

Subchapter 4.6—Mass Storage

4.6.1—HP StorageWorks Disk System 2100 (DS2100) and Disk System 2110 (DS2110)

Description

The HP StorageWorks Disk System 2100 is a four-slot Ultra3 SCSI capable interface Storage Enclosure. The enclosure is 1 EIA unit high and consists of a single bay in front that has 4 horizontally oriented hot-swappable disk module slots. The low voltage differential Ultra3 SCSI bus provides a data transfer rate of up to 160 MB/s. Storage capacity is either 18 to 293 GB in a 1U chassis.

The DS2110 is identical to the DS2100 except that it has enhanced power capability to be able to support the newer capacity and performance points made available with the newer disk mechanisms. The enclosure also integrates 1 power supply, 2 non-redundant fans modules and the SCSI backplane. The DS21xx is intended as a stand-alone JBOD, connected to one host. The power supply and fans are integral to the chassis and are not replaceable individually. The entire chassis, minus disk modules, is a field replaceable unit (FRU).

The Disk System 2100 is not operating system specific. It is designed to work with any Ultra3 SCSI LVD equipped workstation or server and is backward compatible to slower SCSI LVD interfaces. The DS2110 is not operating system specific, either. It is designed to work with any Ultra320 SCSI LVD equipped workstation or server and is backward compatible to slower Ultra3, or Ultra160, LVD interfaces. However, both enclosures are limited to U160 operation. This limitation must be implemented by HBA configuration during the system's boot process. Please be aware that when the DS21xx is configured for single-ended (SCSI/SE) operation, only one unit with up to four drives may be connected to the SCSI interface.

Internally, the hot-swappable disk modules are all on the same bus. There are two SCSI connectors, labeled LVD/SE. Either port can be used for host connect, with the other for daisy chaining to another enclosure. When there are no additional devices to be connected to the DS21xx, the unused port must be terminated with a LVD/SE SCSI termination plug (C2364A), which is included with the enclosure. A total of three enclosures can be connected on the same bus with a single initiator, and a total of two enclosures can be connected on the same bus with dual initiators (due to the addressing scheme of the enclosure, ID 6 needs to be used for the second initiator).

The rear of the enclosure has two 68-pin HD SCSI LVD connectors, power connector, a power switch and a 3-position switch for setting the SCSI address ranges for the enclosure's disk modules.

This storage enclosure is available in field rack, desktop and factory rack configurations. A minimum of one disk drive must be installed for the Disk System 21xx to function.

The Disk System 21xx also includes product manuals, 68-pin LVD/SE terminator plug, disk drive filler panels and an AC power cord.

The DS2100 will support new Ultra320 drives that will replace the existing capacity and performance points, but only at Ultra160 transfer rates. The DS2100 will not be able to support the new Ultra320 capacity and performance points, and will not support Ultra320 73-GB 15K RPM or Ultra320 146-GB 10K RPM drives. Additionally, both enclosures will only support host connectivity at U160 performance levels.

Figure 4.6.1.1 Disk System 21xx



Table 4.6.1.1 HP Disk System 2100 or HP Disk System 2110—Field rack

Product/Option Number	Description
A5675A	Disk System 2100 field rack enclosure (Enterprise systems)
A5675AE	Disk System 2100 field rack enclosure with no disk integration (Enterprise Systems)
A7381A	Disk System 2110 field rack enclosure
A7381AE	Disk System 2110 field rack enclosure (empty enclosure for distributor stocking – disk drives cannot be integrated)
A6571A option OD1	36-GB 10K RPM LVD Ultra320 disk module installed into the A5675A or A7381A field rack enclosure
A7285A	73-GB 10K RPM LVD Ultra320 disk module add-on
A7285A option OD1	73-GB 10K RPM LVD Ultra320 disk module installed into the A5675A or A7381A field rack enclosure
A7286A	73-GB 15K RPM LVD Ultra320 disk module add-on (for the DS2110 ONLY – not supported in the DS2100!)
A7286A option OD1	73-GB 15K RPM LVD Ultra320 disk module installed into the A7381A field rack enclosure (for the DS2110 ONLY – not supported in the DS2100!)
A7287A	146-GB 10K RPM LVD Ultra320 disk module add-on (for the DS2110 ONLY – not supported in the DS2100!)
A7287A option OD1	146-GB 10K RPM LVD Ultra320 disk module installed into the A7381A field rack enclosure (for the DS2110 ONLY – not supported in the DS2100!)
A7328A	18-GB 15K RPM LVD Ultra320 disk module add-on
A7328A option OD1	18-GB 15K RPM LVD Ultra320 disk module installed into the A5675A or A7381A field rack enclosure
A7329A	36-GB 15K RPM LVD Ultra320 disk module add-on
A7329A option OD1	36-GB 15K RPM LVD Ultra320 disk module installed into the A5675A or A7381A field rack enclosure

Note: The rack kit for the field rack option must be ordered separately.

Table 4.6.1.2 HP Disk System 2100 or HP Disk System 2110—Factory rack

Product/Option Number	Description
A5675AZ	Disk System 2100 factory rack enclosure, (Enterprise systems)
A7381AZ	Disk System 2110 factory rack enclosure
A6571A	36-GB 10K RPM LVD Ultra320 disk module add-on
A6571A option OD1	36-GB 10K RPM LVD Ultra320 disk module installed into the A5675AZ or A7381A Z factory rack enclosure
A7285A	73-GB 10K RPM LVD Ultra320 disk module add-on
A7285A option OD1	73-GB 10K RPM LVD Ultra320 disk module installed into the A5675AZ or A7381AZ factory rack enclosure
A7286A	73-GB 15K RPM LVD Ultra320 disk module add-on (for the DS2110 ONLY – not supported in the DS2100!)
A7286A option OD1	73-GB 15K RPM LVD Ultra320 disk module installed into the A7381AZ field rack enclosure (for the DS2110 ONLY – not supported in the DS2100!)
A7287A	146-GB 10K RPM LVD Ultra320 disk module add-on (for the DS2110 ONLY – not supported in the DS2100!)
A7287A option OD1	146-GB 10K RPM LVD Ultra320 disk module installed into the A7381AZ field rack enclosure (for the DS2110 ONLY – not supported in the DS2100!)
A7328A	18-GB 15K RPM LVD Ultra320 disk module add-on
A7328A option OD1	18-GB 15K RPM LVD Ultra320 disk module installed into the A5675AZ or A7381AZ factory rack enclosure
A7329A	36-GB 15K RPM LVD Ultra320 disk module add-on
A7329A option OD1	36-GB 15K RPM LVD Ultra320 disk module installed into the A5675A or A7381A factory rack enclosure

Note: The rack kit for the factory rack is included with this option.

Table 4.6.1.3 Disk System 21xx—Desktop, Enterprise Systems

Product/Option Number	Description
A5675AD	Disk System 2100 desktop disk enclosure (Enterprise systems)
A5675ED	Disk System 2100 desktop disk enclosure with no disk integration (Enterprise systems)
A7381AD	Disk System 2110 desktop disk enclosure
A7381ED	Disk System 2110 desktop disk enclosure (empty enclosure for distributor stocking – disk drives cannot be integrated)
A6519A	Deskside Pedestal Kit for the DS21xx (can hold 1 or 2 enclosures)
A6571A	36-GB 10K RPM LVD Ultra320 disk module add-on
A6571A option OD1	36-GB 10K RPM LVD Ultra320 disk module installed into the A5675AD or A7381AD desktop enclosure
A7285A	73-GB 10K RPM LVD Ultra320 disk module add-on
A7285A option OD1	73-GB 10K RPM LVD Ultra320 disk module installed into the A5675AD or A7381AD desktop enclosure
A7286A	73-GB 15K RPM LVD Ultra320 disk module add-on (for the DS2110 ONLY – not supported in the DS2100!)
A7286A option OD1	73-GB 15K RPM LVD Ultra320 disk module installed into the A7381AD field rack enclosure (for the DS2110 ONLY – not supported in the DS2100!)
A7287A	146-GB 10K RPM LVD Ultra320 disk module add-on (for the DS2110 ONLY – not supported in the DS2100!)
A7287A option OD1	146-GB 10K RPM LVD Ultra320 disk module installed into the A7381AD field rack enclosure (for the DS2110 ONLY – not supported in the DS2100!)
A7328A	18-GB 15K RPM LVD Ultra320 disk module add-on
A7328A option OD1	18-GB 15K RPM LVD Ultra320 disk module installed into the A5675AD or A7381AD desktop enclosure
A7329A	36-GB 15K RPM LVD Ultra320 disk module add-on
A7329A option OD1	36-GB 15K RPM LVD Ultra320 disk module installed into the A5675AD or A7381AD desktop enclosure

Table 4.6.1.4 Disk System 21xx—Accessories, Enterprise Systems

Product/Option Number	Description
A5679A	Rail Kit – Rose Bowl II and Rittal Rack
A5680A	Rail Kit – Rose Bowl I Rack
C2978B	0.5-meter 68-pin HD to 68-pin HD SCSI Cable
C2978B option OD1	0.5-meter 68-pin HD to 68-pin HD SCSI Cable integrated into a factory rack Disk System
C2911C	1-meter 68-pin HD to 68-pin HD SCSI Cable
C2911C option OD1	1-meter 68-pin HD to 68-pin HD SCSI Cable integrated into a factory rack Disk System
C2979B	1.5-meter 68-pin HD to 68-pin HD SCSI Cable
C2979B option OD1	1.5-meter 68-pin HD to 68-pin HD SCSI Cable integrated into a factory rack Disk System
C2924C	2.5-meter 68-pin HD to 68-pin HD SCSI Cable
C2924C option OD1	2.5-meter 68-pin HD to 68-pin HD SCSI Cable integrated into a factory rack Disk System
C7521A	5-meter 68-pin HD to 68-pin HD SCSI Cable
C7521A option OD1	5-meter 68-pin HD to 68-pin HD SCSI Cable integrated into a factory rack Disk System
C2361B	1-meter VHDCI to 68-pin HD SCSI Cable
C2361B option OD1	1-meter VHDCI to 68-pin HD SCSI Cable integrated into a factory rack Disk System
C2362B	2.5-meter VHDCI to 68-pin HD SCSI Cable
C2362B option OD1	2.5-meter VHDCI to 68-pin HD SCSI Cable integrated into a factory rack Disk System
C2365B	5-meter VHDCI to 68-pin HD SCSI Cable
C2365B option OD1	5-meter VHDCI to 68-pin HD SCSI Cable integrated into a factory rack Disk System
C2364A	SCSI Terminator LVD/SE 68-pin HD
C7541A	2-meter VHDS68/HDTS68 LVD/SE self-terminating SCSI Cable for V-Class
C7541A	2-meter VHDS68/HDTS68 LVD/SE self-terminating SCSI Cable for V-Class integrated into a factory rack Disk System.
C7520A	5-meter VHDS68/HDTS68 LVD/SE self-terminating SCSI Cable for V-Class
C7520A	5-meter VHDS68/HDTS68 LVD/SE self-terminating SCSI Cable for V-Class integrated into a factory rack Disk System.

Notes:

1. The System Integration Specification Plan (SISP), product number A3142B must be ordered with the server for a complete factory assembled server/storage configuration.
2. Use of the DS21xx with the HP V-Class systems requires the use of a self-terminating cable (C7520A).

Table 4.6.1.5 Supported SCSI HBA Options—Enterprise Systems

Class	HBA	Description	Bus
A-/N-Class	A6828A	Single-port Ultra160 HBA	PCI
N-Class	A6829A	Dual-port Ultra160 HBA	PCI

Note: A-/N-Class systems core I/O card supports LVD Ultra2 connections and may be used with the Disk System .

Features

Enclosure

The HP Disk System 2110 supports Ultra320 mechanisms, but only at Ultra160 transfer rates. It is also backward compatible to Ultra160, and will auto-negotiate to that speed if connected to an Ultra160 adapter. The Disk System 2100 supports up to Ultra3 SCSI interface to the host(s). The disk modules are Ultra3 capable, but are also backward compatible with the Ultra SCSI speeds and SCSI/SE. Only one DS21xx enclosure can be used (no daisy-chaining) when operated in SCSI/SE mode.

- Fit in 1U space including racking kit solutions for Rittal/HP System E Solution racks
- HP Original Rack kit for the DS21xx consumes 2U space when racked
- Designed to be either standalone, desktop, deskside or rackable
- Root, Boot, and Swap support
- The DS2100 supports 18-GB, 36-GB and 73-GB 10K RPM Ultra3 SCSI disks as well as 18-GB and 36-GB 15K RPM Ultra3 SCSI disks.
- The DS2110 supports these same drives, as well as a 73-GB 15-K RPM Ultra320 SCSI disk and a 146-GB 10K RPM Ultra320 SCSI disk
- Designed for HP Rack Systems (Rose Bowl I, Rose Bowl II) and Rittal Rack Systems
- 15-inch Product Depth
- Designed for standard Telecom two-post and four-post rack systems.
- Daisy-chain up to 3 enclosures on a single channel to expand capacity

Warning: When the DS21xx is configured for single-ended operation, only one unit with up to four drives may be connected to the SCSI interface.

Disk Modules

- Utilizes the Common HP Disk Carrier with downloadable firmware
- Non-OS Specific Disk Firmware
- Hot swappable disk modules
- Front Access only
- Shock mounted disk drive
- Easy insertion/removal (accomplished with a cam handle)
- Positive lock-in
- LED status indicator
- ESD grounding

Upgradability

You can increase Disk System storage capacity by:

- Replacing disk drives with higher capacity disk drives
- Adding disks in unused slots
- Adding another Disk System (maximum of 3 for single initiator, maximum of 2 for dual initiator)

Storage Capacity

The Disk System 21xx has four (4) slots for disk drive mechanisms. The enclosure can accept multiple-capacity drives such as 18-, 36-, 73-GB, or 146-GB (DS2110 only) simultaneously, subject to host file system restrictions. A total of three DS21xx units may be daisy-chained together. The maximum of 876 MB of storage is available on a single bus using three Disk Systems with 73-GB drives, or 1.75 TB using 146-GB drives. Further increases in capacity require additional HBAs in conjunction with multiple Disk System 21xx enclosures.

Power Switch

The Disk System DS21xx power switch is located at the rear of the enclosure. This switch controls the activation of DC power only. AC power is still present in the enclosure as long as the AC power cord is plugged into a functional outlet.

Powerfail Protection

A UPS is required for powerfail protection on the Disk System 21xx. The DS21xx is rated at 126 VA, fully loaded. Size the UPS for the appropriate number of Disk Systems to be protected.

Cables

The cables must be explicitly ordered for all three configurations. Cables will be shipped with the Disk System 21xx. Connections between daisy-chained DS21xx units are made using the 68-pin HD to 68-pin HD cables. Endeavor to use the shortest practical cable lengths between Disk Systems, as the maximum cable length between DS2100 terminated SCSI/LVD ports is 12 meters (39.3 feet). The maximum cable length between DS2110 terminated SCSI/LVD ports is 9 meters. You must also allow for internal cable lengths for each device connected on the bus. The internal cable length for each DS21xx is 1.1 meters.

For the Disk System 2110, use only 0.5-meter cable between enclosures in daisy-chain configurations. Longer cable lengths between enclosures are not supported."

The maximum cable distances and enclosure limits are listed in the table below.

Table 4.6.1.6 Maximum Cable Lengths

SCSI Technology	Maximum Cable Distance	Maximum DS21xx Enclosures per SCSI Bus
LVD	12 meters (DS2100); 9 meters (DS2110)	3
Fast-5 (SE)	6 meters	1
Fast-10 (SE)	3 meters	1
Fast-20 (SE)	3 meters	1

Note: Each enclosure consumes 39 inches (1m) of SCSI bus cable length. This enclosure distance must be factored into all cable length calculations.

Configuration

Enclosure Addressing and SCSI IDs

The disk module SCSI addresses are fixed by slot position. There are no jumper settings required.

Each drive requires a SCSI ID, a four-bit address defined as SCSI ID (3:0). The SCSI ID0 and SCSI ID3 bits are controlled by an "A-B-C" slide switch located at the rear of the enclosure. The table below lists the SCSI Bus addresses corresponding to the Box ID selected. Each enclosure must have a unique Box ID on a given SCSI channel.

Table 4.6.1.7 Disk Slot SCSI ID Map

Box ID	Slot 1	Slot 2	Slot 3	Slot 4
A	0	2	4	6
B	8	10	12	14
C	9	11	13	15

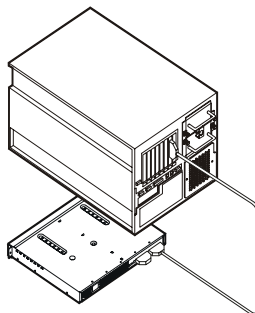
Topologies

The Disk System 21xx supports multiple configuration options based on single host environments with anywhere from 1 to 3 disk enclosures per SCSI/LVD channel.

Single Host, One Disk System

This configuration presents the most basic setup of a single host connected to a single DS21xx disk enclosure. Notice that the unused SCSI port on the enclosure is terminated because it resides at the end of the SCSI chain.

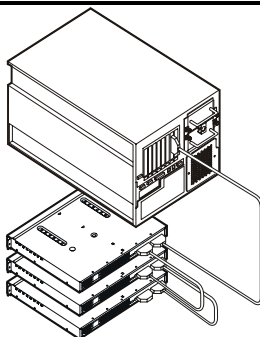
Figure 4.6.1.2



Single Host, Multiple Disk Systems

This configuration presents the highest capacity expansion to a basic setup. Here a single host is connected to three DS21xx disk enclosures. Each enclosure requires unique addressing by selecting a different position on the “A-B-C” switch at the rear of the enclosure. Notice that the unused SCSI port on the final enclosure is terminated because it resides at the end of the SCSI chain.

Figure 4.6.1.3



Disk Mirroring

Disk mirroring is available through the use of the “Mirrored Disk/iX” software (30349A).

Racking Considerations

Rack/rail kits required for the Disk System DS21xx:

- A5679A—Rittal/HP System/E Racking Kit
- A5680A—HP Rack Systems Racking Kit for Rose Bowl I
- A6576A—Two Post Carrier Grade Racking Kit
- A6578A—Four Post Carrier Grade Racking Kit

DS2100 Support Information

DS2100 Product Upfront Support Options for Enterprise Channel

The Upfront Options are on the Disk System only and contains the support pricing of the drives.

HP Service levels	CATS Support Options—1 Year	CATS Support Options—3 year
Next Day	H4400A/H4401A	H4400Y/H4401Y
Same Day	H4402A/H4403A	H4402Y/H4403Y
24×7	H4404A/H4405A	H4404Y/H4405Y
6-hour Call-to-Repair	H4385A/H4386A	N/A
6-hour Call-to-Repair-SAP	H4388A/H4389A	N/A
4-hour Call-to-Repair	H4395A	N/A

DS2100 Support Contractual Pricing for Commercial and Enterprise Channels

Enclosure Monthly Support Pricing	Disk Drive Monthly Support Pricing
A5675A	A6537A
A5675AZ	A6538A
A5675AD	A6544A
	A6545A
02C: 4	02C: 5
02A: 5	02A: 6
02G: 6	02G: 8
02V: 10	02V: 13
02X: 12	02X: 15
07A: 4	07A: 5
07C: 3	07C: 4
07G: 5	07G: 7
07V: 9	07V: 12
07X: 11	07X: 14

DS2110 Support Information

DS2110 Product Support/Care Packs for Commercial Channel

The support packs are on the disk system only and contains the support pricing of the drives.

HP Service levels	Support/Care Packs—1 Year	Support/Care Packs—3 year
Next Day (DS2100 only; DS2110 base warranty is next day)	H7542A/H7542E	H7546A/H7546E
4-hour, 13×5 onsite	H7543A/H7543E	H2865A/H2865E
4-hour, 24×7 onsite	H7544A/H7544E	H2866A/H2866E
6-hour Call-to-Repair	H7545A/H7545E	H2867A/H2867E
4-hour Call-to-Repair	N/A	N/A

Note: Commercial channel product support pack codes ending with the letter "A" denote physical device support. Those ending with the letter "E" denote electronic support.

DS2110 Product Upfront Support Options for Enterprise Channel

The Upfront Options are on the disk system only and contains the support pricing of the drives. Blue channel refers to pre-merger HP product numbers; purple channel refers to post-merger common product numbers.

HP Service levels	Blue Channel		Purple Channel	
	CATS Support Options—1 Year	CATS Support Options—3 year	CATS Support Options—1 Year	CATS Support Options—3 year
Next Day (DS2100 only; DS2110 base warranty is next day)	H4400A/H4401A	H4400Y/H4401Y	HA101A1	HA101A3
Same Day	H4402A/H4403A	H4402Y/H4403Y	HA103A1	HA103A3
24×7	H4404A/H4405A	H4404Y/H4405Y	HA104A1	HA104A3
6-hour Call-to-Repair	H4385A/H4386A		HA105A1	HA105A3
Support Plus			HA109A1	HA109A3
Support Plus 24			HA110A1	HA110A3
Proactive 24 Service			HA111A1	HA111A3
Critical Service			HA112A1	HA112A3

The price band for Upfront Options is 897.

The product number for optional installation is H4725A (Blue) or HA113A1 (Purple). The price band is 564.

Contractual Support for Enterprise and Commercial Channels

SPNs

- 02C
- 02A
- 02G
- 02V
- 01A
- 07A
- 07C
- 07G
- 07V
- 01B

Description of Services Offered

The 02x and 01A are the post warranty support contractual monthly pricing available after the warranty. The 07x and 01B are the upgrade warranty support contractual monthly pricing available during the warranty.

Below are the Service Levels:

Code	Description
02A	On-site 4 hour same day hardware response, Monday - Friday, business hours.
07A	07A is available as a warranty upgrade to an 02A response level
02C	On-site next day hardware response, Monday - Friday, business hours (vary by country).
07C	07C available as a warranty upgrade to an 02C response level
02G	On-site 4 hour same day hardware response, seven days a week, 24 hours a day.
07G	07G available as a warranty upgrade to an 02G response level
02V	On-site six-hour hardware call-to-repair, seven days a week, 24 hours a day. Sold as part of mission critical contract. Time begins when the original call to the call center is made. Recovery of operating system and other software are excluded from time commitment. Available only for customer sites up to 50 miles (80 km) from a primary HP Support Response Office.
07V	07V available as a warranty upgrade to an 02V repair level
01A	On-site six-hour hardware call-to-repair, seven days a week, 24 hours a day. Sold standalone. Time begins when the original call to the call center is made. Recovery of operating system and other software are excluded from time commitment. Available only for customer sites up to 50 miles (80 km) from a primary HP Support Response Office.
01B	01B available as a warranty upgrade to an 01A repair level

Operating System Support

The following operating systems are supported with the DS21xx:

- HP-UX
- Microsoft NT 4.0 Server and Enterprise
- Novell NetWare (4.2)
- RedHat Linux 6.2 and 7.1, Advanced Server 2.1
- Microsoft Windows 2000 Server and Advanced Server
- SCO OpenServer 5.0.X
- SCO UnixWare 7.X
- MPE/iX 7.0 or greater

Termination

Termination is a requirement for the SCSI bus connecting the Disk System and the host or other device connected to the Disk System. Termination is required and must be enabled whenever the Disk System is at the end of a bus. Termination is not required whenever the Disk System is in the middle of a bus. The LVD/SE 68-pin terminator is included with the Disk System 21xx product.

Product Specifications

Physical Dimensions

Measure	Metric	English
Width	44.85 cm	17.65 in
Depth	37.60 cm	14.80 in
Height	4.32 cm	1.7 in
Weight without disk modules	4.94 kg	10.90 lbs
Weight fully loaded	8.11 kg	17.89 lbs