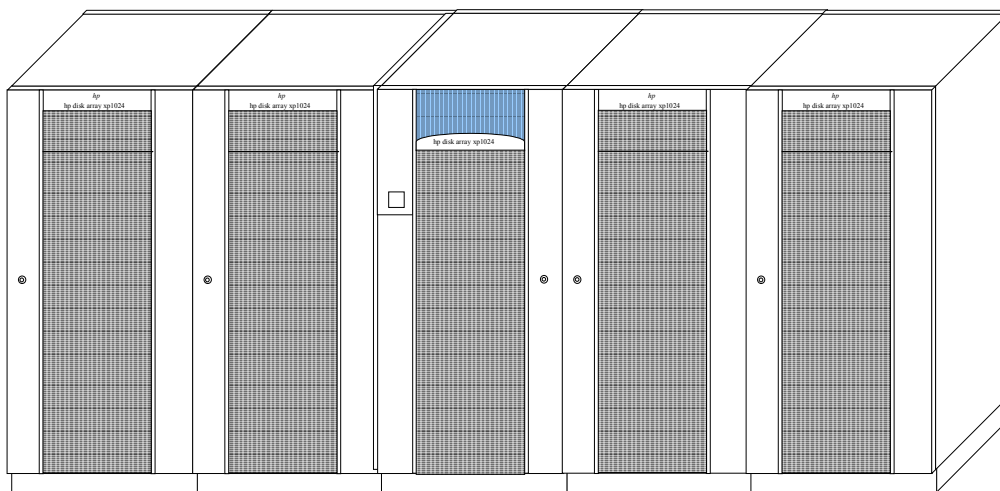


4.7.3—HP Surestore Disk Array XP1024

This document provides an overview of the configuration and ordering information for the HP Surestore Disk Array XP1024 enterprise disk array. The Hewlett-Packard Surestore Disk Array XP1024 provides high-capacity, high-speed enterprise storage with continuous data availability, heterogeneous systems support, ease of serviceability, scalability, and connectivity. The XP1024 can be attached to multiple open systems servers as well as to mainframes, meeting customer needs for a wide range of configurations. The XP1024 is appropriate for capacity needs from 100 GB up to a maximum raw capacity of 74 TB with 73-GB disk drives.

This guide includes an overview of the hardware and software, a description of the XP1024 products by product number, instructions for ordering new systems and upgrades to existing XP1024 systems. Detailed instructions for ordering software for XP1024 are in a separate section in this book, HP XP Software. There is a glossary of XP-specific terms at the end of **Subchapter 4.7**, “HP Surestore Disk Array XP128”.

Figure 4.7.3.1 Surestore Disk Array XP1024



Hardware and Software Overview

This exciting new storage solution consists of the following major components:

XP1024 Hardware

The XP1024 hardware consists of a cabinet for the controller and one to four cabinets for the disks. The controller cabinet 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). There is space in each disk cabinet for up to 256 disk drives.

XP1024 Software

A full complement of software tools are available for XP1024 Disk Array management, management integration, and to enable a wide range of High Availability solutions. Please refer to **Subchapter 4.7**, “XP Surestore Disk Array Software” for more information.

Support and Services

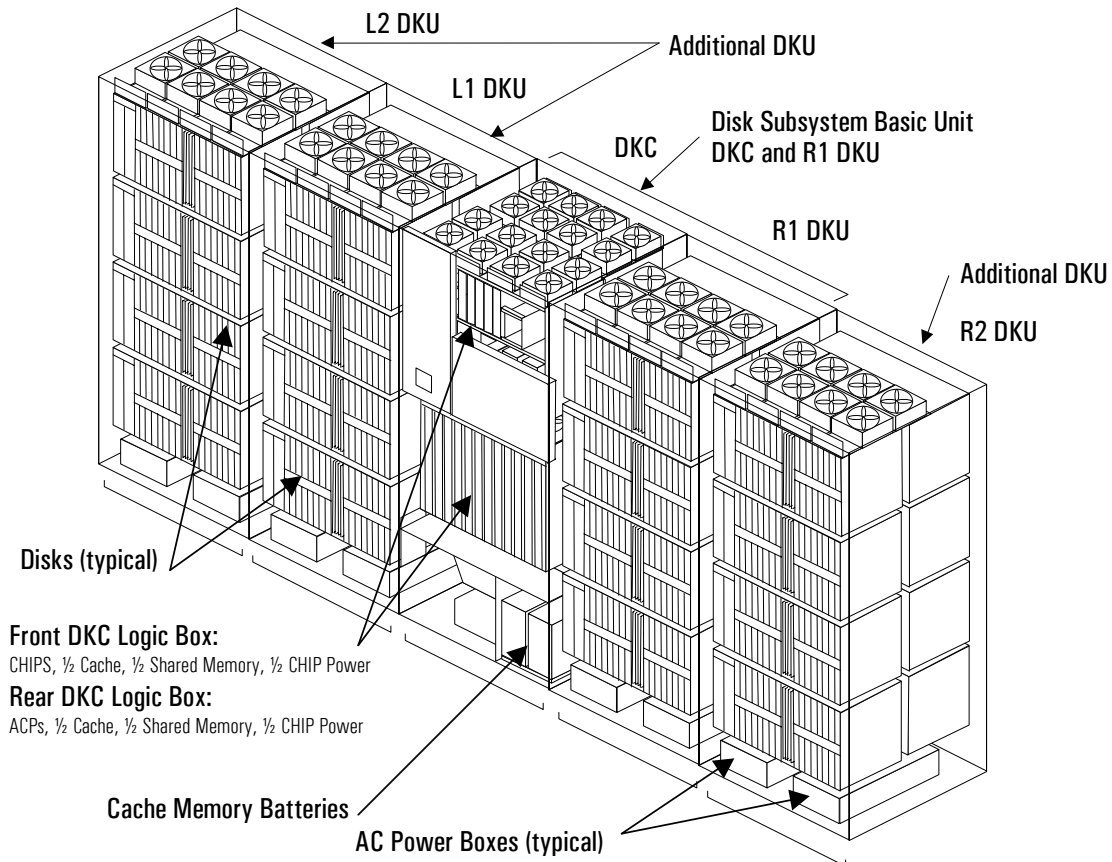
- Hardware Support, including site preparation, installation, configuration and on-site training.
- Software Support, including enablement and consulting

Hardware

Hardware Components

Figure 4.7.3.2 shows the layout of the cabinets comprising the subsystem. The central frame or DKC contains the Array Control Processor (ACP) pair(s), redundant power, cache memory, shared memory (SM), control panel, Service Processor (SVP), and Client Host Interface Processors (CHIPs), and batteries for cache backup (BU). The disk cabinets (DKU) on either side each hold up to 256 disk drives. A minimal XP1024 subsystem must contain the DKC and at least one DKU.

Figure 4.7.3.2 XP1024 Cabinet Detailed View



Features

The XP1024 features the following:

- Fully redundant components, with no single point of failure
- Dynamically-duplexed cache with battery backup (BU)—cache is expandable from 4 GB up to 64 GB total capacity in 2-GB increments. Beyond 32 GB, or when the cache is configured in high performance mode with the optional cache platform boards (A7919A or A7919U) the cache is upgraded in 4-GB increments.
- Crossbar switch—fast, efficient, switching with direct point-to-point connections at 15 GB/sec.
- Shared memory—stores command and control data so that the entire amount of cache memory is available for quick access to user data. Shared memory is expandable from 512 MB to 3.0 GB in 512-MB increments.
- Power redundancy—two connections to AC power with different sources, using single-phase or three-phase in 50- or 60-Hz

Client Host Interface Processors (CHIPs)

Client Host Interface Processors provide connections to host or servers that use the XP1024 for data storage. CHIPs come in board pairs with a minimum of one pair and up to a maximum of four pairs of CHIPs per XP1024 system. CHIP pairs available for use in the XP1024 include:

- 4- and 8-port 1- to 2-Gbit Auto sensing Fibre Channel with Continuous Access support
- 8-port 1-Gbit Fibre Channel with Continuous Access support
- 8-port ExSA Channel (ESCON compatible)

Array Control Processor (ACP)

The ACP performs reads and writes to the cache and cache reads and writes to the disks. The ACP also provides data protection through the use of RAID 0/1 mirroring and RAID 5 parity generation. The Array Control Processor (ACP) is configured in pairs for redundancy. The XP1024 can have one, two, three or four pairs of ACPs.

Cache Memory

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 XP1024 base product comes standard with 4-GB cache and is expandable up to 64-GB in increments of 2 GB. Above 32 GB, the cache should be installed in increments of 4 GB. All cache is backed up by a fully redundant 48-hour battery.

Shared Memory

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. The base XP1024 configuration contains 512 MB of shared memory and is expandable to a maximum of 3 GB of shared memory in increments of 512 MB. All shared memory is backed up by a fully redundant 48-hour battery.

XP1024 Disk Cabinets (DKUs)

The disk cabinets hold the disk drives. A single DKU can hold up to 256 physical disks. There must be at least one and can be up to four disk cabinets in each XP1024. The disks in a single cabinet are connected to both the primary and secondary ACP channels by separate Fibre Channel arbitrated loops.

XP1024 Disk Drives

This table summarizes the specifications of the disk drives supported by the HP Surestore Disk Array XP1024. All disks are dual ported with fibre channel interface.

Disk Drive Specifications	36 GB, 15K	73 GB
Raw capacity (User area)	35.76	72.91 GB
Disk diameter	2.5 inches	3 inches
Rotation speed	14,904 rpm	10,025 rpm
Mean latency time	2.01 ms	2.99 ms
Mean seek time (Read/Write)	3.8-4.2 ms	4.9 to 5.7 ms
Internal data transfer rate	68.5 to 88.3 MB/sec	44.2 to 74.0 MB/sec
Interface type	Dual-ported Fibre Channel	Dual-ported Fibre Channel

AC Power Options

The XP1024 is orderable with either three-phase or single-phase power at 50-Hz or 60-Hz.

Server Connectivity

Like other members of the XP family, the XP1024 connects to a variety of servers and operating systems. For details on which servers and operating systems are currently supported, please check the current listings at the following link “XP1024/1024 Connectivity streams documents” at the URL below:

http://turbo.rose.hp.com/spock/#Disk_Storage_Information. This is an internal HP web site. Resellers will need to work with their HP technical support contact to review the supported server and operating system information.

Switch Support Details

The XP1024 connects to the leading Fibre Channel switches in the industry today. For detailed information on supported switch configurations, please check the current listings at the following link “XP1024/1024 Connectivity streams documents” at the URL below:

http://turbo.rose.hp.com/spock/#Disk_Storage_Information This is an internal HP web site. Resellers will need to work with an HP contact to review the supported switch information.

Reference Documents

For more information on the XP1024 array and how it operates, please see www.hp.com/support/XP1024

Configuration

Steps Required for XP1024 Configuration

Below is a list of the major steps involved in designing an XP1024 array configuration. These are the steps associated with the array.

Configuring an XP array precisely can be an exacting challenge. For precise answers to technical details regarding optimal configurations, please contact the appropriate technical expert in your area.

1. Determine the total raw capacity of storage that will be required by the customer.
 - a. Determine the performance characteristics required by the customer
 - i. Will the customer want to maximize performance or minimize price per megabyte?
 - ii. Has the customer specified a particular drive capacity or rotational speed?
 - b. Determine the number and type of disk drives required
2. Determine the type of configuration and software to be required.
 - a. Will Continuous Access XP be required?
 - b. Will local copies using Business Copy XP be made?
 - c. How much of the storage will be configured in RAID 0/1?
 - d. How much of the storage will be configured in RAID 5?
3. Determine the number and type of hosts or switches that will connect to the array.
 - a. How many Fibre Channel ports will be required?
 - b. How many ExSA ports will be required?

When you have determined the answers to the above questions, you can follow the steps below to correctly configure an XP1024.

Configuration Steps

Using the tables provided below configure an XP1024 using the following steps. Please note that configuring an XP1024 is complex. There are a number of interdependencies, where configuring certain numbers of one product will require the configuration of other product numbers.

1. Select the basic SSP (structure solution program) product number A7905A for the XP1024.
2. Select the Disk Control (DKC) product number A7906A for the XP1024 and the desired power option. The XP1024 DKC includes one Array Control Processor pair, 4 GB of Cache, and 512 MB of shared memory.
3. Select the desired number of disk array groups. Note that a disk array group consists of four drives. The XP1024 can support a mix of types of drive sizes and speeds. The number of array groups will be an important factor in configuring the rest of the array.
4. Configure at least one spare drive for each drive type configured in the array. Spare drives are only configurable in the R1 and L1 DKUs. There can be a maximum of eight spare drives in each of R1 and L1. Thus an XP1024 can have from 1 to 8 spare drives if the A7925A L1 DKU is not configured and up to 16 spare drives if the L1 DKU is configured. If a drive type is not configured in an array, then no spare drives for that type of drive can be configured. Only a maximum of 8 spares can be configured in the factory. If the customer desires more than 8 spares, then order up to two extra disk array groups of four drives. These extra disk array group drives can be configured in the field at installation time as spare drives.
5. Select the desired number of additional high performance Array Control processors (ACP), A7922A. See the table XP1024 Configuration Relationships below for guidance on how many ACPs to configure based on how many array groups are planned. Where higher performance is required now or in the future, select additional high performance ACPs. Generally more ACPs provide more performance and more scalability within a particular configuration.
6. Configure the desired number of disk cabinets based on the number of array groups, the number of ACPs and the number of empty disk slots desired by the customer. You must configure at least 1 DKU and not more than four.
7. XP1024 FC Cables Sets, DKU Configuration, ACPs and Disk Array Group Relationships below to help determine how many DKUs are required.
8. Configure the correct FC Cable sets to connect the DKUs to the DKCs. The number of ACP pairs and DKUs determine the number and type of FC Cable sets that should be ordered. See the table XP1024 Configuration Relationships below for guidance on how many and what kind of cable sets to select.
9. Configure at least one and not more than four CHIP pairs for connection of the XP1024 to host processors or switches. If the A7909A ExSA Channel CHIP is configured, then the software product T1617A Resource Manager XP must also be configured. If the total number of CHIP/ACP pairs is five or more, then the A7917A additional CHIP power supply must be ordered.
10. Order the appropriate cables to connect the CH IP pairs to their respective host bus adapters or switches. See **Table 4.7.3.8** for a complete list of available cables for each of the available CHIPS.
11. Configure the desired amount of cache memory. See the table below to select the correct cache memory configuration. Note that to extend the cache memory beyond 32 GB the A7919A Cache Platform Board is required. The Cache Platform Board may be configured with less than 32 GB of cache, which will provide additional bandwidth to cache, improving performance in many cases. When the Cache Platform Board is configured, cache must be configured in increments of 4 GB (two product number A7918A 2-GB Cache Modules per increment.)
12. If selected cache memory exceeds 32 GB, including 4 GB in base A7906A, then you must configure the A7920A Additional Battery for Cache Memory.
13. Configure the desired amount of shared memory. See the table XP1024 Shared Memory Requirements below to select the correct shared memory configuration.
14. Configure the appropriate software for the array using the XP Software Configuration guide found elsewhere in this book or on Electronic Sales Partner.
15. Confirm that there will be a workstation available at the customer site on which to run the software configured above. The specifications for the workstation are described below in the section “Specifications for Workstation for Command View”. The customer cannot run the XP software on the SVP processor. There must be at least one workstation on which to run the Command View software. More than one array can be managed by the same workstation, so a workstation does not have to be dedicated to each array.

Product Structure

Table 4.7.3.1 shows the products and product numbers that make up the XP1024. Product numbers ending with an “A” or an “S” are for purchase with a new system. Product numbers ending with a “U” are for purchase as an upgrade to existing disk arrays. If there is no “U” product number listed, the product cannot be purchased as an upgrade.

Table 4.7.3.1 XP1024 Product Structure

Product Name and Configuration Rules	Product Number	Quote Description	Ordering Instructions
HP Disk Array XP1024 SSP Solution	A7905A	HP Disk Array XP1024 SSP Solution	One A7905A must be ordered to start each new XP1024 configuration
XP1024 Disk Control Frame with 4-GB Cache, 512MB Shared memory, Redundant Power Supplies for CHIP pairs 1-2, FC Cable Set for DKU Frame position R1, Basic High Performance ACP pr, HP microcode, HP Continuous Track XP, Modem and pcAnywhere	A7906A	XP1024 Disk Control Frame (DKC). Includes HP firmware, 4-GB cache, 512-MB shared memory, redundant power supplies for 2 CHIP pairs and Continuous Track XP software.	Required to configure a XP1024 system. Must also order DKC power option, CHIP, ACP, Disk Array Group and a Spare Drive. DKC is always factory integrated, cannot be ordered as an upgrade.
3-phase 60- or 50-Hz for XP1024	A7906A #001	Consists of factory integrated redundant junction boxes with circuit breakers.	Required for customers with 3-phase 50- or 60-Hz power
Single-phase 60-Hz for XP1024	A7906A #003	Consists of factory integrated redundant junction boxes with circuit breakers and 3 wire UL power cords with R&S plugs.	Required for customers with single-phase 60-Hz power
Single-phase 50-Hz for XP1024	A7906A #004	Consists of factory integrated redundant junction boxes with circuit breakers and 3 wire HAR power cords with no plugs.	Required for customers with single-phase 50-Hz power
XP1024/XP128 8-port ExSA Channel Adapter Pair	A7909A A7909U	8-port ESCON Serial Adapter (ExSA) Client-Host Interface Processor pair (CHIP pr) for mainframe connect.	Resource Manager XP software must be ordered if ExSA CHIPs are configured in a XP array. Must use A5752A ESCON fibre optic cables. Maximum 4 CHIP pairs for XP1024. XP1024 Additional CHIP Power Supply is required if more than 2 CHIP pairs are configured with XP1024. Order A7909U for field upgrade.
XP1024/XP128 8-port 1-Gb/sec FC/CA Adapter Pair	A7910A A7910U	8-port 1-Gb/sec Short Wave Fibre Channel (FC) Client-Host Interface Processor pair (CHIP pr) for open systems connect. Interfaces are Non-OFC optical.	Does not support 2-Gb/sec protocol. Standard short wave FC cables with 1-Gb/sec SC form factor connectors required. Maximum 4 CHIP pairs for XP1024. XP1024 Additional CHIP Power Supply is required if more than 2 CHIP pairs are configured with XP1024. Order A7910U for field upgrade.
XP1024/XP128 4-port 1- to 2-Gb/sec Auto-sensing FC/CA CHIP Pair	A7911A A7911U	4-port 1- to 2-Gb/sec Auto-sensing Short Wave Fibre Channel (FC) Client-Host Interface Processor pair (CHIP pr) for open systems connect. Interfaces are Non-OFC optical.	Special short wave FC cables with 2-Gb/sec LC form factor connectors required. Maximum 4 CHIP pairs for XP1024. XP1024 Additional CHIP Power Supply is required if more than 2 CHIP pairs are configured with XP1024. Order A7911U for field upgrade.
XP1024/XP128 8-port 1- to 2-Gb/sec Auto-sensing FC/CA CHIP Pair	A7912A A7912U	8-port 1- to 2-Gb/sec Auto-sensing Short Wave Fibre Channel (FC) Client-Host Interface Processor pair (CHIP pr) for open systems connect. Interfaces are Non-OFC optical.	Special short wave FC cables with 2 Gb/sec LC form factor connectors required. Maximum 4 CHIP pairs for XP1024. XP1024 Additional CHIP Power Supply is required if more than 2 CHIP pairs are configured with XP1024. Order A7912U for field upgrade.
XP1024 Additional CHIP/ACP Power Supply	A7917A A7917U	XP1024 Additional CHIP/ACP Power Supply, consists of 4 power supplies.	CHIP power supplies required for XP1024 configured with a total of five or more CHIP/ACP pairs. Order A7917U for field upgrade

Product Name and Configuration Rules	Product Number	Quote Description	Ordering Instructions
XP1024/XP128 2-GB Cache Memory Module	A7918A A7918U	2-GB Cache Memory Module. Data Memory consists of four 512-MB DRAM modules	Must order XP1024 Cache Platform Board A7919A and XP1024 Additional Cache Battery A7920A when configuring more than 32 GB in XP1024 DKC (4-GB cache is included in XP1024 DKC A7906A). When XP1024 Cache Platform Board is configured in a XP1024, must order Cache in 4-GB increments. Maximum allowable cache is 64GB for XP1024. Order A7918U for field upgrade.
XP1024 Cache Platform Board	A7919A A7919U	XP1024 Cache Platform Board, consists of 2 PCBs without cache modules.	Required for XP1024 when configuring for performance applications with 8-GB cache or greater or for all applications when total installed cache exceeds 32 GB including 4 GB in base A7906A DKC. Order A7919U for field upgrade.
XP1024 Additional Battery for Cache Memory	A7920A A7920U	XP1024 Additional Batteries for Cache Memory, consists of 2 battery controller PCBs and 2 battery assemblies.	Required, and only allowed, for XP1024 when total cache exceeds 32 GB, including 4 GB provided in base A7906A DKC. Order A7920U for field upgrade.
XP1024/XP128 512-MB Shared Memory Module	A7921A A7921U	512-MB Shared Memory Module. Control Memory consists of two 256-MB DRAM modules.	512-MB Shared Memory is included in base XP1024 DKC A7906A. Maximum allowable Shared Memory 3072 MB for XP1024. Order A7921U for field upgrade.
XP1024/XP128 Array Control Processor (ACP) pair- High Performance	A7922A A7922U	Array Control Processor (ACP) pair- High Performance composed of 2 PCBs with 4-ports/4 micro processors providing 8 paths of FC-AL to connect between cache and disk drives.	Maximum 4 ACPs with XP1024 DKC A7906A (1st ACP is included in base XP1024 DKC). When ordering the 3rd ACP pr for XP1024, then must order XP1024 DKU for position L1. Order A7922U for field upgrade.
XP1024 FC Cable Set for L1 DKU	A7924A A7924U	XP1024 FC Cable set for DKU in position L1. Consists of 16 FC data cables and 16 control cables.	L1 cable set required for XP1024 DKU frame configured in L1 position. Cable set for DKU in position R1 is provided with base DKC and A7926A cable set is required for DKU for position R2 or L2. Order A7924U for field upgrade.
XP1024 Disk Array Frame	A7925A A7925U	XP1024 Disk Array Frame without disks. Consists of cabinet with control, FC data path and maintenance PCBs; power supplies and disk slots for up to 256 disks (64 array groups).	Important: Qty of DKU plus Qty of ACPs determines XP1024 system layout. Must select one option and must match power options. Order A7925U for field upgrade.
3-phase 60-Hz for XP1024 DKU	A7925A #001 A7925U #001	Consists of factory integrated redundant AC connection boxes with circuit breakers and 4 wire UL power cables with R&S plugs.	Required for customers with 3-phase 60-Hz power
3-phase 50-Hz, for XP1024 DKU	A7925A #002 A7925U #002	Consists of factory integrated redundant AC connection boxes with circuit breakers and 5 wire HAR power cables with no plugs.	Required for customers with 3-phase 50-Hz power
Single-phase 60-Hz, for XP1024 DKU	A7925A #003 A7925U #003	Consists of factory integrated redundant AC connection boxes with circuit breakers and 3 wire UL power cables with R&S plugs.	Required for customers with single-phase 60-Hz power
Single-phase 50-Hz, for XP1024 DKU	A7925A #004 A7925U #004	Consists of factory integrated redundant AC connection boxes with circuit breakers and 3 wire HAR power cables with no plugs.	Required for customers with single-phase 50-Hz power

Product Name and Configuration Rules	Product Number	Quote Description	Ordering Instructions
XP1024 FC Cable Set for R2 and L2 DKU	A7926A A7926U	XP1024 FC Cable set for DKU in position R2 or L2. Consists of 16 FC data cables and 16 control cables.	R2/L2 cable set required for XP1024 DKU frame configured in R2 or L2 position. Cable set for DKU in position R1 is provided with base DKC and A7924A cable set is required for DKU for position L1. Order A7926U for field upgrade.
XP1024/XP128 36-GB 15k rpm, FC Array Group—4 disks	A7928A A7928U	36-GB 15K RPM High Performance, Dual Ported FC Disk Array Group. 4 drives per group.	Must order minimum one 36-GB 15k rpm spare drive, A7928S, when XP128 or XP1024 is configured with 36-GB 15k rpm array group. Order A7928U for field upgrade.
XP1024/XP128 73-GB 10k rpm, FC Array Group—4 disks	A7929A A7929U	73-GB 10K RPM, Dual-ported FC Disk Array Group. 4 drives per group.	Must order minimum one 73-GB 10k rpm spare drive, A7929S, when XP128 or XP1024 is configured with 73-GB 10k rpm array group. Order A7929U for field upgrade.
XP1024/XP128 36-GB 15k rpm, FC Spare Disk Drive	A7928S A7928SU	36-GB 15K RPM High Performance, Dual-ported FC Spare Disk	Minimum one 36-GB 15k rpm spare drive required, and only allowed, when XP128 or XP1024 is configured with 36-GB 15k rpm array group A7928A. Order A7928SU for field upgrade.
XP1024/XP128 73-GB 10K rpm, FC Spare Disk Drive	A7929S A7929SU	73-GB 10K RPM, Dual-ported FC Spare Disk	Minimum one 73-GB 10k rpm spare drive required, and only allowed, when XP128 or XP1024 is configured with 73-GB 10k rpm array group A7929A. Order A7929SU for field upgrade.

Cache Memory Requirements

The base XP1024 array includes 4 GB of Cache Memory. Depending on the number of disks configured with the system, you will probably need to configure additional cache memory.

The minimum amount of cache memory required is determined by the usable capacity of disk storage configured. When the Cache Platform Board is configured, the cache must be configured in 4-GB increments. The Cache Platform Board is required for all configurations above 32 GB. The Cache platform board adds bandwidth to the cache, which will increase performance of the array. Therefore the cache platform board may be desired for configurations less than 32 GB.

When the total amount of cache memory installed is greater than 32 GB, the additional battery for cache memory (A7921A or A7921U for upgrades) must be ordered.

The configured amount of cache memory for an XP1024 must be at least the minimum shown in the table, and can be up to the maximum of 64 GB. To determine the minimum amount of cache required, calculate the total amount of usable disk to be configured. Use the number and type of disk drives configured above and the table Array Group Data Storage GB and LDEV Capacity for RAID5 and RAID1 below to calculate the usable capacity of storage. Select the amount of cache as shown in the table below based on the usable capacity. For higher performance, additional cache may be configured.

If selected cache memory exceeds 32 GB, including 4 GB in the base A7906A, then you must configure the A7920A Additional Battery for Cache Memory.

Table 4.7.3.2 XP1024 Minimum Cache Requirements

Data Storage Capacity	Required Minimum Cache (GB)	Number of A7918A Cache Modules to Purchase with New System	Required Minimum Cache (GB) with CPB	Number of A7918A Cache Modules to Purchase with New System
Up to 700	4	0	4	0
701-1350	6	1	8	2
1351-2752	8	2	8	2
2753-5517	10	3	12	4
5518-8170	12	4	12	4
8171-10960	14	5	16	6
10961-13650	16	6	16	6
13651-16440	18	7	20	8
16441-20270	20	8	20	8
20271+	22	9	24	10

CPB = XP1024 Cache Platform Board, A7919A

Table 4.7.3.3 XP1024 Cache Increments and Maximum Cache

Without CPB	With CPB ¹	With CPB ¹ and CA and/or BC and/or AL
2 to 32 GB in 2-GB increments	4 to 64 GB in 4-GB increments	4 to 56 GB in 4-GB increments

¹ Additional Battery for Cache (A7920A) required for cache exceeding 32 GB

CPB = Additional Cache Platform Board (A7919A)

BC = Business Copy XP software T1613AA/AB/AC/AD

CA = Continuous Access XP software T1611AA/AB/AC/AD

AL = Auto LUN XP software T1615AA/AB/AC/AD

Table 4.7.3.4 XP1024 Array Group Data Storage (GB) and LDEV Capacity for RAID5, 3D+1P

Emulation Type		OPEN Emulation			
		3	9	E	L
LDEV Capacity (GB)		2.461	7.384	14.568	36.450
Data Storage Capacity (GB)	36 GB 15k Disk	105.82	103.38 ¹	101.98	Not supported
	73 GB 10k Disk	216.56	214.14	218.52	218.70 ¹
LDEV	36 GB 15k Disk	43	14 ¹	7	Not supported
	73 GB 10k Disk	88	29	15	6 ¹

¹ Factory default

Table 4.7.3.5 XP1024 Array Group Data Storage (GB) and LDEV Capacity for RAID1

Emulation Type		OPEN Emulation			
		3	9	E	L
LDEV Capacity (GB)		2.461	7.384	14.568	36.450
Data Storage Capacity (GB)	36 GB 15k Disk	68.91	66.46	58.27	Not supported
	73 GB 10k Disk	145.20	140.30	145.68	145.8
LDEV	36 GB 15k Disk	28	9	4	Not supported
	73 GB 10k Disk	59	19	10	4

To calculate the net capacity available in the array, take the total number of array groups times the capacity indicated in the cell above matching the planned emulation mode. For example if the planned array was to have 10 array groups using 36-GB disk drives configured in Open Emulation mode 9 using RAID5, the usable capacity would be 10×103.38 GB = 1033.80 GB.

Shared Memory Requirements

Shared memory is used to store values internal to the operation of the array. Use the table below to specify the correct amount of shared memory for your configuration. The amount of shared memory required increases depending on the volume of cache memory, the number of LDEVs configured and whether Business Copy (BC) or Continuous Access (CA) are enabled. Configuring additional shared memory does not enhance the performance of the array and is not recommended by HP. If the customer desires to configure more than the recommended amount of shared memory, HP recommends that the full 3 GB of shared memory be configured, which configuration will support all possible LDEV combinations.

Table 4.7.3.6 XP1024 Shared Memory Requirements

Cache Memory (GB)	Without BC or CA or AL					With BC and/or CA and/or AL				
	Minimum Shared Memory (MB)				Maximum	Minimum Shared Memory (MB)				Maximum
	Up to 1024 LDEV	1025 to 2048 LDEV	2049 to 4096 LDEV	4097 to 8192 LDEV		Up to 1024 LDEV	1025 to 2048 LDEV	2049 to 4096 LDEV	4097 to 8192 LDEV	
2	512	1536	1536	2048	3072	1024	2048	2048	2560	3072
4	512	1536	1536	2048	3072	1024	2048	2048	2560	3072
6	512	1536	1536	2048	3072	1024	2048	2048	2560	3072
8	512	1536	1536	2048	3072	1024	2048	2048	2560	3072
10	1024	1536	1536	2048	3072	1536	2048	2048	2560	3072
12	1024	1536	1536	2048	3072	1536	2048	2048	2560	3072
14	1024	1536	1536	2048	3072	1536	2048	2048	2560	3072
16	1024	1536	1536	2048	3072	1536	2048	2048	2560	3072
18	1024	1536	2048	2560	3072	1536	2048	2560	3072	3072
20	1024	1536	2048	2560	3072	1536	2048	2560	3072	3072
22	1024	1536	2048	2560	3072	1536	2048	2560	3072	3072
24	1024	1536	2048	2560	3072	1536	2048	2560	3072	3072
26	1024	1536	2048	2560	3072	1536	2048	2560	3072	3072
28	1024	1536	2048	2560	3072	1536	2048	2560	3072	3072
30	1024	1536	2048	2560	3072	1536	2048	2560	3072	3072
32	1024	1536	2048	2560	3072	1536	2048	2560	3072	3072
36	1024	2048	2048	2560	3072	1536	2560	2560	3072	3072
40	1024	2048	2048	2560	3072	1536	2560	2560	3072	3072
44	1024	2048	2048	2560	3072	1536	2560	2560	3072	3072
48	1536	2048	2048	2560	3072	2048	2560	2560	3072	3072
52	1536	2048	2048	2560	3072	2048	2560	2560	3072	3072
56	1536	2048	2560	3072	3072	2048	2560	2560	3072	3072
60	1536	2048	2560	3072	3072	2048	2560	NS	NS	2560
64	1536	2048	2560	3072	3072	2048	2560	NS	NS	2560

NS = Not Supported (Unbuildable)

BC = Business Copy XP software T1613AA/AB/AC/AD

CA = Continuous Access XP software T1611AA/AB/AC/AD

AL = Auto LUN XP software T1615AA/AB/AC/AD

FC Cable sets, DKU, ACP and Disk Array Group Selection

Table 4.7.3.7 shows the interdependencies between FC cable sets, DKUs, ACPs and Disk Array Groups. The number of DKUs determines the layout of the system, except when 2 DKUs are configured. Where 2 DKUs are configured, the number of ACPs determines the layout. . Please carefully note the different configuration requirements.

Table 4.7.3.7 XP1024 Configuration Relationships

DKU Frames A7925A	ACPs (min - max)	DKU Configuration	FC Cable A7924A ⁴	FC Cable A7926A ⁵	Disk Array Groups (min - max)			
					1 ACP	2 ACP	3 ACP	4 ACP
1	1 - 2	R1	0	0	1 - 31	2 - 63	NS ²	NS ²
2 ³	1 - 2	R1, R2	0	1	2 - 63	4 - 127	NS ²	NS ²
2 ³	3 - 4	R1, L1	1	0	NS ¹	NS ¹	3 - 94	4 - 126
3	3 - 4	R1, R2, L1	1	1	NS ¹	NS ¹	5 - 158	6 - 190
4	3 - 4	R1, R2, L1, L2	1	2	NS ¹	NS ¹	6 - 190	8 - 254

¹ Not Supported (Unbuildable). Minimum 3 ACPs to configure Left Frames

² Not Supported (Unbuildable) ACPs must have DKUs and drives connected

³ When 2 DKUs are ordered then number of ACPs determines the DKU Configuration and required FC Cables

⁴ A7924A=FC Device Cable Set for DKC to L1-DKU

⁵ A7926A=FC Device Cable Set for R2 and L2 DKU

FC Cables for Host or Switch connection

Table 4.7.3.8 shows the interdependencies between FC cable sets and CHIPS. Be sure to order sufficient cables to connect the configured CHIPS to their respective switches or host bus adapters.

Table 4.7.3.8 XP1024/XP128 Host Cable to CHIP Compatibility

Cable Product #	XP1024/XP128 CHIP Pair		
	A7909A/U	A7910A/U	A7911A/A7912A/U
A5750A FC			
A5750A #001		X	
A5750A #002		X	
A5750A #003		X	
A5750A #004			X
A5750A #005			X
A5750A #006			X
A5750A #007		X	X
A5750A #008		X	X
A5750A #010		X	X
A5752A ESCON			
A5752A #001	X		
A5752A #002	X		
A5752A #003	X		
A5752A #004	X		
A5752A #005	X		
A5752A #006	X		
A5752A #007	X		
A5752A #008	X		

Specifications for Management Station for Command View

To operate any XP1024 array, the array must be controlled using the Command View software. Command View runs on a Windows workstation per the specifications below. Multiple arrays can be managed using one workstation, therefore a unique workstation for each array is not a requirement. However, at least one workstation **MUST** be available to run Command View for the XP1024 array somewhere in the customer’s environment.

- Windows NT 4 SP5+ or Windows 2000
- 800-MHz CPU
- 512-MB RAM
- 350 MB free disk space; 350 MB additional per disk array to be managed
- Internet Explorer 5.0+ or Netscape 4.73+
- Java Runtime Environment 1.3.1 (installed automatically by Command View)
- If Performance Advisor is installed, an additional 2 GB of disk space will be required

Hardware and Software Support and Services

Please refer to **Subchapter 4.7**, “HP Surestore Disk Array XP128” for information on hardware and software support and services for the XP1024 Disk Arrays.

Ordering Information

Please refer to **Subchapter 4.7**, “HP Surestore Disk Array XP128” for ordering information for the XP1024 Disk Arrays.

XP1024 Upgrades

The XP1024 Disk Array can be upgraded to provide greater capacity, performance and connectivity. This section describes the various upgrades possible with the XP1024. Careful planning at the time of initial purchase of the array will help in executing the most desirable XP1024 upgrades for the customer.

The components of the XP1024 that can be upgraded or expanded include the Array Control Processors, the Disk Cabinets (DKUs), the number and type of disks, the CHIP pairs, cache memory boards, cache batteries and shared memory.

Any upgrade to the XP1024 must be structured under the XP128/XP1024 Upgrade SSP product number A7873A. Products that can be added to the XP1024 are described above in the Product Structure section with product numbers that end with a letter “U”.

The same configuration guidelines and maximums that are used in configuring new XP1024 systems must be followed for upgrades.

Steps to Configure an XP1024 Upgrade

1. Determine the nature of the upgrade. Upgrades will typically increase capacity, performance, connectivity or a combination of capacity, performance and connectivity.
2. To upgrade any XP1024, you must first know the ACP configuration, the number of currently installed disk array groups, the number of installed DKUs, the number of installed CHIP pairs, the amount of installed cache memory, the amount of shared memory, the number of configured LDEVs and whether BC, Auto LUN or CA software is installed.
3. To upgrade capacity, specify additional disk array groups up to the limits described above in the table XP1024 Configuration Relationships, depending on the number and type of ACPs and number of DKUs currently installed or included in the planned upgrade. Drives of different capacities and rotational speeds may be configured in the same DKU or array. At least one spare drive must be configured for each type and speed of drive configured in the same XP1024.
4. Order additional cache to support the additional disk array groups, or verify that there is sufficient cache memory installed to support the additional disk array groups, per the XP1024 Minimum Cache Requirement table included above. If necessary, order A7919U Cache Platform Board and A7920U Additional Battery for Cache Memory.
5. Order additional Shared Memory to support the additional LDEVs that will be created on the new disk array groups, to support the additional cache memory to be ordered, or to support a software upgrade for the first installation of BC, Auto LUN or CA software, per the XP1024 Shared Memory Requirements table above.
6. To increase performance, customers can add high performance ACP pairs up to a total of four per array. Note that when adding ACP pairs, the system must be upgraded with the appropriate cable sets, DKUs and array groups to take advantage of the additional ACP pairs. Performance may also be increased by adding cache memory, cache platform board or additional array groups as described above.
7. To expand connectivity, additional CHIP pairs may be installed. The XP1024 can hold up to four CHIP pairs. The additional CHIP power supply must be installed when the 3rd CHIP pair is installed.