Overview

Hewlett Packard's 2000 Family of storage arrays features P2000 G3 MSA arrays with the latest 8 Gb Fibre Channel, 6 Gb SAS, 10GbE iSCSI connected models, and now with a new iSCSI model with four 1 Gb iSCSI ports per controller. The arrays are designed for entry-level customers and feature the latest in functionality and host-connect technology while offering excellent price/performance. They are ideal for companies with small budgets or limited IT expertise, and also larger companies with departmental or remote requirements. Each solution is designed to be easy to deploy, to be secure, along with low management costs, while driving rapid return on investment through efficient storage consolidation.

The P2000 G3 arrays are 2U storage area network (SAN) or direct connect solutions (OS and protocol dependent) offering a choice of five controllers - two FC, one SAS, one 10GbE iSCSI and the newest model features a four port 1 Gb iSCSI. The first Fibre Channel controller is a high-performance, 8 Gb dual port model. The second offering is a unique dual-purpose Combo controller with two 8 Gb Fibre Channel ports with the addition of two 1GbE iSCSI ports. The third controller choice is 6Gb SAS with four ports per controller. There is also the recent addition of a two port 10 Gb iSCSI, while the latest controller introduction features four 1 Gb iSCSI ports per controller. Whatever the situation calls for, the P2000 G3 line-up has the right solution.

The dual-protocol P2000 G3 MSA FC/iSCSI Combo Controller gives exceptional flexibility. The 8 Gb FC ports support a full FC SAN while the two 1GbE iSCSI ports can serve two purposes. With this combination you can economically share the array storage resource with a smaller department accessing it over iSCSI or enable the new optional Remote Snap functionality over iSCSI protocol (also available over FC).

The P2000 G3 SAS is the follow-on product to the MSA2000sa G2, adding the latest 6 Gb SAS technology to the four host ports per controller. The P2000 G3 SAS array is designed for directly attaching up to four dual-path or eight single path rack servers. SAS array support for BladeSystems utilizes the recently introduced HP 6 Gb SAS BL Switch.

The P2000 G3 10GbE iSCSI brings the very latest in high-performance host connection with technology generally found only in higher priced arrays. The bandwidth it provides in conjunction with server consolidation is highly advantageous in shared storage configurations. Array connection to 10GbE switches that are in turn connected to 1GbE NICs is commonplace. Directly attached server support requires the server units to have 10GbE NICs.

Rounding out the controller choices is the P2000 G3 iSCSI controller featuring four 1Gb iSCSI Ethernet ports, double the number of the G2 model. This allows an array that keeps the price of the components, particularly the interconnects, low while markedly increasing the performance capabilities.

All P2000 G3 models can be equipped with single or dual controllers, feature the same scalability, and offer 6 Gb SAS back-end transmission speed to drives and JBODs. Significant data protection advances are delivered by the all P2000 G3 arrays. All G3 units come STANDARD with sixty-four snapshot capability at no extra cost and there is an option for the G3 series of five hundred and twelve snapshots. Volume Copy (clone) also comes standard. In a further move to protect the user's data, optional Remote Snap (replication) capability is offered on the FC, FC/iSCSI, and both iSCSI versions.

All P2000 G3 models support hot plug replacement of redundant controllers, fans, power supplies, and I/O modules. Hot add of expansion enclosures is also supported.

The controller-less P2000 chassis is offered in two models - one comes standard with twelve Large Form Factor (LFF) 3.5-inch drive bays, the other can accommodate twenty-four Small Form Factor (SFF) 2.5-inch drives. Both are able to simultaneously support enterprise-class SAS drives, SAS Midline, and archival-class SATA Midline drives. Either chassis can have one or two matching P2000 G3 controllers (same protocol) and are available with AC or DC power Supplies.

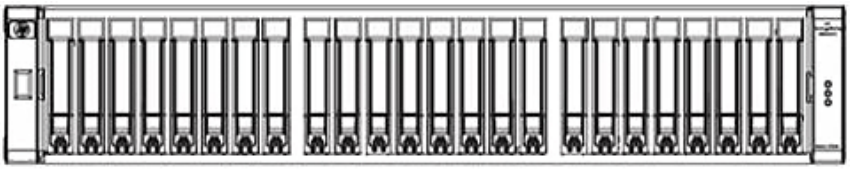
The HP modular approach to entry level SAN solutions enables incremental customer purchases, allowing the array to grow as needs grow, thus allowing a maximum return on investment. Choose a single controller unit for low initial cost with the ability to upgrade later; or decide on a model with dual controllers for the most demanding entry-level situations. There are no unexpected additional charges, licenses or fees as you add enclosures or hosts and users.

Overview

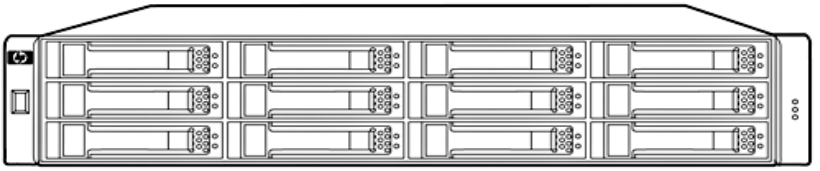
Capacity can easily be added as the need develops by attaching additional drive enclosures. Maximum capacity ranges with LFF drives up to 57.6 TB SAS, 288 TB SAS Midline or 192 TB SATA Midline with the addition of the maximum number of drive enclosures. Configurations utilizing the SFF drive chassis and the maximum number of drive enclosures can grow to 134 TB of SAS, 149 TB of SAS Midline or 74.5 TB SATA Midline with a total of 96 LFF or 149 SFF drives.

What's New in the P2000 G3 array family

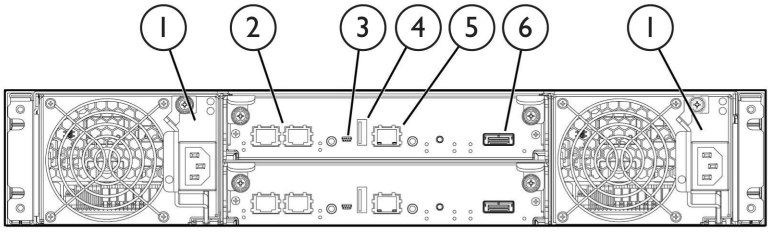
- Adding more fully-populated and half-populated P2000 G3 Arrays bundles with ProLiant SFF SAS drives
- Remote snap operations are now supported on HP 1GbE iSCSI MSA and HP 10GbE iSCSI MSA System controllers
- Added support for vStorage APIs for Array Integration (VAAI), to offload certain processing functions from the host to the array, which can greatly enhance performance



HP P2000 G3 SFF Modular Smart Array

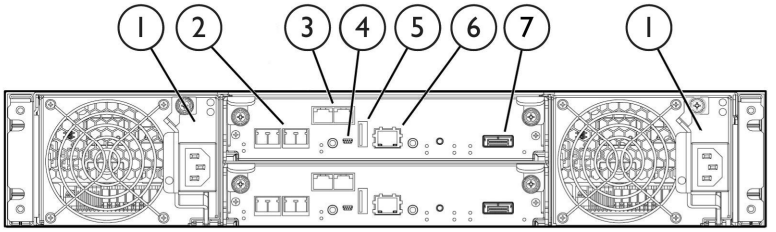


HP P2000 G3 LFF Modular Smart Array



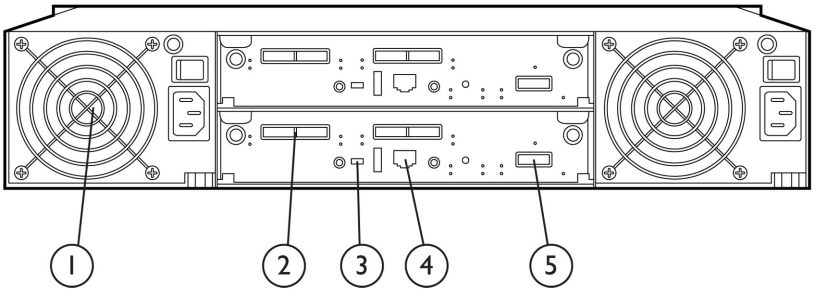
P2000 G3 FC Controllers, 2 installed

1. Power supplies
2. 8 Gb Fibre Channel ports
3. CLI port (mini-USB)
4. Reserved for future use
5. Management Ethernet port
6. Expansion port



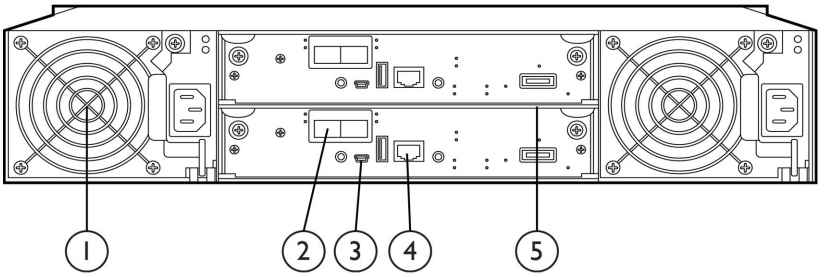
P2000 G3 FC/iSCSI Combo Controllers, 2 installed

1. Power supplies
2. 8 Gb Fibre Channel ports
3. 1GbE iSCSI ports
4. CLI port (mini-USB)
5. Reserved for future use
6. Management Ethernet port
7. Expansion port



P2000 G3 SAS controllers, 2 installed

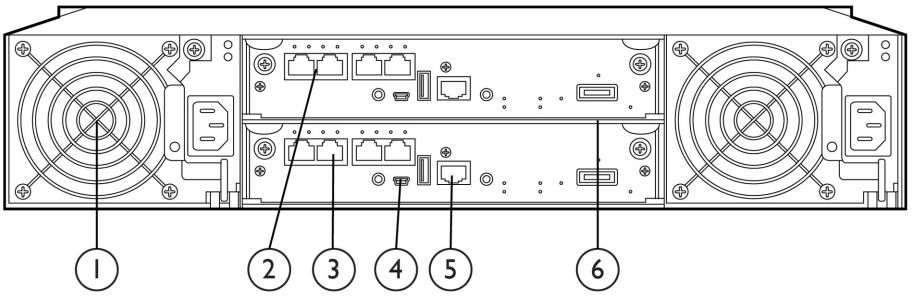
1. Power supplies
2. 6Gb SAS ports (four per controller)
3. CLI port (mini-USB)
4. Management Ethernet port
5. Expansion port



P2000 G3 10GbE iSCSI controllers, 2 installed

1. Power supplies
2. 10GbE iSCSI ports
3. CLI port (mini-USB)
4. Management Ethernet port
5. Expansion port

Overview



P2000 G3 iSCSI dual controller

1. Power supplies
2. 1 GbE iSCSI ports (4)
3. 1 GbE iSCSI ports (4)
4. CLI port (mini-USB)
5. Management Ethernet port
6. Expansion port

Models

P2000 G3 Modular Smart Array	P2000 G3 Controllers	
	P2000 G3 Fibre Channel Controllers	
	HP P2000 G3 MSA Fibre Channel Controller NOTE: two 8Gb FC ports per controller	AP836A
	HP P2000 G3 MSA FC/iSCSI Combo Modular Smart Array Controller NOTE: two 8Gb FC ports and two 1GbE iSCSI ports per controller	AP837A
	P2000 G3 SAS Controller	
	HP P2000 G3 SAS MSA Array System Controller NOTE: four 6Gb SAS ports per controller	AW592A
	P2000 G3 10GbE iSCSI controller	
	HP P2000 G3 10GbE iSCSI MSA Array System Controller NOTE: two 10GbE iSCSI ports per controller	AW595A
	P2000 G3 iSCSI controller (1Gb Ethernet)	
	HP P2000 G3 iSCSI MSA Array System Controller NOTE: four 1Gb iSCSI ports per controller	BK829A
	P2000 Chassis	
	P2000 Controller-less Chassis (AC-powered)	
	HP P2000 Modular Smart Array 3.5-in Drive Bay Chassis (LFF) NOTE: Will accept one or two controllers or Disk Enclosure I/O modules	AP838A
	HP P2000 Modular Smart Array 2.5-in Drive Bay Chassis (SFF) NOTE: Will accept one or two controllers, not I/O modules	AP839A
	P2000 G3 Configured Array Systems	
	Configured Units, 8 Gb Fibre Channel Systems	
	HP P2000 G3 MSA FC Dual Controller LFF Modular Smart Array System	AP845A
	HP P2000 G3 MSA FC Dual Controller SFF Modular Smart Array System	AP846A
	HP P2000 G3 MSA FC/iSCSI Dual Combo Controller LFF Modular Smart Array System	AW567A
	HP P2000 G3 MSA FC/iSCSI Dual Combo Controller SFF Modular Smart Array System	AW568A
	Configured Units, 6 Gb SAS Systems	
	HP P2000 G3 SAS MSA Dual Controller LFF Array System	AW593A
	HP P2000 G3 SAS MSA Dual Controller SFF Array System	AW594A
	Configured Units, 10GbE iSCSI Systems	
	HP P2000 G3 10GbE iSCSI MSA Dual Controller LFF Array System	AW596A
	HP P2000 G3 10GbE iSCSI MSA Dual Controller SFF Array System	AW597A
	Configured Units, 1Gb iSCSI Systems	
	HP P2000 G3 iSCSI MSA Dual Controller LFF Array System	BK830A
	HP P2000 G3 SCSI MSA Dual Controller SFF Array System	BK831A
	P2000 G3 FC SAN Starter Kits	
	HP P2000 G3 FC MSA Dual Controller Small Business SAN Starter Kit (includes dual 8 Gb FC controllers, 12-drive bay LFF chassis, two 8-port 8 Gb switches, four 8 Gb single-port HBAs, SFPs and cables)	AP847A

Models

HP P2000 G3 FC MSA Dual Controller Virtualization SAN Starter Kit (includes dual 8 Gb controllers, 24-drive bay SFF chassis, two 16-port 8 Gb switches, six 8 Gb single-port HBAs, SFPs and cables)	AP848A
Disk Enclosures	
HP P2000 Dual I/O LFF Drive Enclosure, twelve 3.5" drive bays (w/ two .5m mini-SAS to mini-SAS cables. Used with single or dual controller LFF or SFF array head)	AP843A
HP P2000 LFF Drive Enclosure I/O Module (no cable included. Designed exclusively for use with the LFF chassis AP838A to create a single I/O JBOD)	AJ844A
HP D2700 SFF Disk Enclosure, twenty-five 2.5" drive bays (w/ two .5m mini-SAS to mini-SAS cables. Used with single or dual controller LFF or SFF array head)	AJ941A
Controller-less Chassis (DC-powered)	
HP P2000 DC-power LFF Chassis (can add one or two P2000 G3 controllers or P2000 JBOD I/O modules)	AP840A
HP P2000 DC-power SFF Chassis NEBS certified (can add one or two P2000 G3 FC or SAS controllers. No P2000 JBOD I/O module support)	AP841A
Related Option: MSA2000 G2 controllers (Previous generation) (for use only by those needing to configure a prior model MSA2000sa G2 or MSA2000i G2 array. Only supports G2 features, functionalities. Maximum 99 SFF or 60 LFF drives, 256 snaps)	
HP 2300sa G2 Modular Smart Array Controller - 3 Gb SAS (limited use)	AJ808A
HP 2300i G2 Modular Smart Array Controller - 1 Gb iSCSI 2 port (limited use)	AJ803A

P2000 G3 Array Bundles

In some areas HP is offering P2000 G3 Array bundles with ProLiant SFF SAS drives. These bundles can simplify the process of ordering. HP offers these bundles with different type of P2000 G3 Array controllers for different storage capacity needs.

NOTE: These bundles are not offered worldwide so please check the availability for your region

Protocol	Raw Capacity	Regions Availability	Bundle Description	SKUs
Fully Populated Bundles:				
FC Bundles	3.5 TB	AMS APJ	HP P2000 G3 FC DC w/24 146GB SAS 15K SFF HDD 3.5TB Bundle	BV901A
	7.2 TB	AMS APJ	HP P2000 G3 FC DC w/24 300GB SAS 10K SFF HDD 7.2TB Bundle	BV902A
	14.4 TB	AMS APJ	HP P2000 G3 FC DC w/24 600GB SAS 10K SFF HDD 14.4TB Bundle	BV903A
FC/iSCSI Combo Bundles	3.5 TB	AMS APJ	HP P2000 G3 FC/iSCSI DC w/24 146GB SAS 15K SFF HDD 3.5TB Bundle	BV904A

Models

	7.2 TB	AMS APJ	HP P2000 G3 FC/iSCSI DC w/24 300GB SAS 10K SFF HDD 7.2TB Bundle	BV905A
	14.4 TB	AMS APJ	HP P2000 G3 FC/iSCSI DC w/24 600GB SAS 10K SFF HDD 14.4TB Bundle	BV906A
	21.6 TB	AMS APJ	HP P2000 G3 FC/iSCSI MSA DC w/24 900GB SAS 10K SFF HDD 21.6TB Bundle	QR518A
	24 TB	AMS APJ	HP P2000 G3 FC/iSCSI MSA DC w/24 1TB SAS 7.2K SFF MDL HDD 24TB Bundle	QR522A
	3.5 TB	AMS APJ	HP P2000 G3 FC/iSCSI DC w/24 600GB SAS 10K SFF HDD 14.4TB Bundle	BV907A
SAS Bundles	7.2 TB	AMS APJ	HP P2000 SAS DC w/24 300GB SAS 10K SFF HDD 7.2TB Bundle	BV908A
	14.4 TB	AMS APJ	HP P2000 SAS DC w/24 600GB SAS 10K SFF HDD 14.4TB Bundle	BV909A
	21.6 TB	AMS APJ	HP P2000 G3 SAS MSA DC w/24 900GB SAS 10K SFF HDD 21.6TB Bundle	QR519A
	24 TB	AMS APJ	HP P2000 G3 SAS MSA DC w/24 1TB SAS 7.2K SFF MDL HDD 24TB Bundle	QR523A
	3.5 TB	AMS APJ	HP P2000 G3 iSCSI DC w/24 146GB SAS 15K SFF HDD 3.5TB Bundle	BV910A
1G iSCSI Bundles	7.2 TB	AMS APJ	HP P2000 G3 iSCSI DC w/24 300GB SAS 10K SFF HDD 7.2TB Bundle	BV911A
	14.4 TB	AMS APJ	HP P2000 G3 iSCSI DC w/24 600GB SAS 10K SFF HDD 14.4TB Bundle	BV912A
	21.6 TB	AMS APJ	HP P2000 G3 iSCSI MSA DC w/24 900GB SAS 10K SFF HDD 21.6TB Bundle	QR520A
	24 TB	AMS APJ	HP P2000 G3 iSCSI MSA DC w/24 1TB SAS 7.2K SFF MDL HDD 24TB Bundle	QR524A
	3.6 TB	AMS APJ	HP P2000 G3 FC DC w/12 300GB SAS 10K SFF HDD 3.6TB Bundle	BV913A
Half Populated Bundles:				
FC Bundles	7.2 TB	AMS	HP P2000 G3 FC DC w/12 600GB	BV914A

Models

		APJ	SAS 10K SFF HDD 7.2TB Bundle	
	10.8 TB	AMS APJ	HP P2000 G3 FC MSA DC w/12 900GB SAS 10K SFF HDD 10.8TB Bundle	QR525A
	12 TB	AMS APJ	HP P2000 G3 FC MSA DC w/12 1TB SAS 7.2K SFF MDL HDD 12TB Bundle	QR529A
	3.6 TB	AMS APJ	HP P2000 G3 FC/iSCSI DC w/12 300GB SAS 10K SFF HDD 3.6TB Bundle	BV915A
FC/iSCSI Combo Bundles	7.2 TB	AMS APJ	HP P2000 G3 FC/iSCSI DC w/12 600GB SAS 10K SFF HDD 7.2TB Bundle	BV916A
	10.8 TB	AMS APJ	HP P2000 G3 FC/iSCSI MSA DC w/12 900GB SAS 10K SFF HDD 10.8TB Bundle	QR526A
	12 TB	AMS APJ	HP P2000 G3 FC/iSCSI MSA DC w/12 1TB SAS 7.2K SFF MDL HDD 12TB Bundle	QR530A
	3.6 TB	AMS APJ	HP P2000 G3 SAS DC w/12 300GB SAS 10K SFF HDD 3.6TB Bundle	BV917A
SAS Bundles	7.2 TB	AMS APJ	HP P2000 G3 SAS DC w/12 600GB SAS 10K SFF HDD 7.2TB Bundle	BV918A
	10.8 TB	AMS APJ	HP P2000 G3 SAS MSA DC w/12 900GB SAS 10K SFF HDD 10.8TB Bundle	QR527A
	12 TB	AMS APJ	HP P2000 G3 SAS MSA DC w/12 1TB SAS 7.2K SFF MDL HDD 12TB Bundle	QR531A
	3.6 TB	AMS APJ EMEA	HP P2000 G3 iSCSI DC w/12 300GB SAS 10K SFF HDD 3.6TB Bundle	BV919A
1G iSCSI G3 Bundles	7.2 TB	AMS APJ	HP P2000 G3 iSCSI DC w/12 600GB SAS 10K SFF HDD 7.2TB Bundle	BV920A
	10.8 TB	AMS APJ	HP P2000 G3 iSCSI MSA DC w/12 900GB SAS 10K SFF HDD 10.8TB Bundle	QR528A
	12 TB	AMS APJ	HP P2000 G3 iSCSI MSA DC w/12 1TB SAS 7.2K SFF MDL HDD 12TB Bundle	QR532A

Key Features

The HP P2000 G3 Modular Smart Array family encompasses five controllers, each featuring different protocols or combination of protocols to match the exact needs of the user.

- P2000 G3 FC/iSCSI Combo MSA controller: this unique controller offers both 8 Gb Fibre Channel and 1 GbE iSCSI functionalities built into a single array controller. This allows customers to enable storage needing high performance thru the FC ports while leveraging their SAN investment by sharing the array resources with smaller departments through low-cost iSCSI. It also enables optional Remote Snap (replication) for data protection.
- P2000 G3 FC MSA controller: Dual 8 Gb Fibre Channel host ports per controller give high performance with a mature topology and is compatible with the largest installed base of SAN users.
- P2000 G3 10GbE iSCSI MSA controller: HP is the first of the major modular array manufacturers that brings a high performance dual-ported 10GbE iSCSI solution to the entry level segment. Ideal for those who want to utilize cost-effective Ethernet as their infrastructure without sacrificing access time to their data.
- P2000 G3 SAS MSA controller: the P2000 G3 SAS model gives fast 6 Gb transmission rates with low cost SAS connections. Four host ports per controller support a highly efficient direct connect configuration.
- P2000 G3 iSCSI MSA controller offers four 1 Gb iSCSI ports utilizes the popular Ethernet infrastructure with its low cost and ease of management, while the additional ports assure increased performance over the previous generation.

All P2000 G3 models offer a common set of valuable features:

- Ease of management featuring browser-based out-of-band access. This allows a department or small company to effectively handle growing storage requirements, with the aid of an intuitive GUI to administer the unit with a minimum of complexity. Ideal for local or remote installations.
- All G3 models come standard with 64 controller-based snapshots and clone capability. The G3 arrays also support an optional 512 snaps.
- Choose either a low-cost single controller array or start with a configured dual controller array model to fit the budget, high availability, and performance needs.
- All models feature a wide variety of drives: enterprise-class SAS, SAS Midline, and archival-class SATA Midline in either P2000 LFF 3.5-inch or HP ProLiant SFF 2.5-inch drives.
- P2000 G3 models can have a maximum number of P2000 LFF drive enclosures (7), a maximum number of D2700 SFF enclosures (5), or mix both sizes. The array can grow incrementally from a few drives to 134 TB SAS, 288 TB of SAS MDL or 192 TB SATA MDL.
- 2 GB transportable read/write cache per controller. Battery-free cache backup with super capacitors and compact flash
- Vdisks can be spanned across multiple enclosures
- RAID levels 0, 1, 3, 5, 6, 10, 50
- Maximum of 2 drives for RAID level 1, 16 drives for RAID levels 0, 3, 5, 6, and 10, 32 drives for RAID level 50
- 512 LUNs with LUN sizes greater than 40TB depending on the RAID configuration chosen. The maximum LUN size is 64TB
- Non-disruptive on-line controller code upgrade (requires dual controllers w/ multi-pathing software)
- Upgradable by design. Owners of an original MSA2000 G1 or G2 array are able to do data-in-place controller upgrades to the P2000 G3 FC, Combo FC/iSCSI, 1 Gb or 10GbE iSCSI, or P2000 G3 SAS. Cross protocol upgrades are also supported between the protocols. This unique ability protects the earlier investments in chassis, drives, and JBODs

Follow us on twitter and be a part of the conversation, and get the latest P2000 G3/MSA related news and information at: http://www.twitter.com/MSAstorage

Features

HP P2000 G3 FC MSA SAN Starter Kits

The new P2000 G3 FC MSA SAN Starter kits are offered to simplify ordering and implementation of your SAN. HP includes all the necessary hardware components to build your own SAN solution in one package, just add the drives of your choice. These kits are offered at very affordable prices which reflects a savings over purchasing each SAN component separately.

Virtualization SAN Starter Kit	HP P2000 G3 FC MSA Dual Controller Virtualization SAN Starter Kit The HP P2000 G3 FC MSA Dual Controller Virtualization SAN Starter Kit addresses the growing need for server and storage administrators to deliver end-to-end storage, virtualization, and management capabilities across their network infrastructure. The hardware bundle consists of six Host Bus Adapters (HBAs), two FC switches, a P2000 G3 FC MSA Dual Controller Array (SFF Chassis) as well as two licenses per switch enabling Server Application Optimization (SAO) and Adaptive Networking (AN). SAO is an adapter technology that offers Quality of Service (QoS) capabilities that can be used in conjunction with fabric wide QoS and AN to enable a high performing, virtualized infrastructure. With SAO deployed, administrators can protect a VM and its application by assigning its IO flow to a specific priority level. The QoS priorities are enforced at the hardware level, thereby providing adequate bandwidth during periods of high congestion. Applications such as email and databases achieve better performance when deployed in specific SAO and MSA configurations.	AP848A
Small Business SAN Starter Kit	HP P2000 G3 FC MSA Dual Controller Small Business SAN Starter Kit The HP P2000 G3 FC MSA Dual Controller Small Business SAN Starter Kit is a unique end-to-end 8 Gbps SAN Solution, just add disks and power. This kit includes one 8 Gbps P2000 G3 FC MSA Dual Controller Array (LFF Chassis), four 8 Gbps FC HBAs, two HP SN6000 Stackable 8 Gbps 8-port FC switches and HP unique Simple SAN Connection Manager (SSCM) SAN management software, cables, rails and optics. SSCM is the only SAN management software that can manage the FC switch, HBA and provision HP storage from a single pane of glass.	AP847A

Application Solutions

The HP P2000 SAN is the ideal solution for customers running Oracle, Microsoft, SAP environments and those customers who are deploying virtual server technologies like VMware, Hyper-V, and Oracle Virtual Machine. The HP P2000 SAN delivers enterprise functionality that enhances virtual environments, simplifies management, and reduces costs. Easy to deploy, scale and maintain, HP P2000 SANs ensure that crucial business data remains available.
HP has developed best-in-class expertise in Oracle, Microsoft, SAP, and Virtualization Hypervisor technology through extensive testing with the HP P2000 SAN, HP servers, and management software; high availability and disaster recovery solutions; and backup and recovery on the Oracle, Microsoft, and SAP application platforms. As a result, our customers can expect a wide range of operational and business benefits where they can:

- Deploy IT assets across multiple locations.
- Incrementally grow storage without interruption.
- Enable high availability and disaster recovery capabilities for critical applications.
- Deploy a remote disaster recovery site.

Learn more

To learn more about specific HP Storage Solutions that are built with Oracle, Microsoft, SAP and Virtualization environments in mind, visit the solution sites supporting each of these applications.
HP Storage for Oracle hyperlink to: http://www.hp.com/storage/oracle
HP Storage for Microsoft hyperlink to: http://www.hp.com/storage/microsoft
HP Storage for SAP hyperlink to: http://www.hp.com/storage/sap
HP Storage for VMware hyperlink to: http://www.hp.com/go/vmware/storage

	P2000 G3 FC	P2000 G3 SAS	P2000 G3 10GbE iSCSI	P2000 G3 iSCSI (1GbE)
Capacity Minimum / with maximum additional drive enclosures	LFF: 7.2 TB SAS or 36 TB SAS MDL or 24 TB SATA MDL w/ 7 LFF enclosures: 57.6 TB SAS, 288 TB SAS MDL or 192 TB SATA SFF: 21.6 TB SAS or 24 TB SS MDL or 12 TB SATA MDL w/ 5 D2700 JBODs: 134 TB SAS or 149 TB SAS MDL or 74.5 TB SATA MDL	LFF: 7.2 TB SAS or 36 TB SAS MDL or 24 TB SATA MDL w/ 7 LFF enclosures: 57.6 TB SAS, 288 TB SAS MDL or 192 SATA SFF: 21.6 TB SAS or 24 TB SAS MDL or 12 TB SATA MDL w/ 5 D2700 JBODs: 134 TB SAS or 149 TB SAS MDL or 74.5 TB SATA MDL	LFF: 7.2 TB SAS or 36 TB SAS MDL or 24 TB SATA MDL w/ 7 LFF enclosures: 57.6 TB SAS, 288 TB SAS MDL or 192 TB SATA SFF: 21.6 TB SAS or 24 TB SAS MDL or 12 TB SATA MDL w/ 5 D2700 JBODs: 134 TB SAS or 149 TB SAS MDL or 74.5 TB SATA MDL	LFF: 7.2 TB SAS or 36 TB SAS MDL or 24 TBSATA MDL w/ 7 LFF enclosures: 57.6 TB SAS, 288 TB SAS MDL or 192 TB SATA SFF: 21.6 TB SAS or 24 TB SAS MDL or 12 TB SATA MDL w/ 5 D2700 JBODs: 134 TB SAS or 149 TB SAS MDL or 74.5 TB SATA MDL
Controller Cache	2 GB per controller	2 GB per controller	2 GB per controller	2 GB per controller
Total LUNs LUN sizes greater than 40TB depending on the RAID configuration chosen	512 maximum LUN size: 64TB	512 maximum LUN size: 64TB	512 maximum LUN size: 64TB	512 maximum LUN size: 64TB
Host connect P2000 & MSA2000 have 1 or 2 controllers, EVA has 2 controllers standard	Two 8 Gb Fibre Channel ports or Two 8Gb FC and two 1GbE iSCSI ports per controller	Four 6 Gb (x4) SAS ports per controller	Two 10 GbE iSCSI ports per controller	Four 1 Gb iSCSI ports per controller
Maximum Drives w/ expansion	96 LFF/149 SFF	96 LFF/149 SFF	96 LFF/149 SFF	96 LFF/149 SFF
Maximum host supported (dual controller)	64	64 w/ SAS switch: 32 single blade servers (2x c7000), or 16 dual density blade servers	64	64
Optional software: Snapshot, clone, Remote Snap	Snapshot, 64 standard (max 512) Clone (standard) Remote Snap (optional)	Snapshot, 64 standard (max 512) Clone (standard)	Snapshot, 64 standard (max 512) Clone (standard) Remote Snap (optional)	Snapshot, 64 standard (max 512) Clone (standard) Remote Snap (optional)
Use for Storage	Primary Storage with SAS drives. Secondary with SATA	Primary Storage with SAS drives. Secondary with SATA	Primary Storage with SAS drives. Secondary with SATA	Primary Storage with SAS drives. Secondary with SATA

NOTE: maximum available storage capacity depends on the RAID level being implemented

Product Technology

8Gb Fibre Channel controller

Two host ports per FC controller shipped with SFPs. The P2000 G3 FC controller can run in either point-to-point or FCAL (loop). The default is FCAL which is used in Direct Connect, particularly with two controllers. The PtP (fabric) mode is used with almost all switches.

Family Information

Combo controller with FC and iSCSI ports	This ingenious dual-protocol "combo" controller supports a full FC SAN through the 8Gb FC ports, while designating the two 1 GbE iSCSI ports to enable remote replication over iSCSI protocol and perform as an iSCSI target. This allows economical sharing of the storage resource (the P2000 G3 array) with one department needing the performance afforded by the 8 Gb FC ports while simultaneously supporting another department with lesser performance needs and a budget only allowing a 1GbE iSCSI network.
6Gb SAS controller	Four 4x host ports per 6Gb SAS controller.
10GbE iSCSI controller	Two 10GbE ports per G3 10GbE iSCSI controller. Ports are ready for the choice of SFP (none included) Supports the ProCurve and ISS versions of the following 10GbE parts for use in the controllers: HP 10Gb Cables • HP SFP+ 10GbE Copper Cable • HP ProCurve 10-GbE SFP+-SFP+ Direct Attach Cable HP SFP+ Transceivers • HP BladeSystem 10Gb SR SFP+ and HP BladeSystem 10Gb LRM SFP+ • HP ProCurve 10-GbE SFP+ SR Transceiver and HP ProCurve 10-GbE SFP+ LRM Transceiver • No SFP+ LR Transceiver support
1 Gb iSCSI controller	Four 1 Gb Ethernet iSCSI ports per G3 iSCSI controller
Modular Chassis	2U rack height. 12 Large Form Factor or 24 Small Form Factor drive bays, accommodating SAS and SATA. Comes with space for one or two controllers, or P2000 3.5-inch disk Enclosure I/O modules (LFF chassis only)
Drives available	The P2000 G3 controllers support both the P2000 3.5-inch Large Form Factor (LFF) drives, and the HP ProLiant 2.5-inch Small Form Factor (SFF) drives. • Serial Attached SCSI (SAS) enterprise-class drives are designed for high demand, 24x7 usage. • SAS Midline and SATA Midline are usually reserved for archival of data as they are both relatively inexpensive and are available in very large capacities. The HP entry-level family of arrays can accommodate both SAS and SATA drives within the same enclosure making it ideal to have both business-critical, high activity files on SAS drives while using Snapshot, clone, or Remote Snap capability to keep back-up or archival data on the less expensive drives. For investment protection, the controllers will support single and dual port SAS & SATA drives in a legacy single - or dual - domain MSA70. This support allows current owners of MSA70s to migrate their single port drives (in their MSA70 only, not into the array head) to be attached to a P2000 G3 FC or SAS. They can only cascade to another single I/O MSA70. This is not a data-in-place transition, and overall performance could be impacted. SAS drive performance can be approximately 30% greater than SATA performance on sequential host I/O. SAS performance excels in sequential lower latency response time and random I/O per second transaction performance due to higher rpm disk speeds yielding lower seek times. SAS drive random performance is generally twice that of SATA drives. NOTE: P2000 and MSA2 3.5-inch Large Form Factor (LFF) drives are for use only in the P2000 G3 or MSA2000 models. The 2.5-inch Small Form Factor (SFF) drives are supported only with the P2000 G3 or the MSA2300 G2 controllers and are common with and are the same part numbers as the ProLiant hot-plug 2.5-inch drives.
Optional Disk enclosures	Just as the user has a choice of chassis for the array head (LFF and SFF drive bays, AC or DC powered), so also do they have a choice of expansion disk enclosures accommodating either drive size. Both the

P2000 and the D2700 disk enclosures can be hot-added to an operating array.
(NOTE: these are not supported as part of a NEBS-certified configuration with the MSA Carrier Grade Chassis. There is a certified JBOD listed in the Carrier-grade section)

P2000 3.5-inch drive enclosure. This 2U unit has twelve LFF (3.5-inch) drive bays and accepts for P2000 dual-ported SAS and SATA drives. The pre-configured HP P2000 Dual I/O LFF Drive Enclosure (AP843A) has two I/O modules and supports both single and dual controller arrays. If a single I/O disk enclosure model is desired, the appropriate chassis should be purchased along with a single I/O module (AP844A).

- This 3.5-inch drive enclosure can be attached to either the P2000 G3 FC or SAS LFF or SFF array head.
- Each configured model ships standard with two .5m mini-SAS to mini-SAS cables for cascading to other P2000 drive enclosures
- Up to seven P2000 3.5-inch enclosures can be attached to a P2000 G3 FC, FC/iSCSI Combo, or SAS controller in the array head.

D2700 2.5-inch drive enclosure. This 2U storage enclosure (AJ941A) is designed to support twenty five ProLiant 2.5-inch Universal form factor (SFF) 6Gb SAS or SATA hard drives. It ships standard with dual I/O modules installed.

- This 2.5-inch drive enclosure can be attached to a P2000 G3 controller (SFF or LFF) array head
- The D2700 enclosure ships with a two .5m miniSAS to miniSAS cable.
- Up to five D2700 may be attached to the P2000 G3 array head, given total support for 149 SFF drives.

Scalability

The P2000 G3 FC, Combo FC/iSCSI, SAS, 1 Gb or 10GbE iSCSI controllers are designed to allow an installation to begin with smaller capacity and be able to grow gradually as needed. The flexibility of SAS or SATA drive technology, form factors, sizes, speeds, and costs per GB allows a system to easily fit in almost any budget.

- Large Form Factor configurations can scale up to 7.2 TB SAS, 36TB SAS MDL or 24 TB SATA, expandable to 57.6 TB SAS, 288TB SAS MDL or 192 TB SATA with the addition of a maximum of seven P2000 3.5-inch Drive Enclosures.
- Small Form Factor configurations can scale from 21.6 TB SAS, 24 TB SAS MDL or 12 TB SATA MDL. With the addition of five D2700 JBODs, the P2000 G3 can support 134 TB SAS, 149 TB SAS MDL or 74.5 TB SATA MDL.
- Users may configure a 24-drive P2000 G3 SFF array head with 12-drive LFF P2000 3.5-inch disk enclosures. This is an excellent method for a configuration that supports fast SFF enterprise-class SAS drives in the array head, combined with economical LFF drives staged for archival purposes, all in the same array.
- Qualification of larger capacity drives is ongoing.

Vdisks

Vdisks can span across multiple enclosures, where drives used in the Vdisk can be contained in different enclosures. The maximum number of drives that can be used in RAID 1 Vdisk is 2; RAID 0, 3, 5, 6, and 10 is 16; and for RAID 50 Vdisk is 32.

LUNs

The HP 2000 family of arrays supports 512 LUNs (total volumes in a dual controller system) and LUN sizes up to 64 TB depending on the RAID configuration chosen. The array supports expansion and deletion of any LUN.

RAID 0, 1, 3, 5, 6, 10, 50

In addition to the usual RAID levels, the P2000 G3 features several important additional levels. RAID 6 is the highest level of RAID protection. It allocates two sets of parity data across drives and allows simultaneous write operations. It can withstand two simultaneous drive failures without downtime or data loss. RAID 10 is mirroring and striping without parity. It is the most popular of the multiple RAID levels, allowing large arrays with high performance in most cases and superior fault tolerance. RAID 50 combines the block striping and parity of RAID 5 with the straight block striping of RAID 0, yielding higher performance than RAID 5 through the addition of RAID 0, particularly during writes.

Family Information

Performance

Performance numbers are a guideline as established by tests using RAW I/O in an Operating System Agnostic test lab environment. 144 GB 15K SAS drives were used in a dual controller configuration of 12 vdisks consisting of twelve disks per vdisk, 1.6 TB volumes, and 3 volumes per host. 4 hosts directly attached to the P2000 G3 array were used in this test configuration (results cannot be expected with a single host). Results were achieved in Sequential Writes with 256K blocks; all random tests were based on 8K block sizes.

NOTE: Number and type of applications, drive type and number of drives, operating system used, and the number of hosts will affect overall performance. This table is provided strictly as a test-lab comparison. Note: These numbers reflect a full array configuration with the maximum number of front-end ports, disks, and controllers. The test results shown for the P2000 G3 are preliminary and designed to give a reference point for comparisons. They will be reposted shortly when finalized.

2000 Array Performance	P2000 G3 FC	P2000 G3 SAS	P2000 G3 10GbE iSCSI	P2000 G3 1GbE iSCSI
Protocol (host connect)	8 Gb Fibre Channel	6 Gb SAS	10Gb Ethernet	1 Gb Ethernet
2000 RAID 10 Performance Results				
Sequential Reads MB/s	1,650	1,650	1,600	550
Sequential Writes MB/s	850	850	800	525
Random Mix IOPs 60/40 read/write	20,500	23,500	18,500	17,200
2000 RAID 5 Performance Results				
Sequential Reads MB/s	1,650	1,650	1,600	550
Sequential Writes MB/s	1,300	1,350	1,000	525
Random Mix IOPs 60/40 read/write	14,000	16,000	12,500	9,400
2000 RAID 6 Performance Results				
Sequential Reads MB/s	1,650	1,650	1,600	550
Sequential Writes MB/s	1,300	1,100	1,000	525
Random Mix IOPs 60/40 read/write	8,300	9,800	7,500	5,600
Refer to the paper titled "Upgrading the HP MSA2000 (G1 or G2) to the P2000 G3 MSA ", available in the Resource Library at: www.hp.com/go/p2000.				

DC-power chassis

HP is making the two models of controller-less chassis available with direct current (DC) power supplies. They each have the two empty bays where users can insert one or two P2000 G3 controller(s). In addition, the P2000 chassis with LFF drive bay can have P2000 3.5-inch I/O modules inserted to create a LFF DC-power JBOD.

The 500 watt power supply is designed to operate over the input range of -40VDC to -75VDC.

HP P2000 DC-power LFF twelve 3.5-in Drive Bays (supports up to 2 controllers or I/O modules) AP840A

HP P2000 DC-power SFF twenty-four 2.5-in Drive Bays (supports up to 2 controllers, not I/O modules) AP841A

Family Information

Configuration and Management Tools	HP Storage Management Utility (SMU). Management access, out-of-band: WEB GUI, CLI. Interface Types: USB, 10/100 Ethernet. Protocols Supported SNMP, SMI-S, SSL, SSH, SMTP, FTP, HTTP, Telnet
P2000 Software and Documents Support CD	• All product documentation (CD can be used on ALL supported server Operating Systems.) • MSA Device Discovery Tool (Win and Linux) - reports P2000/MSA HW devices, and supported storage software • Host Software Bundles (Win and Linux for both ProLiant x86, ProLiant x64 and Integrity IA64servers) • CD updated quarterly on HP.com with sustaining firmware updates
Hot Plug Expansion and Replacement Support	All P2000 G3 models support hot plug expansion and replacement of redundant controllers, enclosures, fans, power supplies, and I/O modules for simple, fast installation and maintenance. Hot add expansion of disk enclosures is also supported.
Snapshot and Clone	All G3 arrays come standard with 64 snaps, 512 snaps available. Controller based functionality. Offers higher levels of data protection, enabling an almost instant recovery from data failure or corruption. Offers alternative development testing of 'offline' production data and the ability to backup snapped/cloned data.

Overview	The P2000 G3 arrays come integrated with web browser and CLI based software for storage and RAID management, setup, configuration, and troubleshooting. This reduces the cost of ownership by reducing the training and technical expertise necessary to install and maintain your HP storage solution. The SPOCK database provides interoperability information for thousands of components and millions of component combinations. It is available to all users at http://www.hp.com/storage/spock.
Server Compatibility NOTE: depends on protocol	Supports most HP ProLiant, BladeSystems and Integrity servers including • HP ProLiant DL, ML • HP c-Class Blade Servers • Integrity servers, IA64 (FC and FC/iSCSI support only) • Compatibility must be confirmed at: http://www.hp.com/storage/spock
Industry Standard servers support	• Supports most multi-vendor industry standard 32-bit Intel and AMD based (x86) servers. HP requires the Third-Party Server to be logo'd and listed on the Microsoft Windows Server Catalog. • Refer to the Microsoft website: http://www.microsoft.com/windows/catalog/server/ • HP Division recommends that the Third-Party Server Vendor is an active member of TSANet. Refer to the TSANet website for details: www.tsanet.com • Non-HP servers will generally be supported if the HP storage stack is used. This includes supported HP branded HBAs and drivers, and supported FC switches.
OS Support Fibre Channel ports	Refer to the HP support statements for complete current OS version support: http://www.hp.com/storage/spock • Microsoft Windows Server 2008 IA32, x64, IA64 (Standard, Enterprise, Datacenter) • Microsoft Windows Server 2008 R2 x64 • Microsoft Windows 2003 SP1, SP2, and R2 and 2003 R2 IA32, x64 • HP-UX • Red Hat Linux (32/64) • SuSE SLES (32/64) • Microsoft Windows Server 2008 x64 Hyper-V • VMware • OpenVMS • Apple Mac OS X (requires ATTO Celerity 8Gb FC HBA) • Solaris 10 (x86)

Family Information

OS Support Fibre Channel Ports (Integrity)	• HP-UX • Windows • OpenVMS • Linux
OS Support 1GbE iSCSI ports on the G3 Combo FC/iSCSI Controller	• Microsoft Windows Server 2008 and 2008 R2 (x64, IA64) • Microsoft Windows Server 2008 x64 Hyper-V • Microsoft Windows 2003 (SP1, SP2, and R2) and 2003 R2 (IA32, x64) • Red Hat Enterprise Linux (32/64) • SuSE Linux IA32, x64 • VMware ESX
OS Support G3 SAS Controller	Refer to the HP support statements for complete current OS version support: http://www.hp.com/storage/spock • Microsoft Windows Server 2008 IA32, x64 • Microsoft Windows Server 2008 R2 • Microsoft Windows 2003 and 2003 R2 IA32, x64 • Red Hat Linux (32/64) • SuSE SLES (32/64) • Microsoft Windows Server 2008 x64 Hyper-V • VMware • Solaris 10 (x86)
OS Support G3 1Gb iSCSI Controller	• Microsoft Windows Server 2008 SP1, SP2, R2 • Microsoft Hyper-V (x64 only) • Microsoft Windows Server 2003 and 2003 R2, SP2 • VMware • Red Hat Linux (32/64) • SuSE SLES (32/64)
OS Support G3 10GbE iSCSI Controller	• Microsoft Windows Server 2008 SP1, SP2, R2 • Microsoft Hyper-V (x64 only) • Microsoft Windows Server 2003 and 2003 R2, SP2 • Red Hat Linux (32/64) • SuSE SLES (32/64) • VMware NOTE: the G3 10GbE array must connect to a 10GbE switch; direct connect to the G3 10GbE array must be to a 10GbE NIC and supported by the OS.
Web Browser support	• The P2000 G3 and the older MSA2000 support target based management, and include a Web interface and a telnet interface, and require a web browser for management. • The P2000 G3 FC requires Microsoft Internet Explorer V7.x or V8.x • The original MSA2000 and the MSA2000 G2 arrays require Microsoft Internet Explorer V6.X and V7.X (strongly encouraged) • Mozilla Firefox 1.0.7 or later is supported

HP Insight Control Storage Module for vCenter

HP Insight Control Storage Module for vCenter

HP Insight Control Storage Module for vCenter is a component within the HP Insight Control plug-in for vCenter. It provides VMware administrators that are using VMware's vSphere management console (vCenter) with the ability to see how virtual machines are mapped to datastores and individual P2000 volumes. By providing these clear relationships between VM's, datastores and storage, the VMware administrator's productivity increases, as does the ability to ensure quality of service. Roles for administrators can be defined on an individual basis, providing the ability to apply specific permissions for both view and control functions.

The HP Insight Control Storage Module for vCenter supports mixed array environments including EVA, P4000, P2000 (MSA), and the XP array series including the P9500.

When deployed with the P2000 array, provides the following:

- Active Management functionality for the P2000 array:
  - Create/Expand/Delete a Datastore
  - Create a Virtual Machine from a template
- Monitors the health and status of the P2000
- Displays LUN / volume connections from VMs and ESX servers to the arrays and provides the location and attributes of the P2000 within the SAN
- Identifies what storage features are available to allow administrators to match the features available on the P2000 to their requirements
- Provide a cluster-level view of the storage

HP Insight Control Storage Module for vCenter is downloadable from Software Depot: https://h20392.www2.hp.com/portal/swdepot/displayProductInfo.do?productNumber=HPVPR

For more information on HP Insight Control Storage Module for vCenter visit: www.hp.com/go/vmware

vStorage API for Array Integration (VAAI)

The vStorage API for Array Integration (VAAI) is one of the storage application programming interface (API) sets in vSphere 4.1. VAAI is an API storage partners can leverage to enhance performance of virtual machine (VM) management operations by delegating these operations to the storage array. With hardware offload, ESX/ESXi hosts perform certain operations faster and consume less server CPU and memory resources, and also storage port and storage fabric bandwidth. VAAI includes high performance and scalable VM data path primitives. HP introduced VAAI support for HP MSA P2000 Storage array products starting with the T230 firmware release.

Storage Hardware Primitives for VAAI

In the VMware vSphere 4.1 release, the HP StorageWorks P2000 G3 MSA Array Systems offload capabilities support the following three primitives:

- Full Copy or Hardware Assisted Move
- Block Zeroing or Hardware Assisted Zeroing
- Hardware Assisted Locking or Atomic Test and Set (ATS)

Snapshot and Volume Copy Software for the P2000 G3

Product Features

Data Protection

- Snapshots create up to 512 point-in-time pictures of data (512 snaps are exclusive to the P2000 G3)
- Volume Copies create up to 128 point-in-time copies of data
- Recovery is instant - revert data from any previous Snapshot or Volume Copy
- Backup 'snapped' data to disk, virtual tape, or physical tape without a backup window
- A 64 snapshot license and Volume Copy are included with all P2000 G3 models.
- Support and updates are desired for bundled software functionalities (such as 64 LTU Snap and/or Volume Copy etc in the P2000 G3 products) a combination HW + SW support care pack must be purchased.
- HP does not provide warranty assistance for software products included with our base hardware products. This would either be SupportPlus or SupportPlus24. The hardware warranty component of these services is accounted for in the pricing of the SP and SP24 care packs.

Data Testing

- Snap or clone data to test the performance of a software application on 'offline' production data
- Snap or clone data to test how a software patch or enhancement will function on 'offline; production dat0061

P2000 G3 Snapshot and Clone:

G3 controllers/models come STANDARD with 64 snapshots and Volume Copy software
512 Snapshot option is ONLY available and supported with the G3, not the prior generation MSA2000 models

HP P2000 Snapshot 512 Software LTU	TA806A
HP P2000 Snapshot 512 Software E-LTU	TA806AAE

MSA2000 and MSA2000 G2 Snapshot and Volume Copy (clone) software:
Snapshot and Volume Copy software is optional on models other than the P2000 G3.
The following skus are designated for use by the MSA2000 G2 models. They are neither necessary nor available for the P2000 G3 FC.

HP 2000 Modular Smart Array Snapshot 255 Software LTU[1]	T5539A
HP 2000 Modular Smart Array Snapshot 64 Software LTU	T5512A
HP 2000 Modular Smart Array Snapshot 8 Software LTU	T5513A
HP 2000 Modular Smart Array Snapshot 8/255 Upgrade Software LTU[1]	T5540A
HP 2000 Modular Smart Array Snapshot 64/255 Upgrade Software LTU[1]	T5541A
HP 2000 Modular Smart Array Snapshot 8 to 64 Upgrade Software LTU	T5515A
HP 2000 Modular Smart Array Volume Copy Software LTU	T5514A

[1] The snapshot software is supported on G2 and G3 models only. 512 snaps only applies to G3 controllers.

HP P2000 Remote Snap Software
(G3 FC and FC/iSCSI, 1GbE and 10GbE iSCSI controllers only)

- HP P2000 Remote Snap Software is array based software that provides remote replication on the HP P2000 G3 MSA Array products (except SAS model). HP Remote Snap is a form of asynchronous replication which consists of replication of block-level data from a volume on a local system to a volume that may be on the same system or on a second independent system. This second system may be collocated with the first system or may be located at a remote site. It requires T230Rxx controller firmware or higher.
- HP Remote Snap functionality is based on existing Snapshot technology offered by HP P2000 SAN Array products. Snapshots are used to track the data to be replicated as well as to determine the differences in data updated on the master volume, minimizing the amount of data to be transferred.

Optional Software

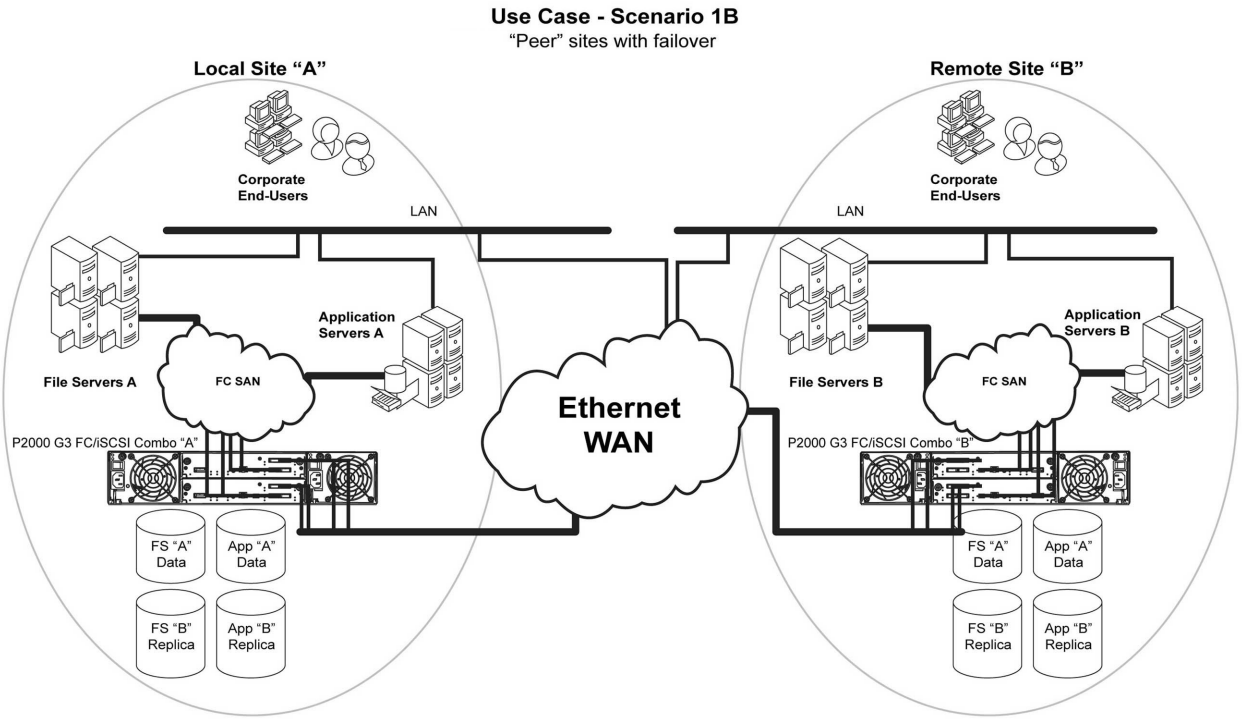
- HP Remote Snap replication technology provides the ability to accomplish key data management and protection capabilities. First, because Remote Snap uses snapshots as the underlying technology it creates multiple local recovery points which can be used for such tasks as to complement daily backups; second, replication provides the ability to access data in a remote site which could be used for dispersed operations; and third but definitely not least important replication allows for business continuance in the event of a failure on the primary site.
- In order to perform a replication, a snapshot of the volume to be replicated is taken, creating a point-in-time image of the data. This point-in-time image is then replicated to the destination volume by copying the data represented by the snapshot via a transport medium such as TCP/IP (iSCSI) or Fibre Channel. The amount of data transferred is minimized though the use of snapshots whenever possible.

HP P2000 Array System Remote Snap Software LTU	TA808A
HP P2000 Array System Remote Snap Software E-LTU	TA808AAE

(NOTE: One license per array is required for replication. For example, if you have two P2000 arrays performing replication (from Primary system to Remote System), you will need 2 licenses).

Product Features

- Storage based asynchronous snapshot replication
- Initial copy of data can be performed locally, reducing burden on wide area networks
- Support of both Ethernet and Fiber Channel interconnects provides flexible options to the application environments.
- Snapshot based replication technology means only changed data will be replicated to alternate site
- Many to 1 replication (up to 4 nodes) - primary use case is to replicate from "many" branch offices to the home office for the purpose of backing up data from the branches
- Single controller to single controller replication
- Mixed controller replication - replication between P2000 G3 Fibre Channel and P2000 G3 FC/iSCSI Combo arrays
- Advanced scheduler provides several options to IT administrators for business continuance
- Flexible architecture allows remote replication between P2000 G3 Fibre Channel and/or P2000 G3 FC/iSCSI Combo arrays. Protects existing investments and enhances business continuity planning objectives.
- Replication Wizard simplifies the task of setting up and establishing replication pairs from one unified, easy to use GUI.
- Snapshot based replication enables both local and remote recovery depending on the need. Snapshot replication isolates problems to a specific point in time which can be selected by the administrator. Additionally snapshot replication supports longer distance replication.
- Multiple relationships provide greater storage flexibility and utilization.
- Bundled 64 Snapshots and Volume Copy integration provides better efficiencies by combining the management and array technologies to create local copies.
- Fast application recovery with minimal or no transaction loss
- Creation of disaster tolerant copies of your critical business data
- No-single-point-of-failure solution to increase the availability of your customers data
- Remote snap operations and I/O can be processed simultaneously on HP 1GbE iSCSI MSA and HP 10GbE iSCSI MSA System controllers



Customer Benefits

Disaster Recovery

Replication technology has typically been used to address disaster recovery issues. Disaster recovery is still the driving business case behind replication. Remote replication can be implemented from the production site to one or more remote sites across a campus, across town, across a state or across the country. When a disaster strikes the primary location, the applications can be brought up at the remote site and continue processing against the replicated copies. When the primary site is back online, the replication can be reversed and when the data is resynchronized, processing can be switched back to the primary site and business can continue. In the past, if an e-mail system experienced a disaster it was an "oh well" moment. The loss of a day or more of e-mail was not considered important. Today, e-mail is a critical component of many companies' business plans and recovering e-mail after a disaster quickly and completely is required.

Maintenance

HP Remote Snap software can also be used to solve other business needs. For instance, E-mail servers may need periodic maintenance that can take hours to complete. With remote replication in place, the downtime can be minimal (as long as it takes to bring the remote peer of the primary e-mail server online). The primary server can be worked on (patches, hardware upgrades, etc.) and then brought back online and into production. A whole datacenter can be failed over to a remote site on purpose to perform maintenance on generators, air conditioning, etc. Replication can also be used to perform a datacenter move with minimal downtime (fail everything to the DR site, move the production datacenter to its new location then fail the DR site back to the new datacenter).

Storage Based

Data replication is performed at the storage subsystem controller level and is totally transparent to the host, alleviating unnecessary host cycles to perform the data mirroring functions. Unlike a fabric based or host based solution, the storage based solution dedicates its resources to managing the replication process between arrays, with minimal impact to applications, other data or devices on the SAN.

Bi-Directional

The bidirectional HP P2000 Array solution addresses the growing need among businesses to ensure continuous availability of applications that are critical to daily business operations. HP P2000 enables two sites in a remote replication connection to use each other as a destination to maintain replicated copies of online data. This maximizes resource utilization while enabling business continuance, even in the event of disaster.

Disaster Tolerance

The P2000 G3 FC products utilize snapshot data online and in real time to a remote P2000 G3 through a local or extended storage area network (SAN). Additionally, data replication can be bidirectional, meaning that a storage array can be both a source and a destination. A particular LUN can be replicated in only one direction between the two storage arrays. Write I/O data sent to the source is replicated by HP P2000 Array to the destination. A pair of properly configured HP P2000 G3 FC arrays is a replication solution that guarantees data integrity in the event of a storage system or site failure.

Normalization (first initial copy)

When a DR site is initially created a normalization or initial copy of the data from the source volume to the target volume must occur. The P2000 G3 array allows this first copy to take place locally. After completion the disks can me manually moved to the remote location. Subsequent changes will only remotely copy the changed blocks.

SAN Extensions

HP P2000 G3 Array provides the capability to replicate data over direct Fibre Channel. The distances supported over dark fiber are determined by the speed of the dark fiber connection and the technology used to communicate over the dark fiber.

Path failover (MPIO)

MPIO for Windows provides a single multi-path solution for HP P2000 G3 Modular Smart Array on HP servers.
Support for Windows 2003 and Windows 2003 R2 operating systems is provided by HP MPIO Full Featured DSM. For the P2000 G3 this version is 2.6.1.7 or greater.
Support for Microsoft Windows 2008 is bundled within the operating system
Support for Linux distributions is with Device Mapper 4.4.0 or greater.
Support for HPUX is native multipathing in HP-UX v3 and PV-Links in HP-UX v2.

HP X3000 G2 Network Storage Gateways

Add more value to your P2000 array

Stretch your P2000 array investment by adding file & print services, iSCSI connectivity, and management hosting with an X3000 G2 Series Network Storage Gateway platform. X Series Network Storage Gateways are optimized file and print server solutions that are built on industry-standard HP ProLiant servers and come with Microsoft Windows Storage Server 2008 R2 operating system pre-installed. Since they're Windows-based, network integration is easy, your tools and data protection applications run right on the box, and management has a familiar look and feel. Like many Network Attached Storage (NAS) devices, they support heterogeneous file serving environments and are pre-configured to install in minutes.

An X3000 G2 Network Storage Gateway is a file/iSCSI gateway that adds IP-based services to your Fibre Channel array or SAN. So it not only enhances your P2000 investment with file and print services, but it helps you save even more by enabling tiered (Fibre Channel and iSCSI) block access for application servers. All of your important client and server data can be managed, scaled, and protected on a single P2000 G3 array.

NOTE: For more information visit: www.hp.com/go/X3000

HP P2000 G3

The P2000 G3 is an 8 Gb Fibre Channel connected 2U storage area network (SAN) or direct connect

Optional Software

Carrier-Grade Components

solution designed for network equipment providers (NEPs) and communication service providers. Suited for those who need a robust telecom infrastructure--- they need storage devices to catch videos, photos, text, new services---need a place to have the data stored and cached.

The HP P2000 Carrier-Grade Chassis (AP841A) is a controller-less 6Gb chassis capable of supporting one or two P2000 G3 8Gb Fibre Channel controllers (AP836A) and has twenty-four Small Form Factor (SFF) drive bays. It comes equipped with two DC-power power supplies.

The HP P2000 2.5-in Dual I/O JBOD is a special model disk enclosure designed only for use with the carrier-grade array heads. It has 24 drive bays (unlike the D2700 with 25 drive bays) and has dual DC-power supplies. It is only sold with a carrier grade array. Five of these JBODs may be cascaded from the array head.

When used in conjunction with specific ProLiant SFF SAS drives, the solution is NEBS certified. NEBS level-3 certification provides the assurance that the equipment is safe to operate and sturdy enough to withstand certain physical and environmental (for example, fire, earthquakes) conditions. For Seismic Zone 4 rating, the P2000 must be mounted in an HP Seismic Rack (AH335A)

P2000 DC-power Carrier-grade SFF Chassis

HP P2000 Modular Smart Array 2.5-in Drive Bay Carrier-Grade Chassis. AP841A
NOTE: NEBS certified

G3 Controller 8Gb FC

HP P2000 G3 MSA Fibre Channel Controller AP836A
NOTE: (1 or 2) With two 8Gb FC ports per controller. NEBS certified.

G3 Controller 6Gb SAS

HP P2000 G3 SAS MSA Array System Controller AW592A
NOTE: (1 or 2) with four 6Gb SAS ports per controller. NEBS certified.

HP Modular Smart Array SC08e 2-ports Ext PCIe x8 SAS Host Bus Adapter 614988-B21

G2 Controller 3Gb SAS

HP 2300sa G2 3Gb SAS Modular Smart Array Controller AJ808A
NOTE: (1 or 2) with four 3Gb SAS ports per controller NEBS certified.

HP SC08Ge 2-ports Ext PCIe x8 SAS Host Bus Adapter 488765-B21
NOTE: (NEBS certified, only to be used with MSA2000sa G2SAS controller.
NOTE: Not for use with G3 product.

SFF Carrier-grade (only) DC-power JBOD

HP P2000 2.5-in Dual I/O DC-power Drive Enclosure. BV921A
NOTE: NEBS certified.
24-drive SFF bays, NEBS certified, NOTE: only sold with carrier-grade arrays

Drives, carrier-grade

HP 146GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive 512547-B21

HP 300GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive 507127-B21

Carrier-grade HBA

HP FC2242SR 4Gb PCIe DC Host Bus Adapter A8003A

HP 82E 8Gb Dual Port PCI-e Fibre Channel Host Bus Adapter AJ763A
NOTE: Emulex 82E

For more information on HP Carrier Grade Platforms go to
http://www.hp.com/products1/servers/carrier_grade/index.html?jumpid=reg_R1002_USEN

Warranty

Three-year limited warranty, parts exchange Next Business day delivery

Enclosures, Hard drives, and Options for the P2000 G3 FC carry their own warranty. Refer to HP's Limited Warranty Statement for more information.

The P2000 G3 FC has been designed with customer self repairable parts to minimize repair time and provide greater flexibility in performing defective parts replacement. Please refer to HP's limited warranty Statement and parts replacement instructions for further details.

http://h18006.www1.hp.com/products/storageworks/warranty.html

Products included in various kits carry their own individual warranties.

NOTE: The warranty of the hard drive options purchased with the P2000 G3 FC, SAS, and 10GbE iSCSI products is different for SAS hard drives versus SAS MDL and SATA hard drives. SAS hard drive options have a three year warranty and SAS MDL and SATA hard drives options have a one year warranty.

HP Care Pack Services: Packaged server and storage services for increased uptime, productivity and ROI
When you buy HP server and storage products and solutions, it's also a good time to think about what levels of support you may need. Our portfolio of service options reduce deployment and management worries while helping you get the most out of your server and storage investments. We take a holistic approach to your environment, bridging servers, blades, storage, software and network infrastructures with our packaged HP Care Pack Services for servers and storage.

Protect your business beyond warranty
When it comes to robustness and reliability, standard computing equipment warranties have matured along with technology. Good news that can also create problems stemming from depending on standard warranties designed to only protect against product defects and some downtime causes. Using a standard approach to warranty uplifts, such as HP Care Pack Services, helps reduce downtime risks and provides operational consistency for mission-critical and standard business computing.

HP Care Pack Services: Upgrading or extending standard server and storage warranties cost effectively
HP Care Pack Services offer a standard reactive hardware and software support services suite sold separately, or combined with our Support Plus and Support Plus 24 services. The portfolio also provides a combination of integrated proactive and reactive services, such as Proactive 24 Service and Critical Service. In addition with HP Proactive Select, you can acquire the specific proactive constancy and technical services. HP Proactive Select menu offers a broad set of service options that you can mix and match depending on your specific requirements. Proactive service options include offers for server, storage, network, SAN device, software, environment and education services.

HP server and storage lifecycle support services offers a full spectrum of customer care-from technology support to complex migrations to complete managed services. HP Factory Express provides customization, integration and deployment services for turnkey solutions. HP Education Services offer flexible, comprehensive training on to help your IT staff get the most out of your server and storage investments. HP Financial solutions extend innovative financing and cost-effective asset management programs-from purchase to equipment retirement.
Learn more: www.hp.com/services/servers and www.hp.com/services/storage

NOTE: Care Pack Services availability may vary by product and country.

HP Care Pack Services are sold by HP and HP Authorized Service Partners:

- Services for customers purchasing from HP or an enterprise reseller are quoted using HP order configuration tools.
- Customers purchasing from a commercial reseller can find HP Care Pack Services at

Recommended HP Care Pack Services for optimal satisfaction with your HP product.

3-Year HP Support Plus 24

For a higher return on your server and storage investment, HP Support Plus 24 provides integrated hardware and software support services designed specifically for your technology. Available 24x7, this 3-year combined reactive support option delivers onsite hardware support and over-the-phone software support around-the-clock. Leverage the full strength of HP Technology Services - customers can trust the services professionals at HP to work collaboratively with them, putting our strategic and technical know-how to work across their entire infrastructure.

- Improve uptime with responsive hardware and software services
- Enjoy consistent service coverage across geographically dispersed sites
- Update HP software at a predictable cost
- Increase customer satisfaction-with no interoperability gaps

http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-6638EEE

HP MSA Family Disk Array Installation and Startup Service

For smooth startup, HP MSA Family Disk Array Installation and Startup Service -provides you with a custom-tailored deployment of the MSA Array so that it is properly integrated into your storage environment, and helps you realize the maximum benefit from your storage investment. In today's new era of business technology, technology must produce thousands of business outcomes. Today's HP Technology Services portfolio helps customers manage their technology in action-because when technology works, business works.

- Verification that any service prerequisites are met prior to installation
- Delivery of the service at a mutually scheduled convenient time
- Installation of HP MSA and SAN deployment according to product specification
- Availability of an HP service specialist to answer basic questions during the onsite delivery of this service
- Customized installation plan to support unique configuration requirements

http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA0-3048ENW.pdf

HP Proactive Select Service

HP Proactive Select Service improves your IT performance and manageability through the use of cost effective flexible services. HP provides technical expertise and best practices to accelerate ROI of your technology investment. Selectable proactive services span a wide range of technology and process services - a flexible way to purchase proactive services that fit your particular environment and situation.

HP Proactive Select Service is technology agnostic and purchased in addition to your choice of underlying reactive support.

- Access to a list of flexible and customizable proactive service activities
- Enhance customers' in-house IT team with complementary assistance from HP
- Improved time to solution
- Reduce business risk and project costs by accessing HP specialists
- Simplify IT operational procedures by leveraging HP best practices

http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA2-3842ENN.pdf

Optional HP Care Pack Services that will enhance your HP product experience.

5-Year HP Support Plus 24

As an alternative to our recommended support level, for customers who need to improve uptime with responsive 24x7 product support:
HP Support Plus 24 helps you increase performance and availability with comprehensive, consistent hardware and software services. Working with your IT team, HP Services engineers deliver onsite hardware support and over-the-phone software support around-the-clock 365 days per year. Service coverage encompasses HP products and selected multivendor hardware and software.

In addition, this convenient HP Care Pack packaged service makes software updates available to you at substantial savings.

Choose Support Plus 24 when you need to:

- Improve uptime with responsive hardware and software services available anytime
- Cost-effectively obtain expert 24x7 multivendor hardware and software support
- Enjoy consistent service coverage across geographically dispersed sites
- Update HP and selected third-party software at a predictable cost
- Take advantage of subscription savings on software updates

http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-6638EN.pdf

HP Entry Storage Data Migration Service for Windows

For customers who need to safely migrate Windows data within their TCP/IP networks with minimal impact to their operations:
You have a need to migrate data between Windows servers within your TCP/IP network. Or you have a need to migrate storage for your Windows servers. Or both. And you need to accomplish these migrations efficiently while minimizing risk at the same time.

HP Entry Storage Data Migration Service for Windows offers you a cost competitive and convenient way to accommodate data migration triggered by a need to refresh or consolidate storage, or to create different storage tiers. This service offers a migration cost in line with the costs of storage products in small and medium-sized storage environments. The service is delivered via a skilled HP service specialist with special consideration for data availability, integrity, and ongoing operational performance during the transfer process.
http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA2-4734ENW.pdf

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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

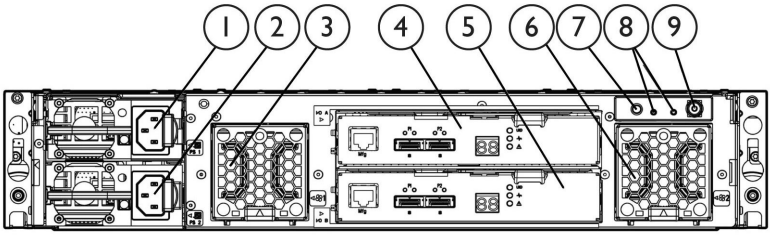
HP Insight Remote Support software delivers secure remote monitoring and support for your HP Servers and Storage, 24 X 7, so you can spend less time solving problems and more time focused on your

	business. You can have your systems remotely monitored for hardware failure using secure technology that's been proven at thousands of companies around the world. In many cases, you can avoid problems before they occur.
Customer Technical Training	HP Education Services In today's cost-conscious business environment, IT professionals, developers, consultants and users face an interesting challenge: how to keep up with the latest technologies and expand important skills while delivering profitable results on current projects. To help address this challenge, HP offers innovative training solutions that help keep you up-to-date on virtualization, server, storage, Insight Control, Citrix, Microsoft® and open source/Linux-related topics-while spending less time away from business-critical activities.
HP Services Awards	HP Technology Services continues to be recognized for service and support excellence by customers, partners, industry organizations and publications around the world. Recent honors and award reflect our services team's dedications, technical expertise, professionalism and uncompromising commitment to customer satisfaction.
Additional Services Information	To learn more on HP ProLiant servers, HP BladeSystem servers and HP storage products, please contact your HP sales representative or HP Authorized Channel Partner. Or visit www.hp.com/services/proliant or www.hp.com/services/bladesystem or http://www.hp.com/hps/storage

Configure to Order Program Information

HP has a very successful Configure to Order program for the P2000 G3 family The P2000 G3 models and options may or may not be factory installed in a rack with add-on controllers, switches, P2000 disk enclosures and hard drives. The P2000 G3 arrays may be integrated with ProLiant servers or as standalone storage.
Orders to be shipped through the CTO process must have a minimum of two drives of the same type (SAS, SAS MDL, or SATA) ordered per controller. SAN Starter Kits are not eligible for CTO.

Description	Product #
P2000 G3 Controllers & Controller-less Chassis	
HP P2000 G3 FC Modular Smart Array Controller NOTE: two 8Gb FC ports	AP836A#0D1
HP P2000 G3 FC/iSCSI Combo Modular Smart Array Controller NOTE: two 8Gb FC ports and two 1GbE iSCSI ports	AP837A#0D1
HP P2000 G3 SAS Modular Smart Array Controller NOTE: four 6Gb 4x SAS ports	AW592A#0D1
HP P2000 G3 10GbE iSCSI Modular Smart Array Controller NOTE: two 10GbE iSCSI ports	AW595A#0D1
HP P2000 G3 iSCSI MSA Array System Controller NOTE: four 1Gb Ethernet iSCSI ports	BK829A#0D1
HP P2000 Modular Smart Array 3.5-in Drive Bay Chassis (LFF) NOTE: Will accept one or two controllers or Disk Enclosure I/O modules	AP838A#0D1
HP P2000 Modular Smart Array 2.5-in Drive Bay Chassis (SFF) NOTE: Will accept one or two controllers, not I/O modules	AP839A#0D1
Disk Enclosures	
HP P2000 Dual I/O LFF Drive Enclosure, NOTE: twelve 3.5" drive bays Used with single or dual controller LFF or SFF array head	AP843A#0D1
HP P2000 LFF Drive Enclosure I/O Module NOTE: no cable included. Designed for use with blank LFF chassis AP838A	AP844A#0D1
Configured Units	
HP P2000 G3 FC MSA Dual Controller LFF Modular Smart Array System	AP845A#0D1
HP P2000 G3 FC MSA Dual Controller SFF Modular Smart Array System	AP846A#0D1
HP P2000 G3 FC/iSCSI MSA Dual Combo Controller LFF Array	AW567A#0D1
HP P2000 G3 FC/iSCSI MSA Dual Combo Controller SFF Array	AW568A#0D1
HP P2000 G3 SAS MSA Dual Controller LFF Modular Smart Array System	AW593A#0D1
HP P2000 G3 SAS MSA Dual Controller SFF Modular Smart Array System	AW594A#0D1
HP P2000 G3 10GbE iSCSI MSA Dual Controller LFF Array System	AW596A#0D1
HP P2000 G3 10GbE iSCSI MSA Dual Controller SFF Array System	AW597A#0D1
HP P2000 G3 iSCSI MSA Dual Controller LFF Array System	BK830A#0D1
HP P2000 G3 iSCSI MSA Dual Controller SFF Array System	BK831A#0D1



HP D2700 Disk Enclosure

Rear Panel components

1. Power Supply 1
2. Power Supply 2
3. Fan 1
4. I/O Module A
5. I/O Module B
6. Fan 2
7. Rear UID push button
8. Enclosure LEDs
9. Power on/standby button

D2700	HP D2700 Disk Enclosure NOTE: 25 Small Form Factor (SFF) drive bays	AJ941A#0D1
SAS & SATA Drives (SFF 2.5-inch)	HP 146GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	507125-B21
	HP 300GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	507127-B21
	HP 450GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	581284-B21
	HP 600GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	581286-B21
	HP 900GB 6G SAS 10K rpm SFF (2.5-inch) Enterprise 3yr Warranty Hard Drive	619291-B21
	HP 72GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	512545-B21
	HP 146GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	512547-B21
	HP 1TB 6G SAS 7.2K rpm SFF (2.5-inch) Hot Plug Midline 1yr Warranty Hard Drive	605835-B21
	HP 500GB 6G SAS 7.2K rpm SFF (2.5-inch) Dual Port Midline 1yr Warranty Hard Drive	507610-B21
	HP 500GB 3G SATA 7.2K rpm SFF (2.5-inch) Midline 1yr Warranty Hard Drive	507750-B21
	NOTE: Go to the HP Hard Drive Compatibility table for complete drive compatibility information (http://www.hp.com/products/harddiskdrives). Using hard drives in unsupported configurations will result in voiding the warranty and could result in damage to the drive and/or loss of data.	

Configuration Information

Step 1 - P2000 G3 - Base Configuration

Select one:

Model Name	Part Number
HP P2000 Modular Smart Array 3.5-inch Drive Bay Chassis	AP838A
• Controller-less chassis with twelve Large Form Factor (LFF) drive bays. Space for two controllers.	
HP P2000 Modular Smart Array 2.5-inch Drive Bay Chassis	AP839A
• Controller-less chassis with twenty-four Small Form Factor (SFF) ProLiant drives bays. Space for two controllers.	

There are two array-head chassis - one with twelve 3.5-inch large form factor bays, the other with twenty-four 2.5-inch small form factor drive bays. For an additional twelve drive bays purchase a P2000 3.5-inch Disk Enclosure. You may attach a total of seven P2000 Drive Enclosures for a total of ninety-six LFF drive bays. For 25 additional SFF drive bays purchase D2700 JBOD. You may attach a total of five D2700 JBODs for a total of one hundred and forty nine SFF drive bays. Dual I/O modules JBODS support both single and dual controller arrays.

Step 2 - Options

Select each option with quantities specified.

Step 2a - Options

Quantity	Description with Parts Shipped:	Part Number
1 or 2	HP P2000 G3 MSA Fibre Channel Controller NOTE: for either the LFF or SFF P2000 or the two DC-powered chassis	AP836A
1 or 2	HP P2000 G3 MSA FC/iSCSI Combo Modular Smart Array Controller NOTE: for either the LFF or SFF P2000 or the two DC-powered chassis	AP837A
1 or 2	HP P2000 G3 SAS MSA Array System Controller NOTE: for either the LFF or SFF P2000 or the two DC-powered chassis	AW592A
1 or 2	HP P2000 G3 10GbE iSCSI MSA Array System Controller NOTE: for either the LFF or SFF P2000 or the two DC-powered chassis	AW595A
1 or 2	HP P2000 G3 iSCSI MSA Array System Controller NOTE: for either the LFF or SFF P2000 or the two DC-powered chassis	BK829A

Configuration Information

Step 2b - SAS and SATA Drive Options

NOTE: SATA drives are designed for archival or reference data. They should not be used in a heavy or intense I/O environment. Those situations require the use of enterprise-class SAS drives. P2000 3.5-inch drives are for use only with P2000 products.

P2000 Large Form Factor (LFF) SAS drives for P2000 G3 FC and P2000 3.5-inch Disk Enclosure

HP P2000 300GB 6G SAS 15K rpm LFF Dual Port Enterprise Hard Drive	AP858A
HP P2000 450GB 6G SAS 15K rpm LFF Dual Port Enterprise Hard Drive	AP859A
HP P2000 600GB 6G SAS 15K rpm LFF Dual Port Enterprise Hard Drive	AP860A

P2000 Large Form Factor (LFF) SAS MDL DP drives for P2000 G3 FC and P2000 3.5-inch Disk Enclosure

HP P2000 1TB 6G SAS 7.2K LFF (3.5-inch) Dual Port MDL Hard Drive	AP861A
HP P2000 2TB 6G SAS 7.2K LFF (3.5 inch) DP MDL HDD	AW555A
HP P2000 3TB 6G SAS 7.2K 3.5 in MDL HDD	QK703A

NOTE: Before installing 3TB HDDs in an P2000 G3 Array please update P2000 array controller firmware to version TS230Rxxx or later

MSA2 Large Form Factor (LFF) SATA drives for P2000 array head an P2000 disk enclosure

HP MSA2 1TB 7.2K rpm 3.5 inch Dual-port SATA Hard Disk Drive	AJ740A
HP P2000 2TB 3G SATA 7.2K LFF MDL Hard Drive	AW556A

ProLiant Small Form Factor (SFF) SAS drives for P2000 G3 Array (24 drive bay) and the D2700 JBOD (25 drive bay)

HP 146GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	507125-B21
HP 300GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	507127-B21
HP 450GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	581284-B21
HP 600GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	581286-B21
HP 900GB 6G SAS 10K rpm SFF (2.5-inch) Enterprise 3yr Warranty Hard Drive	619291-B21
HP 72GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	512545-B21
HP 146GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	512547-B21

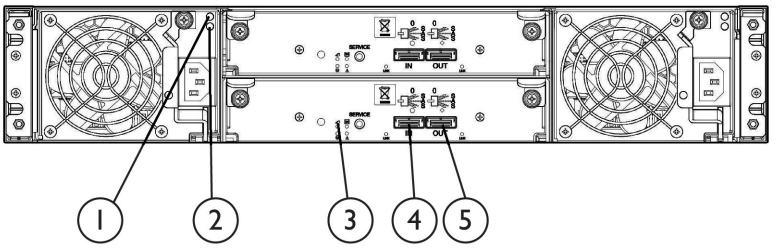
ProLiant Small Form Factor (SFF) SAS MidLine drive for P2000 G3 Array (24 drive bay) and the D2700 JBOD (25 drive bay)

HP 500GB 6G SAS 7.2K rpm SFF (2.5-inch) Dual Port Midline 1yr Warranty Hard Drive	507610-B21
HP 1TB 6G SAS 7.2K rpm SFF (2.5-inch) Hot Plug Midline 1yr Warranty Hard Drive	605835-B21

ProLiant Small Form Factor (SFF) SATA MidLine drive for P2000 G3 Array (24 drive bay) and the D2700 JBOD (25 drive bay)
(NOTE: SFF SATA drives are single ported and therefore do not have a fail-over path intrinsic to their design)

HP 500GB 3G SATA 7.2K rpm SFF (2.5-inch) Midline 1yr Warranty Hard Drive	507750-B21

Step 2c - Drive Enclosure Options



P2000 Dual I/O 3.5-inch 12 Drive Enclosure

Rear Panel components

1. Power Indicator
2. Fault Indicator
3. Unit Locator
4. SAS In Port
5. SAS Out Port

Use either disk enclosure with Large or Small Form Factor, single or dual controller array heads. Each ship with two .5m mini-SAS to mini-SAS cables.

HP P2000 Dual I/O 3.5-inch 12 Drive Disk Enclosure	AP843A
HP D2700 Dual I/O 2.5-inch 25 Drive Disk Enclosure	AJ941A
HP P2000 Drive Enclosure I/O Module	AP844A

NOTE: Only used in conjunction with the P2000 blank chassis (AP838A) if a single I/O disk enclosure is desired. No cable included)

Step 2c - SAS Cable Options

miniSAS to miniSAS Cables:

Connecting P2000 G3 FC or SAS controller to a JBOD if a longer cable is desired. Also used for attaching the P2000 G3 SAS host ports to servers

HP Ext miniSAS to miniSAS 2m Cable	407339-B21

Step 3 - Other P2000 G3 Options

Choose optional AC Power Cords (2 required)

NOTE: Two PDU cables: one 142263-008 (Black) and one 1422633-013 (Grey), ship standard with all AC-powered enclosures.

Power Cord, 220/240 VAC, (US/Canada/Mexico)	227099-001
Power Cord, (Australia/China/New Zealand)	227098-001
Power Cord, (Central Europe)	157215-001
Power Cord, (United Kingdom/Hong Kong)	157216-001
Power Cord, (Switzerland)	157219-001
Power Cord, (Italy)	157217-001
Power Cord, (Denmark)	157218-001
Power Cord, (Japan)	139867-001
Power Cord, (South East Asia/India)	157220-001

Step 4a - Choose Supported Options For Fibre Channel Infrastructure

	Model	Description	Part Number
Fibre Channel Host Bus Adapters - X86 servers	BladeSystem c-Class Fibre Channel Mezzanine HBAs		
		QLogic QMH2562 8Gb FC HBA for HP c-Class BladeSystem	451871-B21
		HP BLc Emulex LPe1205- 8Gb FC HBA for HP c-Class BladeSystem	456972-B21
		Lpe1105-HP 4Gb FC HBA for HP c-Class BladeSystem	403621-B21
		QMH2462 4Gb FC HBA for HP c-Class BladeSystem Windows and Linux	403619-B21
		Brocade 804 8Gb FC HBA for HP BladeSystem c-Class, Windows, VMware, Linux	590647-B21
	Fibre Channel HBAs		
	NOTE: Please visit www.hp.com/go/fchba for product details and www.hp.com/storage/spock for compatibility details.		
	Brocade Fibre Channel HBAs		
		HP 81B PCI-e FC HBA Single Port	AP769A
		HP 82B PCI-e FC HBA Dual Port	AP770A
		HP 41B 4Gb PCI-e FC HBA	AP767A
		HP 42B 4Gb Dual-Port PCI-e FC HBA	AP768A
	Emulex Fibre Channel HBAs		
		HP 81E PCI-e FC HBA Single Port	AJ762A
		HP 82E PCI-e FC HBA Dual Port	AJ763A
		HP FC2142 4Gb PCI-e HBA	A8002A
		HP FC2242 Dual Channel 4Gb PCI-e HBA	A8003A
	QLogic Fibre Channel HBAs		
		HP 81Q PCI-e FC HBA Single Port	AK344A
		HP 82Q PCI-e FC HBA Dual Port	AJ764A
		HP FC1142 4Gb PCI-e HBA	AE311A
		HP FC1242 Dual Channel 4Gb PCI-e HBA	AE312A
Fibre Channel Host Bus Adapters - Integrity servers	Integrity	HP PCI-X 2.0 1Port 4Gb	AB378B
		HP PCI-X 2.0 2Port 4Gb Fibre Channel HBA	AB379B
		HP PCIe 2Port 4Gb Fibre Channel HBA	AD300A
		HP PCIe 1Port 4Gb Fibre Channel HBA	AD299A
		HP PCIe 2-Port 4Gb Fibre Channel HBA	AD355A
		HP PCIe 1-port 4Gb and 1-port 1000BT Adapter	AD221A
		HP PCIe 2-port 4Gb and 2-port 1000BT Adapter	AD222A
		HP PCIe 2-port 4Gb and 2-port 1000BSX Adapter	AD393A
		HP PCI-X 1-port 4Gb FC and 1-port 1000BT Adapter	AD193A
		HP PCI-X 2-port 4Gb FC and 2-port 1000BT Adapter	AD194A
		HP PCI Express 1-port 8Gb Fibre Channel SR (QLogic) Adapter	AH400A
		HP PCI Express 2-port 8Gb Fibre Channel SR (QLogic) Adapter	AH401A
		HP PCIe 1-port 8Gb FC SR (Emulex) HBA	AH402A

		HP PCIe 2-port 8Gb FC SR (Emulex) HBA	AH403A
	Integrity server blades	Emulex LPe1105 4Gb Fibre Channel Host Bus Adapter for c-Class BladeSystem	403621-B21
		QLogic QMH2462 4Gb Fibre Channel Host Bus Adapter for c-Class BladeSystem	403619-B21
		QLogic QMH2562 8Gb Fibre Channel Host Bus Adapter for c-Class BladeSystem	451871-B21
		Emulex LPe1205 8Gb Fibre Channel Host Bus Adapter for c-Class BladeSystem	456972-B21

Fibre Channel Switches	HP 8/8 Base SAN Switch	AM866A
	HP 8/8 SAN Switch	AM867A
	HP 8/24 Base SAN Switch	AM868A
	HP 8/40 Base SAN Switch	AM869A
	HP 8/40 Power Pack+ SAN Switch	AM870A
	HP 8/80 Power Pack+ SAN Switch	AM872A
	HP 8/80 Base SAN Switch	AM871A
	HP 1606 Power Pack+ Extension SAN Switch	AP864A
	HP 1606 Full Extension SAN Switch	AP863A
	HP 1606 Base Extension SAN Switch	AP862A
	HP 2408 FCoE Base Converged Network Switch	AP801A
	HP 2408 FCoE Power Pack+ Converged Network Switch	AP802A
	Brocade 8/12c SAN Switch for HP BladeSystem c-Class	AJ820A
	Brocade 8/24c SAN Switch for HP BladeSystem c-Class	AJ821A
	Brocade 8/24c SAN Switch for HP BladeSystem c-Class Power Pack+	AJ822A
	HP 8/20q Fibre Channel Switch NOTE: 8 device ports active, upgradeable to 20 device ports active	AQ233A
	HP 8Gb Simple SAN Connection Kit NOTE: 8 device ports active, upgradeable to 20 device ports active	AK241A
	HP 8/20q Fibre Channel Switch NOTE: 16 switch ports active	AK242A
	HP SN6000 Stackable 8Gb 24-port single power supply FC Switch NOTE: 20 device ports active/4 stacking (ISL) ports active	AW575A
	HP SN6000 Stackable 8Gb 24-port dual power supply FC Switch NOTE: 20 device ports active/4 stacking (ISL) ports active	AW576A
	HP SN6000 Stackable 8 Gb 12-port Single Power Fibre Channel Switch NOTE: 8 device ports/4 stacking (ISL) ports active, upgradeable to 20 device ports active	BK780A
	Cisco MDS 9124 8-ports Active Fabric Switch	AG646A
	Cisco MDS 9124 16-ports Active Fabric Switch	AG647A
	Cisco MDS 9124 24-ports Active Fabric Switch	AG648A
	Cisco MDS 8Gb 12-port Fabric Switch for HP BladeSystem c-Class	AW563A
	Cisco MDS 8Gb 24-port Fabric Switch for HP BladeSystem c-Class	AW564A
	Cisco MDS 9124e 12-port Fabric Switch for HP c-Class BladeSystem	AG641A

	Cisco MDS 9124e 24-port Fabric Switch for HP c-Class BladeSystem	AG642A
	Cisco MDS 9134 24-ports Active Fabric Switch	AG874A
	Cisco MDS 9134 32-ports Active Fabric Switch	AG875A
	Cisco MDS 9222i Fabric Switch	AG851B
	HP SN6000C 16-ports Active Fabric Switch	AW585A
	HP SN6000C 32-ports Active Fabric Switch	AW586A
	HP Nexus 5010 Converged Network Switch	AP775A
	HP Nexus 5020 Converged Network Switch	AP776A
PremierFlex OM3+ type cables P2000 G3	0.5m PremierFlex LC/LC Multi-Mode Optical Cable	BK837A
	1m PremierFlex LC/LC Multi-Mode Optical Cable	BK838A
	2m PremierFlex LC/LC Multi-Mode Optical Cable	BK839A
	5m PremierFlex LC/LC Multi-Mode Optical Cable	BK840A
	15m PremierFlex LC/LC Multi-Mode Optical Cable	BK841A
	30m PremierFlex LC/LC Multi-Mode Optical Cable	BK842A
	50m PremierFlex LC/LC Multi-Mode Optical Cable	BK843A
OM3 FC LC-LC cables options for the P2000 G3	LC-LC Multi-Mode OM3 Fibre Channel Cable 0.5m	AJ833A
	LC-LC Multi-Mode OM3 Fibre Channel Cable 1m	AJ834A
	LC-LC Multi-Mode OM3 Fibre Channel Cable 2m	AJ835A
	LC-LC Multi-Mode OM3 Fibre Channel Cable 5m	AJ836A
	LC-LC Multi-Mode OM3 Fibre Channel Cable 15m	AJ837A
	LC-LC Multi-Mode OM3 Fibre Channel Cable 30m	AJ838A
	LC-LC Multi-Mode OM3 Fibre Channel Cable 50m	AJ839A
OM2 LC-LC type cables	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
LC-SC for between 1 Gb and 2Gb devices	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

Step 4b - Choose Supported Options For 10GbE Infrastructure

- verify that the cable/transceiver is supported with the connecting device (i.e. switch or NIC/iSCSI HBA)

Configuration Information

Copper Cable	HP 0.5m SFP+ 10GbE Copper Cable	487649-B21
	HP 1m SFP+ 10GbE Copper Cable	487652-B21
	HP 3m SFP+ 10GbE Copper Cable	487655-B21
	HP 5m SFP+ 10GbE Copper Cable	537963-B21
	HP 7m SFP+ 10GbE Copper Cable	487658-B21
SFP	HP BladeSystem 10Gb SR SFP+	455883-B21
	HP BladeSystem 10Gb LRM SFP+	455889-B21
	HP ProCurve 10-GbE SFP+ 1m Direct Attach Cable	J9281B
	HP ProCurve 10-GbE SFP+ 3m Direct Attach Cable	J9283B
	HP ProCurve 10-GbE SFP+ 7m Direct Attach Cable	J9285B
	HP ProCurve 10-GbE SFP+ SR Transceiver	J9150A
	HP ProCurve 10-GbE SFP+ LRM Transceiver	J9152A
NIC	HP NC522SFP Dual Port 10GbE Server Adapter	468332-B21
	HP NC524SFP Dual Port 10GbE Module	489892-B21
	HP NC550SFP Dual Port 10GbE Server Adapter	581201-B21
	HP NC522m Dual Port Flex -10 10GbE Multifunction BL-c Adapter	467801-B21
	HP NC532m 10GbE Dual Port Flex-10 10GbE Multifunction BL-c Adapter	467799-B21
	HP NC550m 10Gb 2-port PCIe x8 Flex-10 Ethernet Adapter	581204-B21
iSCSI HBA - standup	Qlogic QLe4062c	Reference sell
iSCSI HBA - mezz	HP BLc QLogic iSCSI Dual Port Adapter with Virtual Connect Kit	488074-B22
NIC - mezz	HP NC522m Dual Port 10GbE Multifunction BL-c Adapter	467801-B21

Step 4c - Choose Supported Options For SAS connection

	HP SC08e 6Gb SAS HBA for rack servers	614988-B21
	HP Smart Array P712m Controller/256 for Server Blades	488348-B21
	HP Smart Array P711m Controller/1 for Server Blades	513778-B21
	HP 6Gb/s SAS BL Switch - Single Pack for BladeSystems	BK763A
	HP 6Gb/s SAS BL Switch - Dual Pack for BladeSystems	BK764A
	HP Ext Mini SAS 2M cable	407339-B21
	HP Ext Mini SAS 4m cable - (only be used when connecting a SAS HBA or 6Gb SAS switch to a SAS controller. Connecting it to disk enclosures is not supported.)	432238-B21

Step 5 - Choose Rack Options

Please refer to the HP Infrastructure products page for more information on HP racks and rack options or the HP 10000 G2 Series Rack QuickSpec.
http://h18004.www1.hp.com/products/servers/platforms/rackandpower.html
http://h18000.www1.hp.com/products/quickspecs/12402_div/12402_div.HTML

P2000 G3 FC P2000 G3 FC/iSCSI P2000 G3 SAS P2000 G3 10GbE iSCSI P2000 G3 iSCSI (1Gb)	**POWER REQUIREMENTS**	
	Input Power Requirements (typical-running I/O) SFF/LFF arrays	• 8G FC (2 Port - 8G FC) 110VAC 3.32A, 344-390 W; 220VAC 1.61A,374-432W • FC/iSCSI Combo (2 Port - 8G FC + 2 Port -1G iSCSI) 110VAC; 3.64A,357-418W, 220VAC 1.77 A, 365-424W • 6G SAS (4 Port - 6G SAS) 110VAC 3.49A,344-390W, 220VAC 1.7A 374-432W • 10GbE iSCSI (2 Port - 10 GbE iSCSI) 110VAC 3.67A, 395W, 220VAC,1.95A 388.2W • 1G iSCSI (4 Port - 1GbE iSCSI) 110VAC 3.3A 363W, 220VAC, 1.63A 360W
	Max Input Power	100-240 VAC, 50/60 Hz., 4.5-1.9A; 48-60 VDC 10.4A/8.3A
	Heat Dissipation	1622 BTU/hr
	TEMPERATURE AND HUMIDITY RANGES	
	Operating Temperature	41°F to 104°F (5°C to 40°C)
	Shipping Temperature	-40°F to 158°F (-40°C to 70°C)
	Operating Humidity	10% to 90% RH @ 104°F (40°C) non-condensing
	Non-Operating Humidity	Up to 93% RH @ 104°F (40°C)
	DECLARED ACOUSTIC NOISE LEVELS	
	Sound Power	A weighted sound power LWAd=6,75 B
	Sound Pressure	A weighted sound pressure LpAm - 55dB
	SHOCK AND VIBRATION	
	Shock, Operational	10G's for 10 milliseconds
	Shock, Non-Operational	15G 11ms half sine
	Vibration, Operational	5-500Hz, 0.21Grms flat
	Vibration, Non-Operational	3-365-3Hz, 1.22 Grms,z-axis,0.85 Grms, X&Y axis shaped spectrum
	PHYSICAL	
	Height	3.5 in/ 8.9 cm
	Depth (excluding cables) (back of ear to back of controller handle)	P2000 G3 SFF 24-bay array: 20.28 in / 51.510 cm P2000 G3 LFF 12-bay array: 21.3 in. / 55.1 cm
	Width (body only)	17.6 in / 44.7 cm (w/ ears 19 in / 48.26 cm)
	Chassis Weight (no controllers)	P2000 LFF chassis: 34.1 lbs. (DC-pwr model: 37.9 lbs) P2000 SFF chassis: 32.3 lbs (DC-pwr model: 36.1 lbs)

Technical Specifications

P2000 G3 FC Controller FC/iSCSI Combo Controller P2000 G3 SAS Controller P2000 G3 10GbE iSCSI Controller P2000 G3 iSCSI Controller (1Gb)	User Interface	Status and activity provided via management interfaces. Status Indicators on front of Controller
	RAID Support	0, 1, 3, 5, 6, 10, 50
	Cache Memory	2GB Read/Write. ECC protection with backup to Flash memory (indefinite backup)
	Cache Backup	ECC protection with back up to flash memory (indefinite backup)
	Upgradeable Firmware	yes
	Disk Drive and Enclosure Protocol Support	6 Gb SAS - Serial Attached SCSI
	Host Ports	FC: 2 x 8Gb Fibre Channel SFP+ SAS: 4 -4x lane 6 Gb SAS Host Connections 10GbE iSCSI: 2 x 10GbE SFP+ 1GbE iSCSI: 4 x 1GbE RJ45
	Expansion Port	SAS (SFF8088) 4x lane 6 Gb SAS
	Weight, controller	P2000 G3 Fibre Channel, FC/iSCSI, SAS, and 10GbE iSCSI MSA Controllers 4.5lbs. 1GbE iSCSI is 4.89 lbs

P2000 G3 Regulatory Info	Safety	UL 60950-1 (USA)
		CAN/CSA-C22.2 No.60950-1-03 (Canada)
		EN 60950-1 (European Union)
		GS mark (Germany)
		IEC 60950-1 (International)
		CCC Mark (power supply only, China PRC)
	Electromagnetic Compatibility	VCCI:2008-04 Class A (Japan)
		FCC 15:109(g) Class A (USA)
		ICES-003:2004 Class A (Canada)
		EN55022 : (European Union Class A); CISPR 22 (International Class A)
		EN61000-3-2 : (Harmonics) (European Union)
		EN61000-3-3 : (Flicker) (European Union)
		EN 55024 (European Union, Immunity, Class A);CISPR 24 (International Immunity, Class A)
		AS/NZS CISPR 22, Class A (Australia, New Zealand)
		CNS 13438 Taiwan, Class A (Taiwan)
		KN22 Class A (Emissions Class A); KN24 (Immunity) (S Korea)
	RoHS and WEEE	RoHS-6/6 Compliance, China RoHS, WEEE
	Country Approvals	United States ,Australia/New Zealand, Canada, China (PRC), European Union, Germany (GS Mark), Japan, South Korea, Taiwan