DKC is the XP20000 System level product. It contains SVP, Power Supplies, base 12V batteries for up to 24 GB cache and 14 GB Shared Memory, HP microcode, HP Continuous Track XP and Modem. (min 1 per XP20000 system, must select 1 internal power cord option (60Hz or 50Hz))	AE191A
60Hz Power Option	#001
50Hz Power Option	#002
NonStop Server Connectivity	#010
P-24 Services Adjustment	#111

SVP High Reliability Support Kit (min 0, max 1)	HP XP24000/20000 SVP Reliability Kit	AE132A

Configuration Information

Channel Adapter (CHA) pairs (Min1 pr, Max 3)		
HP XP24000/20000 8 Port 4 Gb FC CHA		AE135A
HP XP24000/20000 16 Port 4 Gb FC CHA		AE136A
HP XP24000/20000 8 Port 4Gb FICON SW CHA		AE137A
HP XP24000/20000 8 Port 4Gb FICON LW CHA		AE138A
HP XP24000/20000 8 Port EXSA CHA		AE139A
NOTE: FC CHA Long Wave Transceiver - Converts 1 SW FC port to 1 LW FC port. Must order in quantities of 2 for failover capability.		
HP XP24000/XP20000 4 Gb LW Transceiver		AE146A
Cache Memory Adapter (Min 1, Max 1)	HP XP24000/XP20000 Cache Memory Adapter NOTE: Max 8 cache modules (64GB) per Cache adapter	AE151A
Cache Memory (Min 1 module, Max 32 modules)	HP XP24000/XP20000 8 GB Cache Memory HP XP24000/XP20000 4 GB Cache Memory NOTE: Must configure 1 Cache Adapter per 8 cache modules (per 64GB cache).	AE152A AE153A
Shared Memory Adapter (Min 1, Max 2)	HP XP20000 Shared Memory Adapter NOTE: Max 4 SM modules per SM Adapter	AE192A
Shared Memory (Min 1, Max 8)	HP XP24000/XP20000 2 GB Shared Memory HP XP24000/XP20000 4 GB Shared Memory NOTE: Max 4 SM modules per SM Adapter	AE156A AE157A
Additional DKC 12V Battery (Min 0, Max 1)	HP XP20000 DKC 12V Battery 1 set required if either condition is met: • Cache Memory Capacity is 24GB or more. • Shared Memory Capacity is 8GB or more.	AE193A
Additional SVP/Battery Chassis (min 0, max 1)	HP XP20000 SVP/Battery Chassis NOTE: required for SVP High Reliability Support Kit AE132A or for Additional Battery AE194A.	AE194A
Disk Adapter Pair (DKA) (min1, max 1)	HP XP20000 DKA Disk Adapter Pair	AE195A

Configuration Information

Disk Chassis

HP XP20000 Disk Chassis	AE196A
60Hz Power Option	#001
50Hz Power Option	#002

Device Interface Cables

HP XP20000 DKU R0 Base Cable Set	AE197A
HP XP20000 DKU R1 or R3 Cable Set	AE198A
HP XP20000 DKU R2 Cable Set	AE199A

XP20000 Array Groups

(Min 0 with Diskless XP20000) (Max 14 with 1 Disk Chassis) (Max 29 with 2 Disk Chassis in Rack 1) (Max 44 with 2nd Rack and 3 Disk Chassis) (Max 59 with 2nd rack and 4 Disk Chassis) Max AG allowed decreases by 1 for each increment of 4 spares

HP XP20000 73GB 15k rpm Array Group	AE200A
HP XP20000 146GB 15k rpm Array Group	AE201A
HP XP20000 300GB 10k rpm Array Group	AE202A
HP XP20000 300GB 15k rpm Array Group	AE203A
HP XP20000 750GB 7.2k SATA Array Group	AE204A

Spare Disk Drives (min 1 per array group capacity, 4 spares allowed per Disk Chassis)

HP XP20000 73GB 15k rpm Spare Disk	AE200AS
HP XP20000 146GB 15k rpm Spare Disk	AE201AS
HP XP20000 300GB 10k rpm Spare Disk	AE202AS
HP XP20000 300GB 15k rpm Spare Disk	AE203AS
HP XP20000 750GB 7.2k SATA Spare Disk	AE204AS

Upgrades

Upgrade Configurations - HP StorageWorks XP24000/XP20000 Upgr Disk Array	AE130AU

NOTE: This product number (AE130AU) 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 XP20000 DKC upgrade components

NonStop Server Connectivity	AE130AU#010
HP XP20000 Upgr Rack Assembly	AE190AU
4.5M power cord w/Nema L6-20P plug	#001
4.5M power cord with stripped ends	#002
4.5M power cord w/ IEC309 plug	#003
4.5M power cord w/ CEE7/7 plug	#004
4.5M power cord w/Nema L6-30P plug	#005

Configuration Information

HP XP24000/XP20000 Upgr SVP High Reliability Kit SVP High Reliability Sup. Kit / XP24000 Modem Card	AE132AU
HP XP24000/XP20000 Upgr 8 Port 4 Gb FC CHA	AE135AU
HP XP24000/XP20000 Upgr 16 Port 4 Gb FC CHA	AE136AU
HP XP24000/XP20000 Upgr 8 Port 4 Gb FICON SW CHA	AE137AU
HP XP24000/XP20000 Upgr 8 Port 4 Gb FICON LW CHA	AE138AU
HP XP24000/XP20000 Upgr 8 Port EXSA CHA	AE139AU
HP XP24000/XP20000 Upgr 4 Gb LW Transceiver	AE146AU
HP XP24000/XP20000 Upgr 8 GB Cache Memory	AE152AU
HP XP24000/XP20000 Upgr 4 GB Cache Memory	AE153AU
HP XP24000/XP20000 Upgr 2 GB Shared Memory	AE156AU
HP XP24000/XP20000 Upgr 4 GB Shared Memory	AE157AU
HP XP20000 Upgr DKC Battery	AE193AU
HP XP20000 Upgr SVP/Battery Chassis	AE194AU

HP StorageWorks XP20000 DKU upgrade components

HP XP20000 Upgr Disk Chassis	AE196AU
60Hz Power Option	#001
50Hz Power Option	#002
HP XP20000 Upgr DKU R0 Base Cable Set	AE197AU
HP XP20000 Upgr DKU R1 or R3 Cable Set	AE198AU
HP XP20000 Upgr DKU R2 Cable Set	AE199AU
HP XP20000 Upgr 73GB 15k rpm Array Group	AE200AU
HP XP20000 Upgr 146GB 15k Array Group	AE201AU
HP XP20000 Upgr 300GB 10k Array Group	AE202AU
HP XP20000 Upgr 300GB 15k Array Group	AE203AU
HP XP20000 Upgr 750GB SATA Array Group	AE204AU
HP XP20000 Upgr 73GB 15k rpm Spare Disk	AE200AK
HP XP20000 Upgr 146GB 15k rpm Spare Disk	AE201AK
HP XP20000 Upgr 300GB 10k rpm Spare Disk	AE202AK
HP XP20000 Upgr 300GB 15k rpm Spare Disk	AE203AK
HP XP20000 Upgr 750GB SATA Spare Disk	AE204AK

Technical Specifications

Model	HP StorageWorks XP24000 Disk Array
Number of Disk Drives	9 -1152 in 1 to 5 cabinets (Disk Control Frame holds 128 disk drives and the Disk Array Frames hold 256 disk drives each)

Disk Drives, Interface

Disk drive specifications	73 GB, 15K	146 GB, 15K	300 GB, 10K	300 GB, 15K	750 GB SATA, 7.2K
Raw capacity (User area)	71.5 GB	143.76 GB	288.20 GB	288.20 GB	738.62 GB
Rotation speed	15,000 rpm	15,000 rpm	10,000 rpm	15,000 rpm	7,200 rpm
Mean latency time	2.01 ms	2.01 ms	2.99 ms	2.01 ms	4.17 ms
Mean seek time (Read/Write)	3.5 / 4.0 ms	3.5 / 4.0 ms	4.9 / 5.5 ms	3.5 /4.0 ms	8.5/10.0 ms
Internal data transfer rate	95 to 202 MB/sec	95 to 202 MB/sec	59 to 144 MB/sec	120 to 202 MB/sec	128.75 MB/sec
Interface type	Dual ported 4 Gbps FC AL	Dual ported 4 Gbps FC AL	Dual ported 2 Gbps FC AL	Dual ported 4 Gbps FC AL	Dual ported 4 Gbps FC AL

Capacity	576 GB - 851 TB raw 288 GB - 745 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)	64K
Cache Memory	4 GB - 64 GB
Shared Memory	2 GB to 14 GB
Battery backup time	Fast restart with battery backup mode protects Cache and Shared Memory for at least 36 hours. De-stage mode keeps the entire system running for 1 min and then flushes Cache to final destination.
Operating Systems	HP-UX, Tru64, Open VMS, NonStop, Solaris, VMware, AIX, Windows, NetWare, IRIX, Linux, Mainframe
Host Interface	Fibre Channel, ESCON, FICON
Host Ports	8 to 224 by increments of 8/16
Disk Drive Interface	73GB /146GB/300GB 15K Disk Drives — Dual ported 4 Gbps Fibre Channel Arbitrated Loop (FC-AL) 300 GB 10K Disk Drives — Dual ported 2 Gbps Fibre Channel Arbitrated Loop (FC-AL) 750 GB SATA 7.2K Disk Drives — Dual ported 4 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 75.6 in (78.2 x 92.5 x 192.0 cm) Max Weight — 1745 lb (791 kg)
Physical Dimensions - Disk array frame (DKU)	Width x Depth x Height — 25.6 x 36.4 x 75.6 in (65.0 x 92.5 x 192.0 cm) Max Weight — 1579 lb (716 kg)

Technical Specifications

Shipping Dimensions - Disk control frame (DKC)	Width x Depth x Height	37.4 x 43.7 x 82.3 in (95.0 x 111.0 x 209.0 cm)
	Max Weight	1955 lb (887 kg)
Shipping Dimensions - Disk array frame (DKU)	Width x Depth x Height	37.4 x 43.7 x 82.3 in (95.0 x 111.0 x 209.0 cm)
	Max Weight	1779 lb (807 kg)

Heat Dissipation and Power Consumption Specifications

Parameter	DKC	Each DKU	Full Array (4 DKUs and 1 DKC)
Max Power consumption (kVA)	6.70	6.56	32.9
Max Heat dissipation (kW)	6.44	6.27	31.5
Max BTUs per hour	22000	21400	107,646
Max Kcal per hour	5540	5390	27100

DKC AC line voltage requirements

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

Parameter	Nominal Rated Voltage (VAC)				
	200 VAC	208 * VAC	220 ** VAC	230 VAC	240 ** VAC
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)***	18.2	17.5	16.6	15.8	15.2
Number of power cords	2	2	2	2	2
Number of circuit breakers	2	2	2	2	2
Recommended circuit breakers	50	50	50	50	50

* 60 Hz only
** 50 Hz only
*** Maximum configured DKC at minimum operating voltage

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

Parameter	Nominal Rated Voltage (VAC)				
	200 VAC	208 * VAC	220 ** VAC	230 VAC	240 ** VAC
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)***	9.10	8.77	8.29	7.90	7.58
Number of power cords	4	4	4	4	4
Number of circuit breakers	4	4	4	4	4
Recommended circuit breakers	30	30	30	30	30

* 60 Hz only
** 50 Hz only
*** Maximum configured DKC at minimum operating voltage

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

Parameter	Nominal Rated Voltage (VAC)							
	200 VAC	208 * VAC	220 ** VAC	230 VAC	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)***	10.5	10.1	9.59	9.13	8.76	5.53	5.26	5.07
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
** 50 Hz only
*** Maximum configured DKC at minimum operating voltage

DKU AC line voltage requirements

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

Parameter	Nominal Rated Voltage (VAC)				
	200 VAC	208 * VAC	220 ** VAC	230 VAC	240 ** VAC
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)***	17.8	17.2	16.2	15.5	14.8
Number of power cords	2	2	2	2	2
Number of circuit breakers	2	2	2	2	2
Recommended circuit breakers	50	50	50	50	50

* 60 Hz only
** 50 Hz only
*** Maximum configured DKU at minimum operating voltage

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

Parameter	Nominal Rated Voltage (VAC)				
	200 VAC	208 * VAC	220 ** VAC	230 VAC	240 ** VAC
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)***	8.91	8.59	8.12	7.74	7.42
Number of power cords	4	4	4	4	4
Number of circuit breakers	4	4	4	4	4
Recommended circuit breakers	30	30	30	30	30

* 60 Hz only
** 50 Hz only
*** Maximum configured DKU at minimum operating voltage

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

Parameter	Nominal Rated Voltage (VAC)							
	200 VAC	208 * VAC	220 ** VAC	230 VAC	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)***	10.3	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	30	30	30	30	30	30	30	30

* 60 Hz only
** 50 Hz only
*** Maximum configured DKU at minimum operating voltage

Technical Specifications

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	5 to 10Hz: 2.5mm	Sine Vibration: 4.9m/s^2, 5min.
	10 to 300Hz: 0.49m/s^2	10 to 70Hz: 4.9m/s^2	At the resonant frequency with the highest displacement found between 3 to 100Hz
		70 to 99Hz: 0.05mm	
		99 to 300Hz: 9.8m/s^2	Random Vibration: 0.147m^2/s^3,
			30min, 5 to 100Hz
Shock	—	78.4m/s2, 15ms	Horizontal: Incline Impact 1.22m/s
			Vertical: Rotational Edge 0.15m
Altitude	-60 to 3,000m		—

[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 disk drive should be observed under any conditions.
[5] The above specifications of vibration are applied to all three axes.

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 XP Thin Provisioning Software
HP StorageWorks XP Array Manager Software
HP StorageWorks XP External Storage Software
HP StorageWorks XP Performance Advisor Software
HP StorageWorks XP Continuous Access Software
HP StorageWorks XP Business Copy Software
HP StorageWorks XP Command View Advanced Edition Software
HP StorageWorks XP Provisioning Manager Software
HP StorageWorks XP Replication Monitor Software
HP StorageWorks XP Tiered Storage Manager Software
HP StorageWorks XP Auto LUN Software

Mainframe titles for the XP24000

The HP StorageWorks XP24000 Disk Array also provides unique capabilities for the IBM eServer zSeries and for IBM z/OS, z/VM and VSE environments. XP24000 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.

HP StorageWorks XP for Business Continuity Manager Software
HP StorageWorks XP for Compatible Parallel Access Volumes Software
HP StorageWorks XP for Compatible Extended Remote Copy (XRC) Software
HP StorageWorks XP for FlashCopy Mirroring Software
HP StorageWorks XP for Data Exchange Software

Model HP StorageWorks XP20000 Disk Array

Number of Disk Drives 0 -240 in 1 to 2 racks (primary rack holds 120 disk drives and the second rack holds up to 120 more disk drives)

Disk Drives, Interface

Disk drive specifications	73 GB, 15K	146 GB, 15K	300 GB, 10K	300 GB, 15K	750 GB SATA, 7.2K
Raw capacity (User area)	71.5 GB	143.76 GB	288.20 GB	288.20 GB	738.62 GB
Rotation speed	15,000 rpm	15,000 rpm	10,000 rpm	15,000 rpm	7,200 rpm
Mean latency time	2.01 ms	2.01 ms	2.99 ms	2.01 ms	4.17 ms
Mean seek time (Read/Write)	3.5 / 4.0 ms	3.5 / 4.0 ms	4.9 / 5.5 ms	3.5 /4.0 ms	8.5/10.0 ms
Internal data transfer rate	95 to 202 MB/sec	95 to 202 MB/sec	59 to 144 MB/sec	120 to 202 MB/sec	128.75 MB/sec
Interface type	Dual ported 4 Gbps FC AL	Dual ported 4 Gbps FC AL	Dual ported 2 Gbps FC AL	Dual ported 4 Gbps FC AL	Dual ported 4 Gbps FC AL

Capacity
0 GB - 177TB raw
0 GB - 155 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) 64K

Cache Memory 4 GB - 64 GB

Shared Memory 2 GB to 14 GB

Battery backup time Fast restart with battery backup mode protects Cache and Shared Memory for at least 36 hours.

Operating Systems HP-UX, Tru64, Open VMS, NonStop, Solaris, VMware, AIX, Windows, NetWare, IRIX, Linux, Mainframe

Host Interface Fibre Channel, ESCON, FICON

Host Ports 8 to 48 by increments of 8/16

Technical Specifications

Disk Drive Interface	**73GB /146GB/300GB 15K Disk Drives**	Dual ported 4 Gbps Fibre Channel Arbitrated Loop (FC-AL)
	300 GB 10K Disk Drives	Dual ported 2 Gbps Fibre Channel Arbitrated Loolp (FC-AL)
	750 GB SATA 7.2K Disk Drives	Dual ported 4 Gbps Fibre Channel Arbitrated Loop (FC-AL)
Regulatory Approvals	This product meets all applicable safety and regulatory specifications	
Primary Rack Physical Dimensions	Width x Depth x Height	24 x 40 x 77 in (60.4 x 102 x 200 cm)
	Max Weight	1272 lb (577 kg)
Second Rack Physical Dimensions	Width x Depth x Height	24 x 40 x 77 in (60.4 x 102 x 200 cm)
	Max Weight	997 lb (452 kg)
Primary Rack Shipping Dimensions	Width x Depth x Height	36 x 48 x 86 in (91 x 122 x 218 cm)
	Max Weight	1397 lb (634 kg)
Second Rack Shipping Dimensions	Width x Depth x Height	36 x 48 x 86 in (91 x 122 x 218 cm)
	Max Weight	1122 lb (509 kg)

Heat Dissipation and Power Consumption Specifications

Parameter	Primary Rack	Secondary Rack	Full Array (Primary and Secondary)
Max Power consumption (kVA)	4.18	3.00	7.18
Max Heat dissipation (kW)	4.01	2.87	6.88
Max BTUs per hour	13702	9788	23490
Max Kcal per hour	3453	2466	5919

Primary Rack AC line voltage requirements

20- amp, 50 or 60 Hz, Single phase 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
Number of power cords	4	4	4	4	4
Number of circuit breakers	4	4	4	4	4
Recommended circuit breakers (amps)	20A	20A	20A	20A	20A

* 60 Hz only
** 50 Hz only

Secondary Rack AC line

20- amp, 50 or 60 Hz, Single phase operation

Technical Specifications

voltage requirements

Parameter	Nominal Rated Voltage (VAC)				
	200 VAC	208 * VAC	220 ** VAC	230 VAC	240 ** VAC
Minimum operating voltage (VAC)	184	191	202	212	221
Maximum operating voltage (VAC)	212	220	233	244	254
Number of power cords	2/4***	2/4***	2/4***	2/4***	2/4***
Number of circuit breakers	2/4***	2/4***	2/4***	2/4***	2/4***
Recommended circuit breakers	20A	20A	20A	20A	20A

* 60 Hz only
** 50 Hz only
*** 4 power cords provided with AE190A/AU XP20000 Rack Assembly. Only 2 power cords and 2 circuit breakers required when only 1 AE196A/AU Disk Chassis is installed. 4 power cords and 4 circuit breakers required when 2 AE196A/AU Disk Chassis are installed.

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	10	10	20
Vibration[5]	5 to 10Hz: 0.25mm	5 to 10Hz: 2.5mm	Sine Vibration: 4.9m/s^2, 5min.
	10 to 300Hz: 0.49m/s^2	10 to 70Hz: 4.9m/s^2	At the resonant frequency with the highest displacement found between 3 to 100Hz
		70 to 99Hz: 0.05mm	
		99 to 300Hz: 9.8m/s^2	Random Vibration: 0.147m^2/s^3,
			30min, 5 to 100Hz
Shock	—	8G, 15ms	Horizontal: Incline Impact 1.22m/s
			Vertical: Rotational Edge 0.15m
Altitude	-60 to 3,000m		—

[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 disk drive should be observed under any conditions.
[5] The above specifications of vibration are applied to all three axes.

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 XP Thin Provisioning Software HP StorageWorks XP Array Manager Software HP StorageWorks XP External Storage Software HP StorageWorks XP Performance Advisor Software HP StorageWorks XP Continuous Access Software HP StorageWorks XP Business Copy Software HP StorageWorks XP Command View Advanced Edition Software HP StorageWorks XP Provisioning Manager Software HP StorageWorks XP Replication Monitor Software HP StorageWorks XP Tiered Storage Manager Software HP StorageWorks XP Auto LUN Software Mainframe titles for the XP20000 The HP StorageWorks XP24000 Disk Array also provides unique capabilities for the IBM eServer zSeries and for IBM z/OS, z/VM and VSE environments. XP24000 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. HP StorageWorks XP for Business Continuity Manager Software HP StorageWorks XP for Compatible Parallel Access Volumes Software HP StorageWorks XP for Compatible Extended Remote Copy (XRC) Software HP StorageWorks XP for FlashCopy Mirroring Software HP StorageWorks XP for Data Exchange Software

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