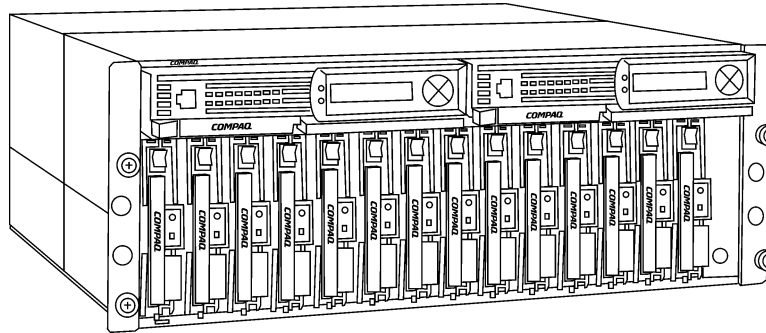


MODELS

StorageWorks™ Modular SAN Array 1000 by Compaq



MSA1000

201723-B21

MSA1000 Controller

218231-B21

MSA Fibre Channel I/O Module

218960-B21

MSA Fabric Switch 6

218232-B21

FCA2101 Host Adapter

245299-B21

2Gb/s SFP SW Transceiver Kit

221470-B21

StorageWorks Enclosure Model 4314R

190209-001

StorageWorks Enclosure Model 4354R

190211-001

Secure Path V3.1B for Windows Workgroup Edition

213076-B22

ProLiant™ Cluster HA/F100 for MSA1000 for NT 4.0 and Windows 2000 (dual server, single path)

252408-B21

ProLiant Cluster HA/F200 for MSA1000 for NT 4.0 and Windows 2000 (dual server, dual path)

252409-B21

COMPAQ

OVERVIEW

StorageWorks Modular SAN Array 1000

The *StorageWorks* Modular SAN Array 1000 is the first generation 2Gb Fibre Channel storage system designed for the entry level to mid-range Storage Area Network (SAN). Designed to reduce the complexity, expense and risk of SAN deployment, the MSA1000 is a scaleable, high performance storage system built with investment protection in mind. The modular design of the MSA1000 allows the user to easily add storage capacity on an as needed basis.

The MSA1000 combines the array controller shelf and the drive shelf, which holds up to fourteen 1" universal disk drives in a single 4U rack mount cabinet. More storage can be easily deployed with the addition of up to two *StorageWorks* 4314 or 4214 Enclosures for a maximum storage capacity of 3TB when using 72 GB drives. The MSA1000 provides the latest 2Gb Fibre Channel technology to the hosts. Besides the single port 2Gb Fibre Channel I/O module that comes standard, there is an optional 6-port, 2Gb Fibre Channel fabric switch that fits inside the MSA1000. The MSA1000 provides Ultra3 SCSI connections to the hard drives and uses the Compaq Universal 1" Ultra2 and/or Ultra3 drives. By utilizing existing SCSI drives, the MSA1000 lowers the total cost of ownership and extends the customer's hardware investments into the future. The MSA1000 can be remotely managed by using management tools such as Compaq Insight Manager – XE, Array Configuration Utility – XE and the *StorageWorks* Fabric Switch Management Utility.

The MSA1000 offers the following key features:

- High performance controller(s) built on DTS architecture for maximum investment protection
- 4U rack mount design combining both the controller and disk shelf
- 2Gb/s Fibre Channel host connections
- Optional embedded 6 Port 2Gb/s Fibre Channel fabric switch
- Ultra3 SCSI connections to drives
- Support for Compaq Ultra2 and Ultra3 Universal 1" Drives
- Scaleable from 14 to 42 drives via *StorageWorks* 4200/4300 Enclosures
- Support for 1Gb/s and 2Gb/s Fibre Channel fabrics

MSA1000 HIGHLIGHTS

High Levels of Performance, Scalability, and Functionality

- **Performance** – The MSA1000 and its components have been designed using the latest industry standard 2Gb/s interconnects and Fibre Channel technology. *Performance tests indicate a data transmission rate of over 20,000 IOPS and bandwidth of 160 MB per second. (Single MSA1000 Controller)*
- **Modular Chassis** – The modular design of the MSA1000 cabinet supports up to fourteen 1" Universal hard drives, redundant controllers, 2Gb/s Fabric Switches, fans and power supplies in a 4U rackmount cabinet.
- **Scalability** – The MSA1000 is easily expanded. The MSA1000 cabinet scales to **1.0TB**, using fourteen, 72Gb, 1" Compaq Universal hard drives. By simply adding additional *StorageWorks* 4200/4300 Enclosures (two enclosures max), the MSA1000 scales to **3.0TB**, using forty-two, 72Gb, 1" Compaq Universal hard drives – all within 10U of rack space.
- **Modular SAN Array Fabric Switch 6** – The optional MSA Fabric Switch 6, which can be installed within the MSA1000 cabinet, offers 2Gb/s full fabric performance, at an attractive price. A second MSA Fabric Switch 6 can be installed for redundancy.
- **Hot Plug Expansion and Replacement Support** – The MSA1000 supports hot plug expansion and replacement of hard drives, controllers and fabric switches for simple, fast installation and maintenance. Fans, power supplies and EMU I/O Module are hot plug replaceable also. The MSA1000 does not support hot add of *StorageWorks* 4200/4300 Enclosures.
- **Advanced Data Guarding (RAID ADG) Fault Tolerance** – This is the highest level of fault tolerance. It allocates two sets of parity data across drives and allows simultaneous write operations. This level of fault tolerance can withstand two simultaneous drive failures without downtime or data loss.

DTS Architecture (Direct Attach to SAN) Data Migration

DTS (Direct Attach to SAN) architecture is an exclusive Compaq feature that provides a quick and easy way to migrate stored data protected by Smart Array controllers to an MSA1000 storage system.

Data that is currently stored on 1" Universal disk drives using newer Compaq Smart Array controllers, as well as data on an RA4100 can easily be migrated to the MSA1000. Simply remove the drives from the older systems and insert them into the MSA1000. All configuration information and data will be preserved allowing migration to be completed in minutes, not hours or days. Refer to the MSA1000 DTS Data Migration White Paper for details.

MSA1000 HIGHLIGHTS *(continued)*

Low Total Cost of Ownership

The modular and scalable design of the MSA1000 provides an extremely flexibly platform. You can buy what you need today and purchase additional capacity and performance as your data storage needs grow, instead of making a large up-front investment. Additional drives, controllers, cache, fabric switches and storage enclosures can easily be added, as your storage needs change.

- **Fabric Support for 1Gb/s and 2Gb/s Infrastructure** – The MSA1000 supports both 1Gb/s and 2Gb/s Fibre channel fabrics to ensure that your investment in 1Gb/s infrastructure is protected.
- **Universal Hard Drive** – Since the MSA1000 supports Compaq Universal 1" Ultra2 and Ultra3 drives, your investment in SCSI technology is protected and cost is minimized as you add new drives. Sharing of a common universal drive form factor between your servers and storage can significantly reduce needs for hardware and spare inventory, and offer overall reduction in storage management and business costs.
- **Pre-Failure Warranty** – Drives installed in an MSA1000 and monitored under Compaq Insight Manager are supported by a Pre-Failure (replacement) Warranty. **NOTE:** Pre-Failure Warranty allows for the replacement of designated drives in an MSA1000 before they actually fail when using Compaq Insight Manger on Compaq servers. **NOTE:** Some operating systems may not support all of these features.
- **Multi-platform Intel-based Server Support** – Compaq offers Multi-platform Intel-based (x86) server support to the MSA1000 to allow a broad range of Intel-based servers to take advantage of the MSA1000's scalability, flexibility and connectivity. When used with a Compaq ProLiant server, the MSA1000 also provides unparalleled integration with Insight Manager, MSA1000 Support CD and Pre-Failure Warranty support.
- **Integrated Configuration and Management Tools** – The MSA1000 utilizes a standard, integrated set of management and utility software. These tools consistently lower the cost of ownership by reducing training and technical expertise necessary to install and maintain Compaq storage.

The MSA1000 comes with/supports the following configuration and management tools:

Configuration

- Array Configuration Utility (ACU) [On-line]
- Array Configuration Utility-XE (ACU-XE) [On-line and Remote Web-Based & Off-line]

Management/Health

- Compaq Insight Manager (CIM)
- Compaq Insight Manager-XE (CIM-XE)

MSA1000 COMPONENTS

With the following components, your storage capacity and performance can be scaled to new levels:

Modular SAN Array 1000

The 4U cabinet houses up to fourteen 1" Compaq Universal hot pluggable Ultra2 and/or Ultra3 drives. Each MSA1000 includes the following standard components: (1) MSA1000 Controller, (1) MSA Fibre Channel I/O Module, dual hot pluggable fans/power supplies and power cables, (2) 3' VHDCI to VHDCI SCSI cables to connect expansion enclosures, documentation and a support software CD.

The modular design of the MSA1000 makes it possible to add redundant controllers, redundant single port Fibre Channel I/O Modules or Fabric Switches and storage expansion enclosures.

MSA1000 Controller

The MSA1000 Controller is an integrated RAID controller with an integrated LCD/LED status display and 128-MB read/write battery-backed cache (expandable to 256 MB per controller). One MSA1000 Controller is included with the MSA1000; the redundant MSA1000 Controller is an option.

Key Features

- Redundant controller support with mirrored cache
- Fabric, Private Loop & Public Loop Support
- Auto Negotiated F, FL & L Port Login
- RAID 0, 1, 1+0, 5 and ADG
- 2Gb/1Gb Frequency Agile
- Primary & Secondary Inter-Controller Link (ICL)
- Host based configuration via ACU
- Remote configuration and monitoring via ACU XE (offline and remote) & CIM XE

MSA1000 Controller Management Features

- **Selective Storage Presentation:** allows multiple hosts to access a single MSA1000 storage system. Host access can be defined all the way down to a logical volume level.
- **Online RAID Level Migration:** allows for online post-configuration change to RAID level without destroying data or volume information.
- **Online Capacity Expansion:** lets you add storage to an operational MSA1000—reducing expensive server downtime.
- **Online Volume Extension:** allows for the capacity growth of existing logical volumes.
- **Global Online Spare:** reduces the risk of data loss by facilitating automatic rebuilds after a drive failure.

Fault Tolerance

Several fault tolerant configurations, which keep data available and servers running while drives are being replaced, are supported including:

- **Advanced Data Guarding (RAID ADG):** Allocates the equivalence of 2 parity drives across multiple drives and allows simultaneous write operations.
- **Distributed Data Guarding (RAID 5):** Allocates parity data across multiple drives and allows simultaneous write operations.
- **Drive Mirroring (RAID 1, (1+0 Striped Mirroring)):** Allocates half of the drive array to data and the other half to mirrored data, providing two copies of every file.

Fault Recovery

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

- **On-Line Spares:** If a failure occurs, recovery begins with an on-line spare and data is reconstructed automatically. One on-line spare can be assigned per array and used across multiple arrays. It is also possible to assign different on-line spares across different arrays.
- **Array Accelerator:** Onboard, battery-backed cache memory protects data in the event of a power failure. In the unlikely event of a controller failure, the battery-backed cache will save critical user data for up to three days.

MSA Fibre Channel I/O Module

Provides a single 2Gb/s Fibre Channel connection from the host side into the MSA1000. The MSA Fibre Channel I/O Module includes one 2Gb/s, Short Wave, Small Form Factor Pluggable Transceiver (SFP). A second MSA Fibre Channel I/O Module can be installed for redundancy when a redundant controller is used.

MSA1000 COMPONENTS *(continued)*

MSA Fabric Switch 6

The MSA Fabric Switch 6 is an optional six port, 2Gb/s Fibre Channel Fabric Switch. The MSA Fabric Switch 6 replaces the standard single port Fibre Channel connection provided by the Modular SAN Array Fibre Channel I/O Module. There are a total of five external fibre channel ports. Four of the external fibre channel ports are Small Form Factor Fixed (SFF) short wave transceivers and are not removable. The fifth port requires the installation of a Small Form Factor Pluggable (SFP) transceiver. One port is used internally by the MSA1000 controller.

Key Features

- 2Gb/s 6 Port Fabric Switch integrated into the MSA1000 Chassis
- 5 ports external, 1 port internal
- 4 Small Form Factor Fixed Short Wave (SFF) Transceivers, 1 Small Form Factor Short Wave Pluggable (SFP) Transceiver
- 2Gb/1Gb Frequency Agile
- Managed Out of Band
- Hot Pluggable
- Efficient, space saving design

Note: The MSA Fabric Switch 6 cannot be cascaded to an external fabric switch. See the MSA1000 Compatibility Matrix for details.

2Gb/s Small Form Factor Pluggable (SFP) SW Transceiver Kit

2Gb/s Small Form Factor Pluggable (SFP) SW Transceivers are industry standard connection devices, which hot plug into 2Gb/s infrastructure components such as 2Gb/s Fabric Switches. *StorageWorks* 2Gb/s SFP SW Transceivers support distances up to 300 meters at 2Gb/s and 500 meters at 1Gb/s using multi-mode fiber optic cable.

Multi-Mode Fibre Channel Cables

Multi-Mode Fibre Channel cables provide a thin, flexible cabling solution that is immune to electromagnetic interference. Compaq offers cables to connect the MSA1000 to both 2Gb and 1Gb Fibre Channel infrastructures. LC to LC cables are used when connecting the MSA1000 to other 2Gb Fibre Channel components because both connections will utilize small form factor transceivers. LC to SC cables are used when connecting the MSA1000 to 1Gb Fibre Channel components. 1Gb components use the larger GBIC style transceivers.

SOFTWARE COMPONENTS

The MSA1000 utilizes a single, consistent set of utility software for storage and RAID management, setup, configuration and troubleshooting. This consistency reduces the cost of ownership by reducing the training and technical expertise necessary to install and maintain your Compaq storage solution.

Array Configuration Utility (ACU-XE/ACU)

- Provides a graphical view of Compaq drive array configurations
- Easy to use Wizards for configuration
- ACU supports on-line configuration
- Web Based ACU-XE supports On-Line, Remote Web Based and Off-line configuration
- Runs online on Microsoft® Windows® NT 4.0 and Microsoft Windows 2000

Selective Storage Presentation (SSP)

- Built-in to MSA1000 Controller firmware and controlled via ACU-XE/ACU
- Allows setting of access rights to the MSA1000 storage by hosts
- Access Control can be set up to a logical volume level using the Array Controller Utility (ACU-XE/ACU)

Compaq Insight Manager (CIM-XE/CIM)

- Powerful storage, server and server option management tool
- Monitor storage from a remote central location
- Browser based CIM-XE provides full access from anywhere on the Intranet, eliminating the need for a dedicated Compaq Insight Manager management console

SOFTWARE COMPONENTS *(continued)*

SANworks™ Virtual Replicator by Compaq

A *SANworks* Virtual Replicator CD and a single system license is included with the MSA1000. Additional licenses of *SANworks* Virtual Replicator are available through your local Compaq sales office.

Key Features:

- Support for NT and Windows 2000
- Online volume growth for virtual disks and basic disks in Windows 2000
- Instant, point-in-time snapshots for backup, online restore, testing or data mining
- Virtual disks, sized to the needs of the application or user – up to 2 TB
- Fully cluster-aware
- Command line interface for scripting
- Scheduling wizards remove the guesswork from repetitive operations

Please refer to the Optional Software section of this document or visit <http://www.compaq.com/> for additional details.

OS Support

- Microsoft Windows 2000 Server and Advanced Server (sp2)
- Microsoft Windows NT 4.0 Server and Enterprise Edition (sp6a)

Please refer to compatibility matrix for complete configuration support.

Software Certifications

- Microsoft Cluster Server Certification

Please refer to compatibility matrix for complete configuration support.

OPTIONAL SOFTWARE

SANworks Virtual Replicator

SANworks Virtual Replicator combines a rich set of innovative capabilities that enhances and simplifies storage management for Windows NT and Windows 2000 environments. Through virtualization, online volume growth, snapshot and management features, the software complements the standard capabilities within the operating system.

Software Features / Functionality

- **Virtualization** – Allows companies to respond quickly to rapidly changing storage capacity requirements. With storage virtualization, multiple storage arrays can be grouped into a pool of disk space for individual or clustered systems to use. Multiple virtual disks, up to 2 terabyte in size, can be created from a pool for users and their applications. System administrators can tailor disk space to specific requirements. Existing storage units with production data can be imported into a pool, the data partition being preserved as a virtual disk and unused capacity added to the pool.
- **Online volume growth** – Enables easy, non-disruptive growth for Windows 2000 with zero downtime. Online Volume Growth allows a system administrator to grow an existing volume on a *SANworks* Virtual Replicator virtual disk and also a Windows 2000 basic disk. The system will remain online, and the data on the volume will remain intact.
- **Snapshots** – Enable the instant creation of multipurpose virtual replicas of production data without the requirement of a physical copy. Snapshots function identically to ordinary physical disks, with both read and write capability. Whenever a quick copy of production data is needed, snapshots can be used with minimal disruption to running applications. For example, the snapshot can be the source for backup using standard backup tools. Snapshots can remain online for restore operations, testing, and data mining.
- **Management** – Simplifies management tasks through easy-to-use interfaces using Microsoft Management Console or a command line. Interactive wizards are available to guide the administrator through all management tasks and create automatic schedules of operations for investment protection and to reduce staff retraining.

OPTIONAL SOFTWARE *(continued)*

SANworks Secure Path for Windows Workgroups

SANworks Secure Path for Windows Workgroups is a family of high availability multi-pathing software products providing continuous data access from the Compaq RAID Array to host servers running the Windows 2000 and Windows NT.

Redundant hardware, advanced RAID technology and Secure Path's automated failover capability are used to enhance fault tolerance and availability. Secure Path effectively eliminates controllers, disk drives, interconnect hardware and host bus adapters as single points of failure in the storage subsystem.

Key Features:

- Maintains connections to storage
- Monitors I/O paths and alerts on significant events
- Assists in load balancing

Used in:

- Stand Alone Configurations
- Cluster configurations
- SAN configurations

ProLiant Cluster HA/F200 for MSA1000

The ProLiant Cluster HA/F200 for MSA1000 uses Compaq's industry-leading ProLiant servers, *StorageWorks* MSA1000, Ethernet server to server interconnect, and Compaq's industry-leading installation and systems management utilities.

The ProLiant Cluster HA/F200 for MSA1000 kit delivers a higher level of availability in cluster environments by enabling multi-path Fiber Channel connections. Compaq *SANworks* Secure Path management software, included with the kit, features support for a redundant Fibre Channel infrastructure (two paths through the Fibre Channel hub or Fabric Switch) utilizing dual Host-Bus-Adapters in each server connected to one or more MSA1000 storage subsystems, each with dual RAID controllers.

ProLiant Cluster HA/F100 for MSA1000

The ProLiant Cluster HA/F100 for MSA1000 is a robust, integrated cluster solution providing high availability for applications and data in business-critical environments. An ideal platform for business-critical databases, large business applications, email or file/print services, the ProLiant Cluster HA/F100 for MSA1000 offers Fibre Channel-based clustering at a fraction of the cost of proprietary cluster solutions.

The ProLiant Cluster HA/F100 for MSA1000 exploits Compaq's industry-leading servers, *StorageWorks* MSA1000, Ethernet interconnect and Compaq's leading installation and systems management utilities. Cluster Management is provided by Microsoft's Cluster Server software, included as part of Microsoft NT Server 4.0 Enterprise Edition, and Microsoft Windows 2000 Advanced Server.

SERVICE & SUPPORT, CAREPAQ AND WARRANTY INFORMATION

Storage Service Packages

The Storage Services Packaging takes the existing storage product along with the existing services and creates a package of the storage hardware and appropriate services. The increased level of support provides for a higher level of storage system availability for the customer. The package includes 24x7 support with a 4-hour response for 3 years as well as installation and startup service.

Warranty

Three-year, on-site Limited Warranty for MSA1000s, Fibre Channel Cables and SFP Transceivers; the greater of one-year Limited Warranty or the remaining Server Warranty for Fibre Channel Host Adapters.

SERVICE & SUPPORT, CAREPAQ AND WARRANTY INFORMATION *(continued)*

Service & Support, CarePAQ and Warranty Information

Software Product Services

- Standalone telephone support
- Rights to new license version
- Media and documentation updates

Hardware Product Services

- Installation services
- On-site maintenance (includes warranty support)
- Response time upgrades during the warranty period
- Post-warranty coverage
- RAID setup and performance consulting via statement of work
- Migration service consulting via statement of work

Installation and Startup Services

The Installation and Startup Service package provides installation and configuration of *StorageWorks* products. Major categories of work could include:

- Pre-installation consulting and planning
- Hardware installation, configuration and verification
- RAID array configuration and initialization
- Installation, configuration and verification of *StorageWorks* software
- Service tools installed, configured and verified
- Customer orientation

Warranty Upgrade Options

- Response – Upgrade on-site response from next business day to same day 4 hours
- Coverage – Extend hours of coverage from 9 hours x 5 days to 24 hours x 7 days
- Duration – Select duration of coverage for a period of 1, 3, or 5 years

CarePAQ Information

CarePAQ Description	9x5, Next Business Day, On-Site Coverage, 3 years	FM-FCXHW-36
	9x5, 4-Hour Response, On-Site Coverage, 3 years	FM-FC4HR-36
	24x7, 4-Hour Response, On-Site Coverage, 3 years	FM-FC724-36
	9x5, Next Business Day, On-Site Coverage, 5 years	FM-FCXHW-60
	9x5, 4-Hour Response, On-Site Coverage, 5 years	FM-FC4HR-60
	24x7, 4-Hour Response, On-Site Coverage, 5 years	FM-FC724-60
	Hardware Installation	FM-FCINS-IN

- CarePAQ is defined as an upgrade to the product warranty attribute, available for a specific duration and hours of coverage.
- CarePAQ is not available for less than the product's warranty duration.
- CarePAQ is available for sale anytime during the warranty period for most products, but the commencement date will be the same as the Warranty Start Date (delivery date to end user customer). Proof of purchase may be required.
- CarePAQ services are prepaid.
- For additional CarePAQ (hardware & software) information on European and other countries, as well as orderable part numbers, please refer to the URL listed below:
<http://www.compaq.com/services/carepag/index.html>

SPECIFICATIONS

Modular SAN Array 1000

LED Indicators on Front (3)	Power	
	Fault detected in one or more sub-systems	
	Fault in Enclosure Management	
LED Indicators for Drive Modules (3)	Drive Access (center)	
	Online (left)	
	Drive Failure (right)	
LED Indicators on Rear Panel (4)	Power Supply/Blower Assembly Fault (1)	
	EMU (3) Power, A bus, B bus	
Interface	Ultra3 SCSI to Hard Drives	
	2Gb/s Fibre Channel to Hosts	
Maximum Number of Drives	Fourteen, 1-inch Compaq Ultra2 or Ultra 3 Universal Hard Drives (MSA1000 Cabinet); expandable to 42 using two additional <i>StorageWorks</i> 4200/4300 Enclosures	
Temperature Range	Operating	50° to 95°F/10° to 35°C
	Shipping	-22° to 122°F/-30° to 50°C
NOTE: Derated 1°C per 1,000 feet of elevation to 10,000 ft.		
Relative Humidity	Operating	10% to 90%
	Non-operating	Up to 95%
Input Power Requirements	Rated Input Voltage	100 to 240 VAC
	Rated Input Frequency	50 to 60 Hz
	Rated Input Current	6 A Max
	Input Power (max)	549 W*
Heat Dissipation (max)	1876 Btu/hr*	
	* Input Power and Heat Dissipation specifications are maximum values and apply to worst-case conditions at full rated power supply load. The power/heat dissipation for your installation will vary depending on the equipment configuration.	
MSA1000 Cabinet	4U Rack Form Factor	
	Dimensions (H x W x D)	6.9 x 19 x 20.5 in/17.5 x 48.3 x 52.1 cm
	Weight	Net 55 to 85 lbs/24.95 to 38.56 kg
Shipping Packaging	Dimensions (L x W x D)	28.5 x 14.81 x 33.13 in/72.4 x 37.6 x 84.1 cm
	Weight	Gross 75 to 105 lbs/34.02 to 47.63 kg

SPECIFICATIONS *(continued)*

Modular SAN Array 1000 Controller

User Interface	Controller Display with Status Indicators (2) and Push Buttons (4) Status Indicators on front of Controller (16)	
Electrical Interface	LVD (Low Voltage Differential)	
Protocol Support	Wide Ultra3 SCSI (160 MB/s per channel)	
SCSI Ports	4-channel: 2 external/2 Internal	
Drives Supported	Up to 42 drives	
Maximum Capacity	3.0 TB (42 drives x 72 GB)	
Logical Drives	Up to 32 logical drives	
RAID Support	RAID ADG (Advanced Data Guarding) RAID 5 (Distributed Data Guarding) RAID 1+0 (Striping & Mirroring) RAID 0 (Striping)	
Cache Memory	Up to 256 MB Read/Write (128-MB modules) ECC protection, battery-backed, and removable Standard: 128 MB cache memory	
Cache Batteries	Up to three days of redundant battery life, removable for easy replacement	
Upgradeable Firmware	2-MB flashable ROM	
Disk Drive and Enclosure Protocol Support	Compaq Ultra3 and Ultra2 SCSI 1-inch Universal drives	
Packaging	Dimensions (L x W x D)	17 x 12.5 x 7.75 in/43.2 x 31.75 x 19.7 cm
	Weight	Gross 6 lbs/2.72 kg

Modular SAN Array Fibre Channel I/O Module

Connector Type	LC	
Number of Fibre Channel Ports	One 2Gb/s Fibre Channel Port using removable Small Form Factor Pluggable Transceiver (SFP)	
Bandwidth	200 MB/s	
Operation Modes	Fibre Channel Class 2 and 3 connectionless service	
Protocols Supported	Fibre Channel	
Packaging	Dimensions (L x W x D)	17 x 12.5 x 7.75 in/43.2 x 31.75 x 19.7 cm
	Weight	Gross 6 lbs/2.72 kg

SPECIFICATIONS *(continued)*

Modular SAN Array Fabric Switch 6

Connector Type	LC	
Number of Fibre Channel Ports	Four external Fibre Channel ports using integrated 2Gb/s Small Form Factor SW Transceiver (SFF) One external Fibre Channel ports using removable 2Gb/s Small Form Factor SW Pluggable Transceiver (SFP) One internal 2Gb/s Fibre Channel Port	
Aggregate Bandwidth	1200 MB/s	
Operation Modes	Fibre Channel Class 2 and 3 connectionless service	
Protocols Supported	Telnet, SNMP	
Switch Management Access	Ethernet (RJ-45, 10/100 Base TX UTP) & Serial port; Out of band Management	
Packaging	Dimensions (L x W x D)	17 x 12.5 x 7.75 in/43.2 x 31.75 x 19.7 cm
	Weight	Gross 6 lbs/2.72 kg

FCA2101 Host Adapter

Connector Type	LC	
Protocol	SCSI, IP	
Data Transfer Method	64-bit/66 MHz PCI	
Maximum Transfer Rate	200 MB/s	
Packaging	Dimensions (L x W x D)	11 x 8.5 x 3 in/27.9 x 21.6 x 7.6 cm
	Weight	Gross 1 lb/0.45 kg

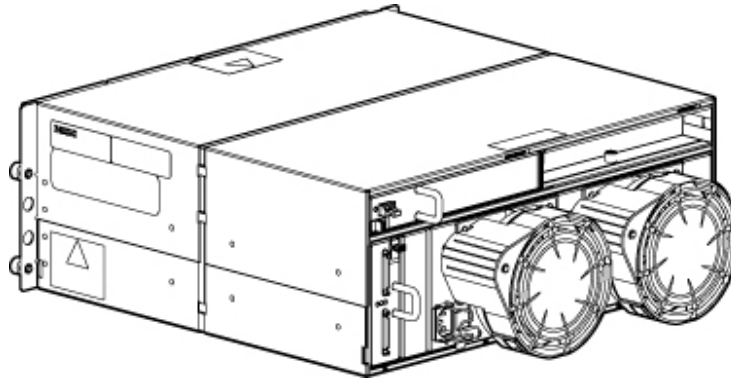
Multi-Mode Fibre Channel Cables Kits

Cable Type	LC-LC (2Gb to 2Gb connections) and LC-SC (2Gb to 1Gb connections) 50 Micron multi-mode fibre	
Available Cable Lengths	6.5 ft, 16.4 ft, and 49.2 ft/2 m, 5 m, and 15 m	
Packaging	Dimensions (L x W x D)	11.5 x 9 x 1.5 in/29.2 x 22.8 x 3.8 cm
	Weight	Gross 0.75 to 1 lb/0.34 to 0.45 kg

CONFIGURATION INFORMATION

STEP 1 – ORDER REQUIRED ITEMS

StorageWorks Modular SAN Array 1000
201723-B21



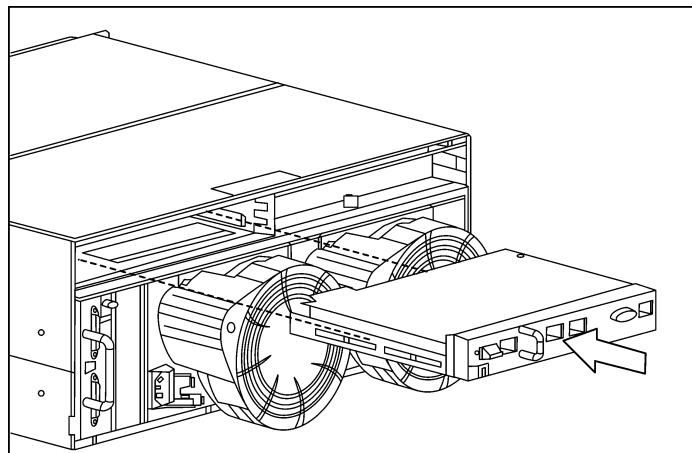
Includes:

- (1) MSA1000 Controller with 128 MB cache
- (1) MSA Fibre Channel I/O Module with 2Gb/s SFP SW Transceiver
- Redundant Hot Pluggable Power Supply/blower assemblies
- Universal Rackmounting Kit
- MSA1000 Support CD & Documentation
- (2) Power cables
- (2) 3-ft VHDCI to VHDCI SCSI cables

NOTE: Fibre Channel cables are ordered separately.

STEP 2 – CHOOSE NON-REDUNDANT MSA1000 SYSTEM OPTIONS

MSA Fabric Switch 6
218232-B21



NOTE: The MSA Fabric Switch 6 has a total of five external fibre channel ports. Four of the external fibre channel ports are Small Form Factor Fixed SW (SFF) transceivers, which are embedded in the Fabric Switch. The fifth available port requires the installation of a Small Form Factor Pluggable (SFP) transceiver.

For a non-redundant configuration, remove the 2Gb/s SFP SW transceiver from the MSA Fibre Channel I/O Module and install it into the MSA Fabric Switch 6. A redundant MSA Fabric Switch 6 will require the purchase of a 2Gb/s SFP SW Kit 221470-B21 to utilize the fifth external port.

FCA2101 Host Adapter
245299-B21

128 MB Cache Module for Controller (Battery Backed)
153506-B21

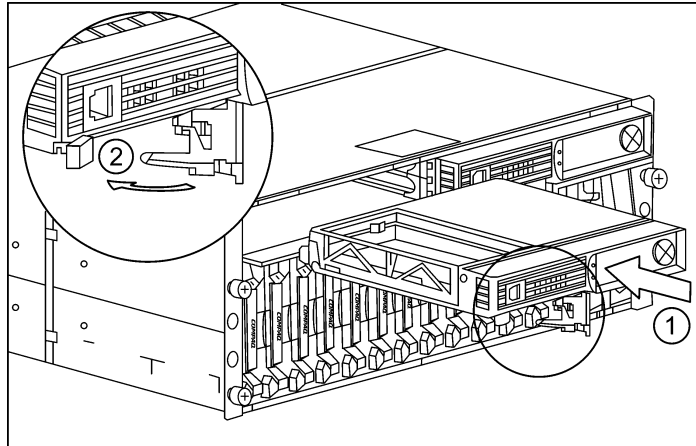
CONFIGURATION INFORMATION *(continued)*

STEP 3 – CHOOSE REDUNDANT MSA1000 SYSTEM OPTIONS

Redundant Configuration:

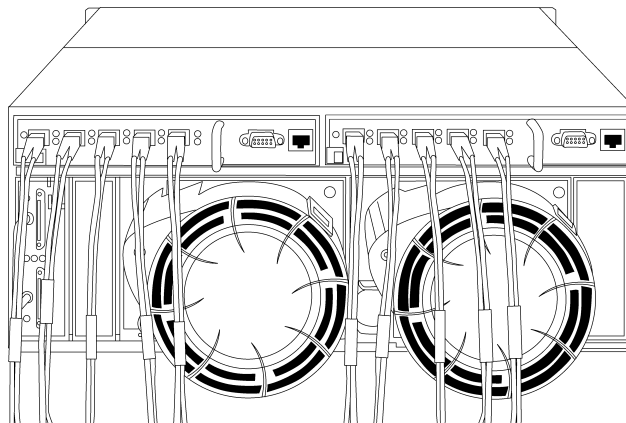
NOTE: Redundant configurations require two Host Adapters per server, an additional controller and I/O module or MSA Fabric Switch 6 and Secure Path software for each server. For ProLiant Clusters, Secure Path software can be substituted with the ProLiant Clusters HA/F200 kit. Mixing of the MSA Fibre Channel I/O Module and the MSA Fabric Switch 6 is not supported in redundant controller configurations. When configuring the MSA1000 for redundant controllers use either two MSA Fibre Channel I/O Modules or two MSA Fabric Switch 6.

MSA1000 Controller
218231-B21



MSA Fibre Channel I/O Module
218960-B21 (Includes 2Gb/s SFP Transceiver)

MSA Fabric Switch 6
218232-B21



NOTE: The MSA Fabric Switch 6 has **four** external Fibre Channel ports using integrated 2Gb/s Small Form Factor Fixed Transceivers (SFF) and **one** external Small Form Factor Pluggable Transceiver (SFP) Fibre Channel port. Utilization of the Small Form Factor Pluggable Transceiver (SFP) Fibre Channel port requires the installation of a Small Form Factor Pluggable (SFP) transceiver. Installation of a redundant MSA Fabric Switch 6 will require the purchase of a 2Gb/s SFP SW Kit (221470-B21) to utilize the Small Form Factor Pluggable Transceiver (SFP) Fibre Channel port.

2Gb/s SFP SW Transceiver Kit
221470-B21

FCA2101 Host Adapter
245299-B21

Secure Path V3.1B for Windows Workgroup Edition
213076-B22

ProLiant Cluster HA/F200 for MSA1000
252409-B21
252409-291 (Japan)

CONFIGURATION INFORMATION *(continued)*

STEP 4 – CHOOSE SUPPORTED OPTIONS FOR 2GB/S OR 1GB/S INFRASTRUCTURE

2Gb/s Fibre Channel Fabric Switches	SAN Switch 2/16	240602-B21
	2Gb/s SFP SW Transceiver Kit	221470-B21
Fibre Channel Cables for 2Gb/s Infrastructure	Use 2Gb/s Fibre Channel cables when connecting the MSA Fibre Channel I/O Module or the MSA Fabric Switch 6 to FCA2101 HBA(s)	
	2 m LC-LC Multi-Mode Fibre Channel Cable	221692-B21
	5 m LC-LC Multi-Mode Fibre Channel Cable	221692-B22
	15 m LC-LC Multi-Mode Fibre Channel Cable	221692-B23
	30 m LC-LC Multi-Mode Fibre Channel Cable	221692-B26
	50 m LC-LC Multi-Mode Fibre Channel Cable	221692-B27
1Gb/s Fibre Channel Fabric Switches and Hub	FC SAN Switch 8 – EL	176219-B21
	FC SAN Switch 16 – EL	212776-B21
	FC SAN Switch 8	158222-B21
	FC SAN Switch 16	158223-B21
	Fibre Channel Storage Hub 7	234453-001
	Fibre Channel Storage Hub 7 (Int'l)	234453-B31
	Fibre Channel Storage Hub 7 (Japan)	234453-291
	GBIC-SW Connector Kit (2 ea.)	234459-B21
	GBIC-LW Connector Kit (2 ea.)	340412-B21
Fibre Channel Cables for 1Gb/s Fabric Switches and Hub	Use 1Gb/s Fibre Channel cables when connecting the MSA Fibre Channel I/O Module and FCA2101 HBA(s) to 1Gb/s fabric switches or hubs.	
	2 m LC-SC Multi-Mode Fibre Channel Cable	221691-B21
	5 m LC-SC Multi-Mode Fibre Channel Cable	221691-B22
	15 m LC-SC Multi-Mode Fibre Channel Cable	221691-B23
	30 m LC-SC Multi-Mode Fibre Channel Cable	221691-B26
	50 m LC-SC Multi-Mode Fibre Channel Cable	221691-B27

STEP 5 – CHOOSE HARD DRIVES & STORAGEWORKS ENCLOSURES

Hard Drives	36.4 GB Pluggable Ultra 3 Universal Hard Drive, 15,000 rpm (1")	232916-B22
	18.2 GB Pluggable Ultra 3 Universal Hard Drive, 15,000 rpm (1")	188122-B22
	72 GB Pluggable Ultra3 Universal Hard Drive, 10,000 rpm (1")	232432-B22
	36.4 GB Pluggable Ultra3 Universal Hard Drive, 10,000 rpm (1")	176496-B22
	18.2 GB Pluggable Ultra3 Universal Hard Drive, 10,000 rpm (1")	142673-B22

NOTE: For complete compatibility information, refer to the Compaq SCSI Hard Drive Compatibility table located at <http://www.compaq.com/products/StorageWorks/hdd/hotplug.html>

StorageWorks Enclosures	The MSA1000 cabinet holds fourteen 1" Universal Drives. Add one <i>StorageWorks</i> Enclosure to increase capacity up to 28 drives. Add two <i>StorageWorks</i> Enclosures to increase capacity up to the maximum of 42 drives.	
	<i>StorageWorks</i> Enclosure Model 4314R (Maximum of two can be connected to the MSA1000)	190209-001
	<i>StorageWorks</i> Enclosure Model 4314R (Maximum of two can be connected to the MSA1000) (Int'l)	190209-B31
	<i>StorageWorks</i> Enclosure Model 4314R (Maximum of two can be connected to the MSA1000) (Japan)	190209-291
	<i>StorageWorks</i> Enclosure Model 4354R (Maximum of one can be connected to the MSA1000)	190211-001
	<i>StorageWorks</i> Enclosure Model 4354R (Maximum of one can be connected to the MSA1000) (Int'l)	190211-B31
	<i>StorageWorks</i> Enclosure Model 4354R (Maximum of one can be connected to the MSA1000) (Japan)	190211-291

STEP 6 – CHOOSE RACK OPTIONS

Compaq 9142 Rack	120663-B21, -B22, -B23
Compaq 9136 Rack	120664-B21, -B22, -B23
Compaq 9122 Rack	120665-B21, -B22, -B23
Compaq 9842 Rack	222192-B21
Fibre Channel Storage Hub 7 Universal Rack Mount Kit	136127-B21

RELATED OPTIONS

SANworks Virtual Replicator v3.0	1 license	261770-B21
	3 license	266236-B21
	5 license	261775-B21
	10 license	261771-B21
	25 license	261772-B21
	50 license	261773-B21
	Base Media and Documentation Kit (license required)	261769-B21
SANworks SecurePath V3.1B for Windows Workgroup Edition	1 license	213076-B22
	5 license	231316-B22
	10 license	231317-B22
	25 license	231318-B22
	50 license	231319-B22
ProLiant Cluster HA/F100 for MSA1000	ProLiant Cluster HA/F100 for MSA1000	252408-B21
	ProLiant Cluster HA/F100 for MSA1000 (Japan)	252408-291

COMPATIBILITY

Servers Supports 32-bit Compaq ProLiant servers and multi-vendor industry standard 32-bit Intel-based (x86) servers.

CONFIGURATION EXAMPLES

Two Node Redundant Cluster Solution

Quantity	Description	Part Number
1	Modular SAN Array 1000	201723-B21
1	MSA1000 Controller	218231-B21
1	MSA Fibre Channel I/O Module	218960-B21
2	Fibre Channel Storage Hub 7	234453-001
4	FCA2101 Host Adapter	245299-B21
6	2 m LC-SC Multi-Mode Fibre Channel Cable	221691-B21
1	ProLiant Cluster HA/F200 for MSA1000	252409-B21
14	36.4 GB Pluggable Ultra3 Universal Hard Drive, 15K	232916-B22

4 Host, 1.5TB, Redundant SAN Solution

Quantity	Description	Part Number
1	Modular SAN Array 1000	201723-B21
1	MSA1000 Controller	218231-B21
2	128 MB Cache Module for Controller	153506-B21
2	MSA Fabric Switch 6	218232-B21
1	2Gb/s SFP SW Transceiver Kit	221470-B21
8	FCA2101 Host Adapter	245299-B21
8	2 m LC-LC Multi-Mode Fibre Channel Cable	221692-B21
4	Secure Path v3.1B for Windows Workgroup Edition	213076-B22
2	StorageWorks Enclosure Model 4314R	190209-001
42	36.4 GB Pluggable Ultra3 Universal Hard Drive, 15K	232916-B22
1	Compaq 9122 Rack	120665-B21

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