

HP **SMART Storage** Offline Solutions

## Backup Tape Drives and Autoloaders from the SMART Storage Family

HP's SMART Family offers the flexibility to integrate multiple removable modules into standard HP 19-inch cabinets complementing the entire system rack solution. In addition, all of the storage modules are available as desktop models.

### Key Features

#### Easy Plug

Each rack-mountable removable storage device is easily plugged into the 68-pin blind-mate connector. To remove it, just quiesce the system, power-off the device, and pull the device out of the enclosure.

#### Modular Design

Mix and match the different technologies in one enclosure—fast wide differential or wide single-ended, both connect to the same blind-mate 68-pin SCSI connector.

#### Operating Environments

All tape devices are supported in HP-UX and most are supported in MPE/iX environments. (See Table 1, Supported Configurations, for more details.)

### Available in Three Versions

#### Factory-Installed Tape Solutions

Tape devices are installed into a rack enclosure with other computer components (such as servers, disks, and other peripherals), ready for single integrated shipment to the customer.

#### Customer-Installed Solutions (Rack-Ready Modules)

Tape devices are easily installed into the existing system and rack setup by the customer onsite.

#### Desktop Devices

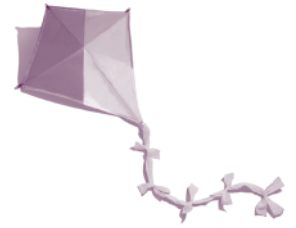
Standalone tape devices that can be simply installed by the customer via a SCSI connection.

#### HP's SMART Full-Height Rack Kit

The four-bay, 5.25-inch-high (3U-EIA units) version can mount either two full-height devices, one full-height and two half-height devices, or four half-height devices. It's a totally flexible solution in a small form factor designed to minimize space.

#### HP's SMART Half-Height Rack Kit

The two-bay (2U-EIA units) version can mount two half-height devices in the lowest form factor environment.



- **S**imple to install, use, and configure
- **M**odular design for configuration flexibility
- **A**vailability of data in HP-UX and MPE/iX environments
- **R**eliable products, high-quality service and support
- **T**echnology leaders—best performance and quality

#### Storage solutions for:

- HP 9000 Enterprise Servers
- HP 9000 Workstations
- HP 3000 Commercial Servers

#### Products available:

##### *DLT Tape Drives*

- DLT 8000 Tape Drives
- DLT 4000 Tape Drives

##### *DDS Tape Drives*

- NEW DDS-4 Tape Drive (April 2000)
- NEW DDS-4 Tape Autoloader (May 2000)
- DDS-2 and DDS-3 Tape Drives
- DDS-3 Tape Autoloader

##### *Enclosures*

- 3U Full-Height Rack Kit
- 2U Half-Height Rack Kit



**Rack-Ready DDS-4 Tape Drive**

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### Small Form Factor

HP tape drives have a small form factor. This makes it easy to add tape drives to an HP 19-inch system or peripheral rack cabinet—ideal when available rack space is limited.

### Product Composition

#### Full-height rack kit (C4318B/C4318SZ) consists of:

- A four-bay rack-mountable enclosure assembly capable of securely holding one, two, or four standalone devices.

#### Half-height rack kit (C4317A)

- A two-bay rack-mountable enclosure assembly capable of securely holding one or two half-height devices.

All devices in HP's SMART Family use SCSI interface. The 50-pin and 68-pin external connections are half-pitch micro D (sometimes called SCSI-2 and SCSI-3, respectively) and support both screw- and latch-type SCSI cabling. The internal ribbon cabling is 0.2 meters in length.

The external connection to a rack kit uses 68-pin, regardless of device. Conversion from this 68-pin rack connection to a device (e.g., 50-pin) is done by the rack's internal ribbon cabling. This allows the use of a single blind-mate connector, regardless of the mechanism bus width (narrow or wide).

### Plugging and Ejection

The rack-ready modules contain an ejection-lever assembly instead of the rubber feet found on the desktop version.

The ejection lever has three main purposes:

- To assist in installing the module into the rack enclosure
- To lock the module in place
- To eject the module

### Cooling

Cooling of racked units is supplied by the internal fan of each unit. All rack kits are designed to be unobtrusive to individual air inlet or exhaust points.

### Power Distribution

On the back of a full-height enclosure is one IEC 320 connector for each device, which can be connected either to separate rack power distribution units (PDUs) or in pairs to a single rack PDU via the use of an optional "Y" AC power cord.



Desktop modules ship with a vertical stand.



Rack-ready devices contain an ejection-lever assembly to assist in inserting the module into the rack enclosure and locking the module in place.



## HP SMART Storage Offline Solutions

**Table 1. SMART Family Products—Supported Configurations**

Description	Part Number • Desktop • Field Racked	HP 9000 Series 800 Servers (HP-UX)		HP 9000 Series 700 Workstations (HP-UX)		HP 3000 Servers (MPE/iX)	
		O/S	Systems	O/S	Systems	O/S	Systems
DDS-2 (NSE)	C6362A (desktop) C6363A (rack-ready)	9.04+	E-, F-, G-, H-, I-Class	9.05+	715, 745, 748, 755, B-, C-, J-Class	5.0+	CIO and NIO
		10.01+	D-, K-, T-Class				
		11.0+	L-, N-, V-Class				
DDS-3 (NSE)	C6364A (desktop) C6365A (rack-ready)	9.04+	E-, F-, G-, H-, I-Class	10.01+	715, 745, 748, 755, B-, C-, J-Class	5.5+	CIO and NIO
		10.01+	D-, K-, T-Class				
		11.0+	L-, N-, V-Class				
DDS-4 (LVD)	C6368A (desktop) C6369A (rack-ready)	10.20+	A-, D-, R-Class	10.20+	B-, C-, J-Class	Not supported	
		11.0+	L-, N-, V-Class				
DDS-3 Autoloader (NSE)	C6366A (desktop) C6367A (rack-ready)	9.04+	E-, F-, G-, H-, I-Class	10.01+	715, 725, 735, 755, B-, C-, J-Class	5.5+	NIO
		10.01+	D-, K-, T-Class				
		11.0+	L-, N-, V-Class				
DDS-4 Autoloader (LVD)	C6370A (desktop) C6371A (rack-ready)	10.20+	A-, D-, R-Class	10.20+	B-, C-, J-Class	Not supported	
		11.0+	L-, N-, V-Class				
DLT 4000 (NSE)	C6380A (desktop) C6381A (rack-ready)		N/S	10.20+	B-, C-, J-Class	5.5+	NIO
DLT 4000 (FND)	C6382A (desktop) C6383A (rack-ready)	10.01+	D-, E-, K-, T-Class	10.01+	725/100, B-, C-, J-Class	5.5+	NIO
		11.0+	L-, N-, V-Class				
DLT 8000 (FWD)	C6378A (desktop) C6379A (rack-ready)	10.20+	A-, D-, R-Class	10.20+	B-, C-, J-Class	5.5+	NIO
		11.0+	L-, N-, V-Class				
SCSI Converter	C4316A	11.0+	V-Class		N/S		N/S
Full-Height Rack Kit	C4318B (field racked)						
Half-Height Rack Kit	C4317A (field racked)						

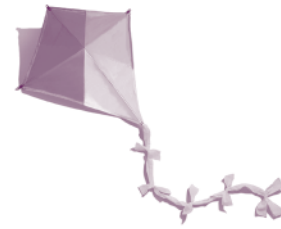
**Notes:**

Power cables—One power cable required per device ("Y" power cable option is available for powering two devices from a single PDU outlet in a rack).  
NSE or FWD Terminator required.

N/S = Not Supported.

Packaging—Suitable for all 19-inch HP systems or peripheral racks.  
I/O bus—Single 68-pin blind-mate SCSI controller.





## HP SMART Storage Offline Solutions

**Table 2. Factory-Installed Solutions: Rack Kit Factory-Installed into HP 19" Cabinet**

Part Number	Option	Description	Peripheral Device
C4318SZ	102	DDS-2 tape drive factory-installed	See C6363A
	103	DDS-3 tape drive factory-installed	See C6365A
	110	DDS-4 tape drive factory-installed	See C6369A
	104	DDS-3 Autoloader factory-installed	See C6367A
	111	DDS-4 Autoloader factory-installed	See C6371A
	106	DLT 4000 tape drive factory-installed HP-UX	See C6383A
	107	DLT 4000 tape drive factory-installed MPE/iX	See C6381A
	109	DLT 8000 tape drive factory-installed	See C6379A

**Table 3. Specification of Different SCSI Bus Types**

Common SCSI Name	Fastest Bus Speed	Bus Width	Signaling Method	Data Transfer Rate	Supported Bus Length	Supported Devices	No. of Pins
NSE (Narrow Single-Ended)	SCSI-1 (5MHz)	Narrow (8-bit)	Single-Ended	5MB/s	6 meters	7	50
WSE (Wide Single-Ended)	SCSI-2 (10MHz)	Wide (16-bit)	Single-Ended	20MB/s	3 meters	7	68
UWSE (Ultra Wide Single-Ended)	SCSI-3 (20MHz)	Wide (16-bit)	Single-Ended	40MB/s	1.5 meters	2	68
FND (Fast Narrow Differential)	SCSI-2 (10MHz)	Narrow (8-bit)	Differential (High Voltage)	10MB/s	25 meters	7	50/68
FWD (Fast Wide Differential)	SCSI-2 (10MHz)	Wide (16-bit)	Differential (High Voltage)	20MB/s	25 meters	15	68
LVD (Low Voltage Differential)	SCSI-3 (40MHz)	Wide (16-bit)	Differential (Low Voltage)	80MB/s	12 meters	15	68

**Notes:**

LVD devices can revert to single-ended operation automatically.

Do not mix LVD and FND/FWD devices on the same bus.

"Wide" devices can be used in "narrow" applications.



## HP SMART Storage Offline Solutions

**Table 4. SMART Family Desktop Products and Cable Information**

### Desktop Devices

The desktop modules contain two 50-pin or two 68-pin connections. One of the connections is for the cable going to the system. The second connection is used for either daisy-chaining modules together or for termination. Unless otherwise stated, cables need to be ordered separately.

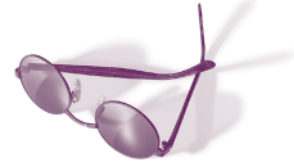
	Pin Connections			Cables	Terminator
	System	Device	Terminator		
NSE—Narrow Single-Ended	50	50	50	C2908A or C2955A or C2957A	C2904A
NSE—Narrow Single-Ended	68 (VHDCI)	50	50	C2367A or C2368A	C2904A
WSE—Wide Single-Ended	68	68	68	C2978B or C2979B	C2972A
WSE—(NSE Mode)	50	68	68	C2906A or C2961A	C2972A
FWD—Fast Wide Differential	68	68	68	C2911C or C2924C	C2905A
FND—Fast Narrow Differential	68 (FWD)	50	50	C2906A or C2961A	Included with module
LVD—Low Voltage Differential	68	68	68	C2978B or C2979B VHDCI: C2361B or C2362B or C2363B or C2365B	C2364A

### Cables and Terminator for N-Class

	Length	Interface	Connections
C2361B	1.0 meter	VHDCI	68-pin to HD 68-pin cable
C2362B	2.5 meters	VHDCI	68-pin to HD 68-pin cable
C2365B	5.0 meters	VHDCI	68-pin to HD 68-pin cable
C2363B	10.0 meters	VHDCI	68-pin to HD 68-pin cable
C2364A		LVD	68-pin terminator
C2367A	1.0 meter	VHDCI	68-pin to HD 50-pin cable
C2368A	2.5 meters	VHDCI	68-pin to HD 50-pin cable

### C4316A: External NSE to FWD Converter (for V-Class)

	Desktop Device Part Number	Cable C2955A 50-50-pin 0.5-meter	Cable C2908A 50-50-pin 1.0-meter	Cable C2957A 50-50-pin 2.0-meter	Cable* C2367A VHDCI 68-HD 50-pin 1.0-meter	Cable* C2368A VHDCI 68-HD 50-pin 2.5-meter	Terminator C2904A 50-pin	
<b>NSE</b>								
DDS-2 Tape Drive	C6362A	•	•	•	•	•	•	
DDS-3 Tape Drive	C6364A	•	•	•	•	•	•	
DDS-3 Autoloader	C6366A	•	•	•	•	•	•	
DLT 4000 Tape Drive	C6380A	•	•	•	•	•	•	
* for N-Class servers								
			C2978B 68-68-pin 0.5-meter	C2979B 68-68-pin 1.5-meter	C2961A 68-50-pin 1-meter	C2906A 68-50-pin 2-meter	C2972A 68-pin	C2364A 68-pin (LVD)
<b>LVD</b>								
DDS-4 Tape Drive	C6368A	•	•	•	•	•	•	
DDS-4 Autoloader	C6370A	•	•	•	•	•	•	
<b>FND</b>								
DLT 4000 Tape Drive	C6382A			•	•	Included		
			C2978B 68-68-pin 0.5-meter	C2911C 68-68-pin 0.9-meter	C2924C 68-68-pin 2.5-meter	C2905A 68-pin		
<b>FWD</b>								
DLT 8000 Tape Drive	C6378A	•	•	•	•	•		



## HP SMART Storage Offline Solutions

**Table 5. SMART Family Rack-Ready Products and Cable Information**

### Rack-Ready Devices

The rack-ready devices have a single connector. The device slides into the rack enclosure. Each bay of the rack enclosure has two 68-pin connections. The first connection is used to connect a device to a rack. The second connection is used for either daisy-chaining devices together or for termination.

### Cables

#### Single Module

Cables	Terminator	Daisy Chaining
NSE	C2972A	C2978B or C2911C
WSE	C2972A	C2978B or C2911C
WSE (NSE Mode)	C2972A	C2978B or C2911C
FWD	C2905A	C2978B or C2911C
FND	Included with module	C2978B or C2911C
LVD	C2364A	C2978B or C2911C

### Cables and Terminator for N-Class

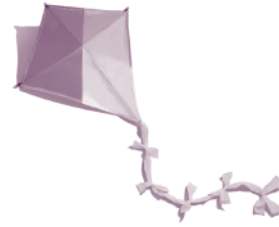
Cables	Length	Interface	Connections
C2361B	1.0 meter	VHDCI	68-pin to HD 68-pin cable
C2362B	2.5 meters	VHDCI	68-pin to HD 68-pin cable
C2365B	5.0 meters	VHDCI	68-pin to HD 68-pin cable
C2363B	10.0 meters	VHDCI	68-pin to HD 68-pin cable
C2364A		LVD	68-pin terminator

### C4316A: External NSE to FWD Converter (for V-Class)

	Rack Ready Device Part Number	Cable	Cable	Cable	Cable	Terminator	Terminator
<b>NSE</b>		C2978B 68-68-pin 0.5-meter	C2911C 68-68-pin 0.9-meter	C2961A 68-50-pin 1-meter	C2906A 68-50-pin 2-meter	C2972A 68-pin	
DDS-2 Tape Drive	C6363A	•	•	•	•	•	
DDS-3 Tape Drive	C6365A	•	•	•	•	•	
DDS-3 Autoloader NSE	C6367A	•	•	•	•	•	
DLT 4000 Tape Drive	C6381A	•	•	•	•	•	
<b>LVD</b>		C2978B 68-68-pin 0.5-meter	C2979B 68-68-pin 1.5-meter	C2961A 68-50-pin 1-meter	C2906A 68-50-pin 2-meter	C2972A 68-pin	C2364A 68-pin (LVD)
DDS-4 Tape Drive	C6369A	•	•	•	•	•	•
DDS-4 Autoloader	C6371A	•	•	•	•	•	•
<b>FND</b>		C2978B 68-68-pin 0.5-meter	C2911C 68-68-pin 0.9-meter	C2924C 68-68-pin 2.5-meter		C2905A 68-pin	
DLT 4000 Tape Drive	C6383A	•	•	•		Terminator Included	
<b>FWD</b>							
DLT 8000 Tape Drive	C6379A	•	•	•		•	



## HP SMART Storage Offline Solutions



**Table 6. Specifications of Tape Devices**

	<b>Transfer Rate (Native)</b>	<b>Cart. Capacity (Native)</b>	<b>Avg. Access Time</b>	<b>Data Bit Error Rate</b>	<b>Note</b>
DDS-2 Tape Drive	0.5 MB/sec	4 GB	40 sec	10 <sup>-14</sup>	
DDS-3 Tape Drive	1.0 MB/sec	12 GB	40 sec	10 <sup>-14</sup>	
DDS-4 Tape Drive	3.0 MB/sec	20 GB	50 sec		
DDS-3 Autoloader	1.0 MB/sec	12 GB	40 sec	10 <sup>-14</sup>	6-cassette autoloader
DDS-4 Autoloader	3.0 MB/sec	20 GB	50 sec		6-cassette autoloader
DLT 4000 Tape Drive	1.5 MB/sec	20 GB	68 sec	10 <sup>-17</sup>	
DLT 8000 Tape Drive	6.0 MB/sec	40 GB	68 sec	10 <sup>-17</sup>	

**Notes:**

Both transfer rate and capacity can be doubled with a 2:1 compression ratio. Actual achievable compression ratio (and throughput) are dependent on the files being stored and will vary between applications.

Answers to some frequently asked questions about DLT:

The DLT 8000 drive can read a DLT tape media written by DLT 4000.

The DLT tape media does NOT need to be formatted before use. The drive will select the media type to use when it first writes to that tape.

The DLT 8000 drive can overwrite a tape written on by a DLT 4000 drive by using an overwrite command or by using a bulk eraser before writing to it.

The DLT 8000 drive cannot append write to a tape written on by a DLT 4000 drive.

The DLT 8000 drive will not write in DLT 4000 format.

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