QuickSpecs

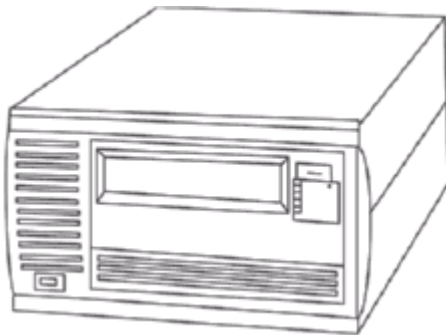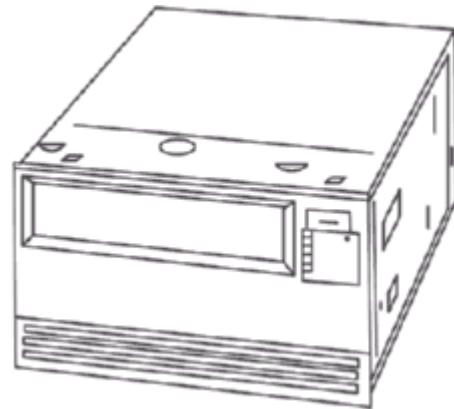*Overview*

The family of HP StorageWorks Ultrium tape drives is HP's premier line of backup devices. Based on the LTO Ultrium format, an open standard with a well-defined six-generation roadmap, HP Ultrium tape drives offer customers the best choice for investment protection. With ultimate reliability and ease of use in mind, even at 100% duty cycles, HP's rugged design builds on superior LTO technology and adds advanced features like hardware data encryption to create a new level of data protection. The tape drives employ dynamic data rate matching to adjust to the speed of the host, reducing wear and tear on both drive and media and increasing performance, even on slower hosts. HP's ultra-durable soft-load feature automatically positions the data cartridge, and the highly reliable HP leader-capture mechanism virtually eliminates lost leaders, increasing the success of your backup and restore operations. Support for HP One-Button Disaster Recovery provides the easiest way to restore data in the event of a disaster. The StorageWorks family of tape drives also features support for HP Library and Tape Tools which provides a single application for drive management, diagnostics, and performance optimization. If data is critical to your business, protect it with an HP StorageWorks Ultrium tape drive.

HP StorageWorks LTO-4 Ultrium 1840 Tape Drive

HP StorageWorks LTO-4 Ultrium 1840 Tape Drive sets new standards for capacity, performance and security. The Ultrium 1840 represents HP's fourth-generation of LTO tape drive technology capable of storing up to 1.6TB per cartridge while providing hardware-based data encryption to enable greater levels of security and unprecedented performance. AES 256-bit hardware data encryption provides easy-to-enable security to protect the most sensitive data and prevent unauthorized access of tape cartridges. By using Ultrium 1840 hardware data encryption, not only is data fully capable of being compressed therefore maximizing capacity, encrypted backups are completed without a loss in performance. Capable of data transfer rates up to 240MB/sec, HP's exclusive Data Rate Matching feature further optimizes performance by matching speed of host to keep drives streaming and increase to reliability of the drive and media. The Ultrium 1840 provides investment protection with full read and write support with LTO-3 media, and the ability to read LTO-2 cartridge. By doubling the capacity of previous generation Ultrium drives, HP customers now require fewer data cartridges to meet their storage needs, significantly reducing their IT costs and increasing their ROI.

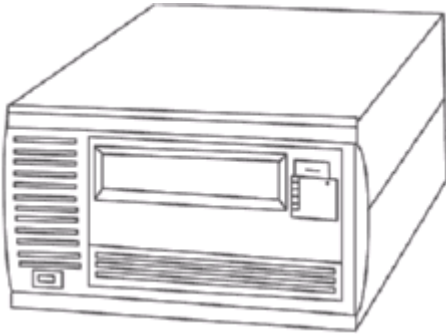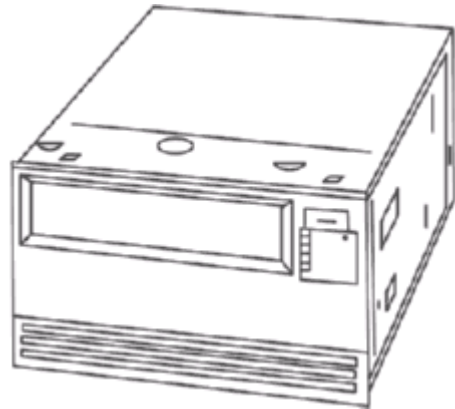|	
Ultrium 1840 External Tape Drive	Ultrium 1840 Internal Tape Drive

HP StorageWorks LTO-3 Ultrium 960 Tape Drive

The HP StorageWorks LTO-3 Ultrium 960 tape drive delivers a capacity of 800 GB of compressed data on a single cartridge with a data transfer rate of 160MB/sec. The Ultrium 960 tape drive is fully read and write compatible with LTO-2 data cartridges, and offers a further degree of investment protection through its backward-read compatibility with LTO-1 media. For IT organizations with stringent, long-term data retention requirements, the Ultrium 960's WORM (Write-Once, Read-Many) media support offers a simple and secure method for archiving records as part of a compliance solution to meet the toughest of industry regulations.

Overview

Ultrium 960 External Tape Drive

Ultrium 960 Internal Tape Drive

Models

Ultrium 1840 Tape Drive	HP StorageWorks LTO-4 Ultrium 1840 SAS Internal	EH860A
	NOTE: 0D1 will appear after this part number on your sales order if factory integration is indicated.	
	HP StorageWorks LTO-4 Ultrium 1840 SAS External	EH861A
	HP StorageWorks LTO-4 Ultrium 1840 SCSI Internal	EH853A
	NOTE: 0D1 will appear after this part number on your sales order if factory integration is indicated.	
	HP StorageWorks LTO-4 Ultrium 1840 SCSI External	EH854A
	HP StorageWorks LTO-4 Ultrium 1840 SCSI Array Module	EH856A
	NOTE: 0D1 will appear after this part number on your sales order if factory integration is indicated.	
	HP StorageWorks LTO-4 Ultrium 1840 SCSI Rack-mount	EH926A
	NOTE: Single drive installed in a 3U SCSI Rack-mount kit	
	NOTE: 0D1 will appear after this part number on your sales order if factory integration into a rack is indicated.	

Ultrium 960 Tape Drive	HP StorageWorks LTO-3 Ultrium 960 SCSI Internal	Q1538A
	NOTE: 0D1 will appear after this part number on your sales order if factory integration is indicated.	
	HP StorageWorks LTO-3 Ultrium 960 SCSI External	Q1539B
	HP StorageWorks LTO-3 Ultrium960 SCSI Array Module	Q1540A
	NOTE: 0D1 will appear after this part number on your sales order if factory integration is indicated.	
	HP StorageWorks LTO-3 Ultrium 960 SCSI Rack-mount	Q1595B
	NOTE: Single drive installed in a 3U SCSI Rack-mount kit	
	NOTE: 0D1 will appear after this part number on your sales order if factory integration into a rack is indicated.	

Key Features

- Large-capacity drive capable of storing up to 1.6TB of compressed storage on a single cartridge, requiring fewer data cartridges to meet their storage needs, significantly reducing their IT costs
- AES 256 hardware data encryption (LTO-4) helps prevent unauthorized access of data and eliminates need to purchase and manage additional devices
- Fast data transfer rate up to 240MB/sec to meet demands of even the tightest backup window
- HP's exclusive data rate matching feature automatically adjusts the drive's read and write speed based on the server and network environment, which increases performance, reduces mechanical wear on the drive, and extends tape life
- Fully read-and-write compatible with Ultrium drives and media from other manufacturers
- Internal, external, array module and rack-mounted models available
- Soft-load feature automatically takes the data cartridge and moves it into the load position
- Advanced tape leader capture design ensures fail-safe cartridge loading
- Active head cleaning provides automated cleaning that increases head life and reduces the need for using the cleaning cartridge
- Lower power consumption for maximum reliability with minimum environmental costs
- Includes HP StorageWorks Data Protector Express Single Server Edition backup/recovery software and the HP StorageWorks Data Protector Express Bare Metal Disaster Recovery option
- HP One-Button Disaster Recovery (OBDR) makes it possible to quickly restore an entire system using a single tape cartridge

Models

- HP StorageWorks Library and Tape Tools (LTT) included to help with installation, management, performance optimization, and troubleshooting
- Support for Write-Once, Read-Many (WORM) media providing a simple and secure method for archiving compliant data to meet regulatory agency requirements

Customer Benefits

- **High-Capacity:** choose from a range of drive options to fit all your data on a single cartridge
- **Fast:** high-performance data transfer that reduces backup windows while reducing the use of server and network resources
- **Secure:** AES 256 bit data encryption and support for WORM media provide a secure method for long-term retention of critical data records
- **Affordable:** high capacity combined with low media cost delivers an exceptionally low cost of ownership and ensures a faster return on investment
- **Agile:** choice of models including internal, external, array module, and rack-mount to meet your backup configuration needs inside and outside of the server
- **Reliable:** high-integrity data path including read and write DRAM that protects your data
- **Compatible:** qualified/tested on all industry-leading operating systems, backup software and servers
- **Easy:** supports One-Button Disaster Recovery (OBDR), simply the easiest way to restore data in the event of a disaster
- **Manageable:** includes superior management capabilities through Library and Tape Tools (LTT), making your drive easy to install, use and support
- **Investment Protection:** delivers a compelling technology roadmap that offers higher capacity and performance tape solutions with backward read and write compatibility for previous drive generations
- **Open:** based on the LTO technology open standard, delivering customers a greater choice of vendors and solutions without compromising compatibility across Ultrium products

Product Highlights

LTO Ultrium Technology

Linear Tape-Open technology was developed by three leaders in the storage industry - HP, IBM, and Quantum - who brought together their combined expertise in tape technology to develop an entirely new format based on the best of existing technologies. Because LTO Ultrium technology was a new format, it required no cumbersome support of legacy formats, so it could be designed without compromising on reliability or performance. The LTO Program, a consortium of the three technology provider companies, has developed a well-defined six-generation roadmap.

Ultrium LTO-1 and LTO-2 tape drive technologies from HP use a linear format of 384 tracks and 512 tracks (respectively), writing eight tracks simultaneously. Ultrium LTO-3 and the new LTO-4 tape drive features a breakthrough in recording technology by writing sixteen tracks simultaneously on a linear format of 704 tracks and 896 tracks (respectively). The data is written in a serpentine pattern; the tape reverses direction after each set of tracks is written. This provides higher density recording, enabling customers to lower costs and increase efficiency by storing more data on a single tape in an industry standard format.

The LTO standard for backward compatibility is to write back one generation and read back two generations; therefore:

- First-generation Ultrium drives (HP Ultrium 230, HP Ultrium 232) read and write LTO 1 media
- Second-generation Ultrium drives (HP Ultrium 460, HP Ultrium 448) read and write LTO 1 and LTO 2 media.
- Third-generation Ultrium drives (HP Ultrium 920, Ultrium 960) read and write LTO 2 and LTO 3 media and also read LTO 1 media.
- Fourth-generation Ultrium drives (Ultrium 1840) read and write LTO 3 and LTO 4 media and also read LTO 2 media.

As part of the LTO open standard, all HP tape drives and media offer the same standards of compatibility with tape drives and media manufactured by other LTO vendors.

LTO data compression (LTO-DC) is an enhanced version of Advanced Lossless Data Compression (ALDC) hardware compression. Compression is automatically turned off if the compressed data would cause an overall expansion in data size, hence optimizing the available capacity on the media. Data compression is also turned off if data is found to be uncompressible; thus, allowing for better data scans. The system is used in all Ultrium tape drives.

The decision about which tape technology you should buy next should be based on your future, not your past, investment. Choose the Ultrium format when you need the following advantages:

- Maximum reliability, capacity and performance
- Compatibility with a broad range of operating systems and servers (e.g., a mixed system environment)
- A legacy-free technology that uses the best attributes from a wide range of tape technologies without any compromises for backward compatibility requirements
- A solid roadmap for future generations of the technology
- An open format available from multiple vendors
- Lowest media cost of any 'superdrive' tape technology

QuickSpecs

Product Highlights

Data Rate Matching

Data Rate Matching combines sophisticated buffer management with HP's exclusive Variable Adaptive Tape Speed technology to allow the tape drive to match its transfer rate to the host speed dynamically and continuously across the wide range of transfer rates. This feature ensures that the tape drive continues to stream data regardless of the environment, and brings two big advantages:

- It optimizes backup performance, regardless of the speed of the host or the network
- It minimizes rewinding and repositioning of the tape, reducing wear and increasing reliability

WORM (Write-Once, Read-Many) Drive and Media Support

Critical to the success of data retention policies in highly regulated environments is the ability to store and manage data in an unalterable state. Following stringent guidelines set forth by regulatory agencies such as the SEC and HIPPA, IT organizations must now integrate new solutions and policies that can verify the integrity of stored data for periods that can extend well beyond seven years.

Ultrium 960 and Ultrium 1840 tape drives feature the ability to archive and store data in a non-rewriteable format that meets the most stringent regulatory guidelines. Using a combination of integrated fail-safe features in the drive firmware, cartridge memory, and tape formatting, Ultrium drives can archive large amounts of data for periods of up to 30 years in a secure, untampered state. Since all Ultrium 960 and Ultrium 1840 tape drives include support for both rewritable and WORM media, IT organizations can now easily integrate a secure, long-term archiving solution into their current data protection strategy. As compared to other technologies that feature support for WORM storage, the Ultrium 960 and Ultrium 1840 offers the advantages of:

- A single drive to support all backup and archiving needs
- Two distinctive tape cartridges to easily distinguish and manage both rewriteable and WORM data cartridges
- A specially designed WORM data cartridge with multiple integrated fail-safe features to prevent accidental or intentional overwriting of data
- High-capacity, low-cost HP WORM media that can store 800GB (LTO-3) or 1.6TB (LTO-4) of data on a single data cartridge
- Support from many backup and archiving software vendors, providing the most comprehensive and mainstream support in the industry
- The LTO open standard that offers greater choice and compatibility across all third-generation Ultrium products

NOTE: While all HP Ultrium 960 and Ultrium 1840 tape drives support LTO Ultrium WORM media, some third-generation LTO Ultrium tape drives from other manufacturers may not include read and write support for LTO Ultrium WORM media. For non-HP LTO-3 and LTO-4 tape drives, please check the manufacturers' specifications to ensure this support is provided if you are using your WORM media. If WORM support is not provided, the drive will eject the WORM tape cartridge immediately upon insertion into to the tape drive.

Product Highlights

HP OBDR (One-Button Disaster Recovery)	One-Button Disaster Recovery is an HP exclusive feature that provides fast and simple disaster recovery through the use of an HP tape drive. OBDR is a firmware-driven utility that can restore a server's operating system, software applications, and data using a single tape cartridge. Depending on the size of the data set, OBDR can provide system recovery in less than one hour, reducing the recovery window by more than 50 percent and minimizing the risks and costs associated with downtime. There's no longer a need to search for software disks and manuals or make a new set of disaster recovery disks each time the network configuration is altered or a peripheral is added. The sheer simplicity of OBDR means less human error. Backup and disaster recovery preparation, previously two separate tasks, now become one process. For more information about OBDR, visit the HP website at http://www.hp.com/go/obdr. For a current list of servers, workstations, and software that support OBDR, check the tape backup compatibility pages on the HP website at: http://www.hp.com/go/connect.

Software in the Box	The HP StorageWorks Ultrium tape drives include HP StorageWorks Data Protector Express Single Server Edition backup/recovery software and the HP StorageWorks Data Protector Express Bare Metal Disaster Recovery option. Data Protector Express Single Server Edition is an easy-to-use backup application to protect a single Windows, Linux or NetWare server. With support for hardware data encryption, HP LTO-4 Ultrium 1840 tape drives are able to provide a safe and secure backup without the performance hit other methods to tape encryption might provide. The Data Protector Express Bare Metal Disaster Recovery (BMDR) option provides automated system recovery of that server following a major hardware or software failure. The fastest method to recovery the server is to use the Data Protector Express BMDR option and the One Button Disaster Recovery feature of the HP StorageWorks Ultrium tape drives. As well as getting the Data Protector Express Single Server Edition software as part of the HP StorageWorks Ultrium tape drives solution, purchasers can also upgrade to the class-leading Data Protector Express backup/recovery software. This is a special SKU, only available for new customers of HP StorageWorks tape products that gives a significant discount off Data Protector Express to recognize the value of the in-box software. Upgrading to Data Protector Express allows network backup of servers and Windows desktops, extends the disk-to-disk backup capacity and capability and permits the additions of agents and extensions to increase scale and performance of the backup infrastructure. For more information about the in-box software please visit http://www.hp.com/go/dataprotectorexpress/sse. If the HP StorageWorks Ultrium tape drive is for a large environment that requires UNIX support and/or enterprise class application and feature support then HP Data Protector Software is the recommended backup/recovery software. For more information and evaluation software please visit http://www.hp.com/go/dataprotector.

Product Highlights

HP Ultrium Storage Media	HP recommends that you use HP-branded cartridges in your HP Ultrium tape drive to assure the highest level of protection for your valuable data. Our test program for HP Ultrium media is the most thorough and comprehensive in the industry.

All HP cartridges must satisfy an exhaustive battery of additional tests that relate directly to real life situations, where real data and real businesses are at stake. The benefit of the HP brand specification for media is consistent quality. Through the testing of thousands of HP drives and HP cartridges, the ideal formulation for backup performance is defined and then continuously monitored. This hugely resource-intensive process is unique to HP and affords deep insight into the HP+HP backup solution for a wide range of environments and duty cycles. Your best choice for ease of support and maximum dependability is to use HP-branded Ultrium cartridges at all times.

Management

HP Ultrium tape drives and automation are supported by HP StorageWorks Library and Tape Tools (LTT). This tool is intended to help in the installation and maintenance of HP tape drives and devices, including:

- Verifies installation of the drive
- Test/verify the health of the drive and media
- Provides HP support with detailed device information
- Multiple options for finding and upgrading new firmware
- Performance optimization and recommendations
- Included with each Ultrium tape drive and available via free download supporting all HP tape products

Instructions and downloads of Library and Tape Tools are available at:
http://www.hp.com/country/us/eng/software_drivers.html

Compatibility

HP's extensive compatibility testing program assures that your HP StorageWorks Ultrium tape drive works with leading servers, operating systems, and backup applications - and not just those sold by HP. HP Ultrium tape drives work seamlessly on many platforms, making them especially suitable if you have a mixed system environment. For the latest list of servers, workstations, operating systems, and backup software that support HP Ultrium tape drives, check the tape backup compatibility pages on our Web site at: http://www.hp.com/go/connect.

Server Compatibility   HP StorageWorks Ultrium tape drives are supported on the following classes of HP systems:

- HP ProLiant DL servers
- HP ProLiant ML servers
- HP Integrity servers
- HP 9000 servers
- HP AlphaServers
- HP workstations

HP StorageWorks Ultrium tape drives are also supported on server platforms from third-party manufacturers including:

- Dell
- IBM
- Sun

For details of which tape drive models work with which systems, including third-party systems, visit http://www.hp.com/go/connect for the latest hardware compatibility information.

OS Support   Microsoft® Windows, HP-UX, Tru64, Red Hat Linux, SUSE Linux, IBM-AIX, Sun Solaris and other operating systems.

NOTE: Please visit http://www.hp.com/go/connect for the latest compatibility information.

Backup Software Support   Supported with HP Data Protector, HP Data Protector Express, CA ARCserve Backup, EMC NetWorker, EMC Retrospect, IBM Tivoli Storage Manager, Symantec NetBackup, Symantec Backup Exec, BakBone NetVault, Commvault Galaxy, Tolis Group BRU and Yosemite Backup

NOTE: Please visit http://www.hp.com/go/connect for the latest compatibility information.

SAS Installation   HP StorageWorks SAS tape drives are available as internal and external models. Both models are supplied with a special split cable that allows you to connect to an internal port (if available) on the embedded SAS controller inside the server. While connection via the split cable provides the most cost-effective way of connecting the tape drive to an HP ProLiant server, this will require a clear understanding of your server's current SAS configuration before installing.

Some server models will allow direct connect to a spare SAS connector on the native SAS controller. Other servers which do not have a spare connector might require you to reconfigure hard disk drive bays and in a few instances, you may also lose the use of one of the hard disk drive bays and will need to rebuild your RAID configuration. In these configurations the simple, recommended solution is connecting to an option SAS host bus adapter and optional SAS cable.

Compatibility

For the most up-to-date information about recommended SAS HBAs and supported cabling configurations with your make and model of server, always refer to http://www.hp.com/go/connect

Cables and Termination

All cables required for a typical internal and external connection to HP servers are provided with your tape drive. For non-HP servers, please consult your manufacturers' server specifications to determine if the cable provided with your Ultrium tape drive is appropriate for use with that server. No terminator is required for internal models (assumes use of terminated cable). The external model features "auto-termination" – no terminator is required. New SAS-based Ultrium models ship with a 4-channel split cable which allows direct attach from embedded SAS controller on host to a tape drive and remaining 3 channels to disk.

NOTE: Visit http://www.hp.com/go/connect for the latest compatibility information.

Performance Tuning

You will need to connect the drive to a dedicated SCSI Host Bus Adaptor (HBA) that is Ultra 160 HBA or higher. To supply data to the drive fast enough to achieve full performance from an HP Ultrium tape drive, you will need at least eight disks as part of a RAID 5 array with read cache enabled. You can test the speed of your system with tools provided at http://www.hp.com/support/pat or with HP's StorageWorks Library and Tape Tools application.

To achieve full performance from your tape drive, do not use the native backup application within the operating system (e.g., NT® Backup, Windows® 2000 Backup). For full details of supported backup applications, see http://www.hp.com/products1/storage/compatibility/tapebackup/index.html

Service and Support, HP Care Pack, and Warranty Information

HP Care Pack Information HP Care Pack Services offer upgraded service levels to extend and expand your standard product warranty with easy to buy, easy to use support packages that help you make the most of your hardware and software investments. They let you choose the support levels that meet your business requirements, from basic to mission-critical. They help you contain total cost of ownership.

HP Care Pack warranty extensions can be purchased along with HP products to cost-effectively upgrade or extend your warranty. For many products, post-warranty HP Care Pack Services are available when your original warranty has expired.

Why purchase an HP Care Pack service?

Your standard warranty protects against product defects. HP Care Pack Services help you guard against unplanned downtime, which can reduce your productivity and profitability. These convenient service packages:

- Protect your investment in HP products
- Provide consistent, predictable levels of support across your entire department or business
- Ease budget planning with fixed-cost support that includes parts and labor
- Give you direct access to proven technical and problem-solving expertise
- Offer a choice of response-time and repair-time commitments
- Deliver prompt, measurable results
- Are available whenever and wherever you do business

HP Care Pack availability may vary by country and product.

Supporting your Adaptive Enterprise journey

HP Services helps you make the Adaptive Enterprise real for your organization. The breadth, depth, and quality of HP hardware and software support services can help you improve the performance of your IT support processes and resolve the complex software and hardware problems that tax user productivity. HP Care Pack services help you increase IT environment stability, efficiency, and agility from the desktop to the data center, and improve the productivity of your employees.

Warranty and Services Included with the Product Hewlett-Packard provides a 3-year, next-day, product exchange, limited warranty for all the StorageWorks Ultrium Tape Drives, plus 9x5 phone support for the duration of the warranty.

For more information about HP's Global Limited Warranty and Technical Support, visit:
ftp://ftp.compaq.com/pub/products/storageworks/warranty/EN_321708-008.pdf

Service and Support, HP Care Pack, and Warranty Information

Recommended Services

In order to maximize ROI and product uptime, and minimize the cost of ownership, Hewlett Packard recommends:

3 years 24 x 7 Hardware Support

- Guards against downtime, which reduces productivity and profitability
- Eases budget planning with fixed-cost support that includes parts and labor
- Direct access to proven technical and problem-solving expertise

3 years 24 x 7 Software Support

- Improve the productivity of system managers and operators
- Improve system performance and reduce downtime due to software defects
- Expedite problem resolution through expert-level technical resources
- 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
- Keep your license compliancy up-to-date

Available HP Care Pack Services

Extend your product warranty with a wide choice of cost-saving support packages.

HP Care Pack Services are sold by HP and HP authorized enterprise and commercial resellers. Services for customers purchasing via direct and enterprise resellers are quoted using HP order configuration tools. Additional information about HP Care Pack Service features and benefits is available at http://www.hp.com/hps/carepack/services/.

Key for HP Care Pack Service availability in the table below:
E = Service available for customers purchasing direct and via enterprise resellers
C = Service available for customers purchasing via commercial resellers
N/A = Service not applicable

HP Care Pack Services Deployment and Per Event Services	Service Available
HP Installation	E/C
HP Installation & Startup	N/A
HP Implementation	N/A

For more information about Deployment and Per Event Services for HP Storage, visit http://www.hp.com/hps/storage/.

HP Care Pack Services

Availability Services	1 yr	3 yr	4 yr	5 yr
HP Next Day Hardware Support	E/C	E/C	C	C
HP 4 Hr, 9x5 HW Support	E/C	E/C	C	C
HP 4 Hr, 13x5 Hardware Support	E/C	E/C	C	C
HP 4 Hr, 24x7 Hardware Support	E/C	E/C	C	C
HP 6 HR Call-to-Repair HW Support	E/C	E/C	C	C
HP Software Support	E/C	E/C	C	C
HP Software Support 24x7	E/C	E/C	C	C
HP Support Plus	E/C	E/C	C	C

Service and Support, HP Care Pack, and Warranty Information

HP Support Plus 24	E/C	E/C	C	C
HP Proactive Essentials 9x5, 10 SW Incidents	N/A	N/A	N/A	N/A
HP Proactive Essentials 9x5, 25 SW Incidents	N/A	N/A	N/A	N/A
HP Proactive Essentials 9x5 Unlimited	N/A	N/A	N/A	N/A
HP Proactive Essentials 24x7, 25 SW Incidents	N/A	N/A	N/A	N/A
HP Proactive Essentials 24x7, 50 SW Incidents	N/A	N/A	N/A	N/A
HP Proactive Essentials 24x7 Unlimited	N/A	N/A	N/A	N/A
HP Proactive 24 Service*	N/A	N/A	N/A	N/A
HP Critical Service*	N/A	N/A	N/A	N/A

*Both Proactive 24 & Critical Service only relate to 'reactive elements'. 'Proactive elements' are available on time & materials basis. (SW is supported separately per package).

To find HP Care Pack Services available via HP authorized commercial resellers, visit http://h30125.www3.hp.com/csn/salesmktg/elfpack/elf_nonlkup_ctrylang.asp?code=ELNL

Important Notice for Tape Drives Installed in a 1U or 3U Rack Mount Kit

NOTE: These Care Packs do not apply to Tape Drives mounted in a 1U or 3U Rack Mount Kit. The HP Rack Mount Kit Care Pack covers the all possible configurations of Tape Drives. Hence the Care Packs for 1U & 3U Rack Mount Kit covers all encumberant drives.
Please follow the following url for the correct Care Pack Services and descriptions.
http://h18000.www1.hp.com/products/quickspecs/10854_div/10854_div.pdf

Important Notice for Internal Tape Drives Installed in an HP Server

NOTE: These Care Packs do not apply to Internal Tape Drives because they do not have Care Packs associated with them if they are mounted in an HP Server. Hence the Care Packs for the HP Server covers all encumberant drives.
Please follow the following url for the correct Care Pack Services and descriptions.

For ProLiant use: http://h18000.www1.hp.com/products/quickspecs/ProductBulletin.html
For BCS use: http://h18000.www1.hp.com/products/quickspecs/ProductBulletin.html

Important Notice for Tape Drive Modules Installed in an HP Tape Array

NOTE: These Care Packs do not apply to Tape Drives mounted in an HP Tape Array because they do not have Care Packs associated with them. Hence the Care Packs for the HP Tape Array covers all encumberant drives.
Please follow the following url for the correct Care Pack Services and descriptions.
http://h18000.www1.hp.com/products/quickspecs/11878_div/11878_div.pdf

Service and Support, HP Care Pack, and Warranty Information

Deployment and Per Event Service Descriptions

Installation is part of a suite of HP deployment services that are designed to provide a quick response to your need for additions to your organization's IT infrastructure, while giving you the peace of mind that comes from good knowing your hardware and software products from HP and selected third parties have been installed in a professional manner by a highly skilled HP service delivery specialist.

HP Installation Service

- Expedited installation, with all service prerequisites met before the installation is performed
- Installation in accordance with manufacturer's specifications, enhancing the supportability of your HP-installed hardware and software
- Service delivery at a mutually scheduled time Allows your IT resources to stay focused on their core tasks and priorities
- Availability of an HP service specialist to answer questions during the onsite delivery of this service
- Service planning
- Service deployment
- Installation verification tests

HP Care Pack Service Product Numbers

Enterprise & Commercial Purchased Care Packs ('A' stands for physical Care Pack, 'E' for electronic Care Pack)

Product Description	Product Number
Tape Installation HW Installation Only	U2090A/E
HW, "3-year", "Next Business Day", "9x5", "on-site"*	H3157A/E
HW, "3-year", "4-hour", "13x5", "on-site"	H4617A/E
HW, "3-year", "4-hour", "24x7", "on-site"	H4622A/E
HW, "3-year", "6hr Call to Repair", "24x7", "on-site"	U6359A/E
HW, "4-year", "4-hour", "13x5", "on-site"	U9342A/E
HW, "4-year", "4-hour", "24x7", "on-site"	U9343A/E
HHW, "5-year", "4-hour", "13x5", "on-site"	U9344A/E
HW, "5-year", "4-hour", "24x7", "on-site"	U9345A/E
HW, "1-year", "Next Business Day", "9x5", "on-site", "Post Warranty"	UA454PE
HW, "1-year", "4-hour", "13x5", "on-site", " Post Warranty "	UA455PE
HW, "1-year", "4-hour", "24x7", "on-site", " Post Warranty "	UA456PE
HW, "1-year", "6hr Call to Repair", "24x7", "on-site", Post Warranty"	UA457PE

Service and Support, HP Care Pack, and Warranty Information

Enterprise Purchased Care Packs

Product Description	Drive Band	Install Band	Product Number
Tape Installation HW Installation Only	N/A	596	HA113A1
HW, "3-year", "next-day", "13x5", "on-site"	450	N/A	HA101A3
HW, "3-year", "4-hour", "13x5", "on-site"	450	N/A	HA103A3
HW, "3-year", "4-hour", "24x7", "on-site"	450	N/A	HA104A3
HW, "3-year", "6hr CTR", "24x7", "on-site"*	450	N/A	HA105A3
SW, "3-year", "Phone-in", "9x5"	N/A	N/A	HA106A3
SW, "3-year", "Phone-in", "24x7"	N/A	N/A	HA107A3
HW Only, Support Plus, "3-year", "13x5"	450	N/A	HA109A3
HW Only, Support Plus 24, "3-year", "24x7"	450	N/A	HA110A3
HW Only, Proactive 24, "3-year", "24x7"*	450	N/A	HA111A3
HW Only, Critical Service, "3-year", "24x7"*	450	N/A	HA112A3

*Both Proactive 24 & Critical Service only relate to 'reactive elements', 'proactive elements' are available on time & materials basis. (SW is supported separately per package).
NOTE: The Care Pack information quoted above relates to 3 year offerings only, 1yr / 4yr & 5yr packs are available for each offering (replace A3 with A1, A4 or A5).

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 Education Services

For more information about HP Education Services for Storage and SAN, visit
http://education.hp.com/curr-storsan.html

Service and Support, HP Care Pack, and Warranty Information

Additional Services Information	For more information about Deployment, Per Event, Consulting and Education services for HP Storage, visit: http://www.hp.com/hps/storage/

For more information about HP Care Pack services for storage products, visit: http://www.hp.com/hps/carepack/storage/cp_networked.html

For more information about HP storage software, services and updates, visit: http://h18006.www1.hp.com/storage/software.html

If you have specific questions, contact your local HP representative. Contact information for a representative in your area can be found at "Contact HP" http://www.hp.com/ |

Models and Kit Contents

Model Name	Kit Contents Description	Part Number
LTO-4 Ultrium 1840 tape drives		
LTO-4 Ultrium 1840 SAS Internal	HP StorageWorks LTO-4 Ultrium 1840 SAS Internal Tape Drive; HP StorageWorks Tape CD-ROM (contains HP StorageWorks Library and Tape Tools utilities, user manuals and Windows drivers); HP StorageWorks Data Protector Express Single Server Edition backup/recovery software CD and the HP StorageWorks Data Protector Express Bare Metal Disaster Recovery option; HP Ultrium 1.6 TB Data Cartridge; Ultrium Cleaning Cartridge; multi-language labels; internal 4-channel split SAS cable; performance tuning poster; documentation. NOTE: 0D1 will appear after this part number on your sales order if factory integration into a server or rack-mount enclosure is indicated.	EH860A
LTO-4 Ultrium 1840 SAS External	HP StorageWorks LTO-4 Ultrium 1840 SAS External Tape Drive; HP StorageWorks Tape CD-ROM (contains HP StorageWorks Library and Tape Tools utilities, user manuals and Windows drivers); HP StorageWorks Data Protector Express Single Server Edition backup/recovery software CD and the HP StorageWorks Data Protector Express Bare Metal Disaster Recovery option; HP Ultrium 1.6 TB Data Cartridge; Ultrium Cleaning Cartridge; multi-language labels; power cord; 4-channel split SAS cable with PCI slot cover (allows connection inside the server with cable running externally through PCI slot); performance tuning poster; documentation.	EH861A
LTO-4 Ultrium 1840 SCSI Internal	HP StorageWorks LTO-4 Ultrium 1840 SCSI Internal Tape Drive; HP StorageWorks Tape CD-ROM (contains HP StorageWorks Library and Tape Tools utilities, user manuals and Windows drivers); HP StorageWorks Data Protector Express Single Server Edition backup/recovery software CD and the HP StorageWorks Data Protector Express Bare Metal Disaster Recovery option; HP Ultrium 1.6 TB Data Cartridge; Ultrium Cleaning Cartridge; multi-language labels; internal SCSI cable; performance tuning poster; documentation. NOTE: 0D1 will appear after this part number on your sales order if factory integration into a server or rack-mount enclosure is indicated.	EH853A
LTO-4 Ultrium 1840 SCSI External	HP StorageWorks LTO-4 Ultrium 1840 SCSI External Tape Drive; HP StorageWorks Tape CD-ROM (contains HP StorageWorks Library and Tape Tools utilities, user manuals and Windows drivers); HP StorageWorks Data Protector Express Single Server Edition backup/recovery software CD and the HP StorageWorks Data Protector Express Bare Metal Disaster Recovery option; HP Ultrium 1.6 TB Data Cartridge; Ultrium Cleaning Cartridge; multi-language labels; power cord; 68-pin HD to 68-pin VHDCI multi-mode SCSI cable; performance tuning poster; documentation.	EH854A
LTO-4 Ultrium 1840 SCSI Array Module (for use with HP StorageWorks Tape Array 5300)	HP StorageWorks LTO-4 Ultrium 1840 offline hot-swap array module; HP StorageWorks Tape CD-ROM (contains HP StorageWorks Library and Tape Tools utilities, user manuals and Windows drivers); HP StorageWorks Data Protector Express Single Server Edition backup/recovery software CD and the HP StorageWorks Data Protector Express Bare Metal Disaster Recovery option; HP Ultrium 1.6 TB Data Cartridge; Ultrium Cleaning Cartridge; multi-language labels; documentation. NOTE: 0D1 will appear after this part number on your sales order if factory integration is indicated.	EH856A
LTO-4 Ultrium 1840 SCSI Rack-mount – single drive installed in a 3U Rack-mount kit	Wide SCSI LVD 3U SCSI rack-mount enclosure kit with power supply and fan; one internal LTO-4Ultrium 1840 SCSI Tape Drive; power cord; HP StorageWorks Tape CD-ROM (contains HP StorageWorks Library and Tape Tools utilities, user manuals and Windows drivers, HP StorageWorks Data Protector Express Single Server Edition backup/recovery software CD and the HP StorageWorks Data Protector Express Bare	EH926A

Models and Kit Contents

Metal Disaster Recovery option; HP Ultrium 1.6 TB Data Cartridge; Ultrium Cleaning Cartridge; multi-language labels; documentation.
NOTE: 0D1 will appear after this part number on your sales order if factory integration into a rack is indicated.

Model Name	Kit Contents Description	Part Number
LTO-3 Ultrium 960 tape drives		
LTO-3 Ultrium 960 SCSI Internal	HP LTO-3 Ultrium 960 Internal SCSI Tape Drive; HP StorageWorks Tape CD-ROM (contains HP StorageWorks Library and Tape Tools utilities, user manuals and Windows drivers); HP StorageWorks Data Protector Express Single Server Edition backup/recovery software CD and the HP StorageWorks Data Protector Express Bare Metal Disaster Recovery option; HP Ultrium 800 GB Data Cartridge; HP Ultrium Cleaning Cartridge; multi-language labels; internal SCSI cable; performance tuning poster; documentation. **NOTE:** 0D1 will appear after this part number on your sales order if factory integration into a server or rack-mount enclosure is indicated.	Q1538A
LTO-3 Ultrium 960 SCSI External	HP StorageWorks LTO-3 Ultrium 960 External SCSI Tape Drive; HP StorageWorks Tape CD-ROM (contains HP StorageWorks Library and Tape Tools utilities, user manuals and Windows drivers); HP StorageWorks Data Protector Express Single Server Edition backup/recovery software CD and the HP StorageWorks Data Protector Express Bare Metal Disaster Recovery option; HP Ultrium 800 GB Data Cartridge; Ultrium Cleaning Cartridge; multi-language labels; power cord; 68-pin HD to 68-pin VHDCI multi-mode SCSI cable; performance tuning poster; documentation.	Q1539B
LTO-3 Ultrium 960 SCSI Array Module (for use with HP StorageWorks Tape Array 5300)	HP StorageWorks LTO-3 Ultrium 960 offline hot-swap array module; HP StorageWorks Tape CD-ROM (includes HP StorageWorks Library and Tape Tools utilities, user manuals and Windows drivers); HP StorageWorks Data Protector Express Single Server Edition backup/recovery software CD and the HP StorageWorks Data Protector Express Bare Metal Disaster Recovery option; HP Ultrium 800 GB Data Cartridge; Ultrium Cleaning Cartridge; multi-language labels; documentation. **NOTE:** 0D1 will appear after this part number on your sales order if factory integration is indicated.	Q1540A
LTO-3 Ultrium 960 SCSI Rack-mount – single drive installed in a 3U Rack-mount kit	Wide SCSI LVD 3U SCSI rack-mount enclosure kit with power supply and fan; one internal LTO-3 Ultrium 960 Tape Drive; power cord; HP StorageWorks Tape CD-ROM (contains HP StorageWorks Library and Tape Tools utilities, user manuals and Windows drivers); HP StorageWorks Data Protector Express Single Server Edition backup/recovery software CD and the HP StorageWorks Data Protector Express Bare Metal Disaster Recovery option; HP Ultrium 800 GB Data Cartridge; Ultrium Cleaning Cartridge; multi-language labels; documentation. **NOTE:** 0D1 will appear after this part number on your sales order if factory integration into a rack is indicated.	Q1595B

Options

Host Bus Adapters, Controllers, and Accessories for ProLiant Servers	HP SC11Xe Host Bus Adapter NOTE: Recommended SCSI HBA for connecting Ultrium tape drives to ProLiant DL servers. Please visit http://www.hp.com/go/connect for a complete list of Ultrium tape drive compatibility with ProLiant servers and other industry standard servers.	412911-B21
	64-Bit/133-MHz Single Channel Ultra320 SCSI HBA G2 NOTE: Recommended SCSI HBA for connecting Ultrium tape drives to ProLiant ML servers. Please visit http://www.hp.com/go/connect for a complete list of Ultrium tape drive compatibility with ProLiant servers and other industry standard servers.	374654-B21
Host Bus Adapters, Controllers, and Accessories for HP PA-RISC and IPF servers	64-Bit/133-MHz Dual Channel Ultra320 SCSI Adapter Please refer to the HP Tape Backup Products Compatibility website at http://www.hp.com/go/connect for more information on support for HP PA-RISC and IPF servers.	A7173A
Host Bus Adapters, Controllers, and Accessories for HP AlphaServers	32-Bit PCI to Single Channel Wide-Ultra2 SCSI Adapter	3X-KZPCA-AA
	Triple-Function Combo Adapter: LVD / SCSI II, 10/100 UTP Ethernet, and 2D Graphics	3X-DEPVZ-AA
	Dual Channel 64/66-MHz PCI-to-SCSI Ultra160 Host Bus Adapter	3X-KZPEA-DB
Host Bus Adapters, Controllers, and Accessories for 3rd Party servers and workstations	64-Bit/133-MHz Single Channel Ultra320 SCSI HBA G2 NOTE: This SCSI controller supports a wide range of connectivity to non-HP 32-bit servers. Please refer to the HP Tape Backup Products Compatibility website at http://www.hp.com/go/connect for more information. HP Ultrium tape drives are supported on a wide range of non-HP server using third-party SCSI controllers and host bus adapters. Please refer to the HP Tape Backup Products Compatibility website at http://www.hp.com/go/connect for more information.	374654-B21
Media	HP LTO1 Ultrium 200 GB Data Cartridge NOTE: Write and read support for Ultrium 230, Ultrium 232, Ultrium 448 and Ultrium 460. Read support for Ultrium 920 and Ultrium 960	C7971A
	HP LTO2 Ultrium 400 GB Data Cartridge NOTE: Write support for Ultrium 448, Ultrium 460 Ultrium 920 and Ultrium 960.	C7972A
	HP LTO3 Ultrium 800 GB RW Data Cartridge NOTE: Write support for Ultrium 920 and Ultrium 960.	C7973A
	HP LTO3 Ultrium 800 GB WORM Data Cartridge NOTE: Supports Ultrium 920, Ultrium 960 and Ultrium 1840. NOTE: This data cartridge only supports Write-Once Read-Many recording format for LTO-3 and LTO-4 drives. Data recorded to this data cartridge can not be overwritten.	C7973W
	HP LTO4 Ultrium 1.6 TB RW Data Cartridge NOTE: Write and read support for Ultrium 1840 only.	C7974A

Options

	HP LTO4 Ultrium 1.6 TB WORM Data Cartridge	C7974W
	NOTE: Write and read support for Ultrium 1840 only.	
	NOTE: This data cartridge only supports Write-Once Read-Many recording format for LTO-4 drives. Data recorded to this data cartridge can not be overwritten.	
	HP LTO1 Ultrium 200 GB Storage Media Kit	C8013A
	HP LTO2 Ultrium 400 GB Storage Media Kit	C8014A
	HP Ultrium Universal Cleaning Cartridge	C7978A

Rack-mount Options	3U SCSI Rack-mount Kit	274338-B22
	NOTE: For racked SCSI-based ProLiant and AlphaServers. No drives included. Accommodates up to four internal half-height drives (such as the Ultrium 232, Ultrium 448 or Ultrium 920) or two full-height drives (such as the Ultrium 460, Ultrium 960 or Ultrium 1840)	
	NOTE: Please refer to web page for further information:	
	http://h18006.www1.hp.com/products/storageworks/3urackmount/index.html	
	NOTE: #0D1 will appear after this part number on your sales order if factory integration into a rack is indicated.	
	3U SAS Rack-mount Kit	AG576A
	NOTE: For racked SAS-based ProLiant servers. No drives included. Accommodates up to four internal half-height drives (such as the Ultrium 448 SAS or Ultrium 920 SAS) or two full-height drives (such as the Ultrium 1840 SAS).	
	NOTE: Please refer to web page for further information:	
	http://h18006.www1.hp.com/products/storageworks/3urackmount/index.html	
	NOTE: #0D1 will appear after this part number on your sales order if factory integration into a rack is indicated.	
	Tape Array 5300	C7508B*
	NOTE: For racked HP-UX or ProLiant servers and other industry-standard racks. Holds up to four offline hot-swap half-height drives (such as the Ultrium 232 or Ultrium 448 array module or a DVD-ROM drive) or up to two offline hot-swap full-height drives (such as the Ultrium 460, Ultrium 960 , or Ultrium 1840 array modules).	
	NOTE: Please refer to web page for further information:	
	http://www.hp.com/products1/storage/products/tapebackup/tapearrays/tapearray5300/index.html	
	*For the factory racked version, please order C7508AZ	
	Redundant, hot-swap power supply and fan for Tape Array 5300	C7496B

Software	Data Protector Express backup/recovery software	BB117ET

Options

Cables and Adapters

68-pin HD/68-pin VHDCI, 12 ft/3.66 m SCSI cable for external drives		341177-B21
68-pin HD/68-pin HD, 16.40 ft/5 m SCSI cable for external drives		328215-001
68-pin HD/68-pin HD, 32.81 ft/10 m SCSI cable for external drives		328215-002
Ultra320 SCSI Cable Kit (for installing Ultra320 SCSI tape drives in the 3U and 5U Rack-Mount Kits)		DW063B
HP StorageWorks Mini-SAS Cable for LTO Internal Tape Drive NOTE: Use this cable to connect HP StorageWorks LTO Ultrium internal tape drives to Mini-SAS (SFF8087) ports.		AP746A
2M External Infiniband (SFF8470) to Mini-SAS (SFF8088) 1x SAS Cable NOTE: Use this cable to connect HP StorageWorks SAS external tape devices to HP SAS controllers with Infiniband (SFF8470) connectors.		AE466A
4M External Infiniband (SFF8470) to Mini-SAS (SFF8088) 1x SAS Cable NOTE: Use this cable to connect HP StorageWorks SAS external tape devices to HP SAS controllers with Infiniband (SFF8470) connectors.		AE468A
2M External Mini-SAS (SFF8088) to Mini-SAS (SFF8088) 1x SAS Cable NOTE: Use this cable to connect HP StorageWorks SAS external tape devices to HP SAS controllers with external Mini-SAS (SFF8088) connectors.		AE470A
4M External Mini-SAS (SFF8088) to Mini-SAS (SFF8088) 1x SAS Cable NOTE: Use this cable to connect HP StorageWorks SAS external tape devices to HP SAS controllers with external Mini-SAS (SFF8088) connectors.		AE465A
4M External Mini-SAS (SFF8088) to SAS 4i (SFF8484) 3x/1x Split SAS Cable NOTE: This split cable connects internally to SAS Hard Drive Cage (3x) and externally to the tape device (1x) with other connector attaching to HP SAS controllers with SAS 4i (SFF8484) connectors. The 1x cable occupies additional PCI slot on the server.		AE464A
4M External Mini-SAS (SFF8088) to Internal Mini-SAS (SFF8087) 3x/1x Split SAS Cable NOTE: This split cable connects internally to SAS Hard Drive Cage (3x) and externally to the tape device (1x) with other connector attaching to the Smart Array P400i controller inside a DL360 G5 or DL365 G5 server. The 1x cable occupies additional PCI slot on the server.		AG452A

Technical Specifications

		LTO-4 Ultrium 1840	LTO-3 Ultrium 960
Dimensions	Form Factor	5¼-inch full-height	5¼-inch full-height
	Physical (HxWxD) Internal	3.3 x 5.7 x 8.2 in (8.5 x 14.5 x 20.7cm)	3.3 x 5.7 x 8.2 in (8.3 x 14.6 x 20.7 cm)
	Physical (HxWxD) External	4.7 x 8.6 x 11.7 in (12.0 x 21.8 x 29.7 cm)	4.7 x 8.6 x 11.7 in (12.0 x 21.8 x 29.7 cm)
	Physical (HxWxD) Array Module	3.3 x 6.1 x 11.2 in (8.5 x 15.5 x 28.5 cm)	3.3 x 6.1 x 11.2 in (8.5 x 15.5 x 28.5 cm)
	Physical (HxWxD) Rack-mount	5.2 x 16.8 x 23.0 in (13.2 x 42.7 x 58.4 cm)	5.2 x 16.8 x 23.0 in (13.2 x 42.7 x 58.4 cm)
	Shipping (HxWxD) Internal	13.4 x 17.7 x 12.2 in (34.0 x 45.0 x 31.0 cm)	13.4 x 17.7 x 12.2 in (34.0 x 45.0 x 31.0 cm)
	Shipping (HxWxD) External	15.2 x 18.7 x 15.2 in (38.5 x 47.5 x 38.5 cm)	15.2 x 18.7 x 15.2 in (38.5 x 47.5 x 38.5 cm)
	Shipping (HxWxD) Array Module	13.4 x 17.7 x 12.2 in (34.0 x 45.0 x 31.0 cm)	13.4 x 17.7 x 12.2 in (34.0 x 45.0 x 31.0 cm)
	Shipping (HxWxD) Rack-mount	15.75 x 23.75 x 33.5 in (40.0 x 60.3 x 85.1 cm)	15.75 x 23.75 x 33.5in (40.0 x 60.3 x 85.1 cm)
Weight	Out of box, Internal	4.94 lb (2.24 kg)	4.94 lb (2.24 kg)
	Out of box, External	12.28 lb (5.57 kg)	12.28 lb (5.57 kg)
	Out of box, Array Module	6.5 lb (2.97 kg)	6.5 lb (2.97 kg)
	Out of box, Rack-mount	31.6 lb (14.4 kg)	31.6 lb (14.4 kg)
	Shipping, Internal	7.9 lb (3.6 kg)	7.9 lb (3.6 kg)
	Shipping, External	16.1 lb (7.3 kg)	16.1 lb (7.3 kg)
	Shipping, Array Module	9.7 lb (4.4 kg)	9.7 lb (4.4 kg)
	Shipping, Rack-mount	56 lb (25 kg)	56 lb (25 kg)
Capacity	Native	800 GB	400 GB
	Compressed (assumes 2:1 data compression)	1.6 TB	800 GB
	Buffer Size	128 MB	128 MB
Performance (1Kb = 1,000 bytes)	Native Data transfer rate	120 MB/s with LTO 4 media 80 MB/s with LTO 3 media 35.6 MB/s with LTO 2 media	80 MB/s with LTO 3 media 30 MB/s with LTO 2 media 20 MB/s with LTO 1 media
	Data transfer rate, compressed (assumes 2:1 data compression)	240 MB/s with LTO 4 media 160 MB/s with LTO 3 media 71.2 MB/s with LTO 2 media	160 MB/s with LTO 3 media 60 MB/s with LTO 2 media 40 MB/s with LTO 1 media
	Burst transfer rate	Ultra320 SCSI: 190 MB/s 3Gb/sec SAS: 240 MB/s	Ultra320 SCSI: 160 MB/s
	Data rate matching range	40-120 MB/s	27-80 MB/s

Technical Specifications

	Data access time (from BOT)	46 seconds typical for LTO 2 media 52 seconds typical for LTO 3 media 62 seconds typical for LTO 4 media	46 seconds typical for LTO 1 and LTO 2 media 53 seconds typical for LTO 3 media
	Rewind time from EOT	< 124 seconds for LTO 4 media < 102 seconds for LTO 3 media < 92 seconds for LTO 2 media	< 98 seconds for LTO 3 media < 88 seconds for LTO 2 media
	Rewind tape speed	7 m/s for (LTO 3 and LTO 2 media)	7 m/s for (LTO 3 and LTO 2 media)
	Average load time	<19 seconds (RW) 22 seconds (WORM-initialized) Uninitialized WORM media can take up to 70 seconds	<19 seconds (RW) 22 seconds (WORM)
	Average unload time	<19 seconds (RW) 22 seconds (WORM-initialized) Uninitialized WORM media can take up to 70 seconds	<19 seconds (RW) 22 seconds (WORM)
Security	Encryption	AES 256 bit	n/a
	WORM media support	LTO 4 media	LTO 3 media
Reliability	MTBF	250,000 hours at 100% duty cycle	250,000 hours at 100% duty cycle
	Uncorrected Error Rate	1×10^{17} bits read	1×10^{17} bits read
Rewriteable Media Compatibility	Read	LTO Ultrium 4 LTO Ultrium 3 LTO Ultrium 2	LTO Ultrium 3 LTO Ultrium 2 LTO Ultrium 1
	Write	LTO Ultrium 4 LTO Ultrium 3 [unencrypted]	LTO Ultrium 3 LTO Ultrium 2
WORM Media Compatibility	Read	LTO Ultrium 4 WORM LTO Ultrium 3 WORM	LTO Ultrium 3 WORM
	Write	LTO Ultrium 4 WORM LTO Ultrium 3 WORM	LTO Ultrium 3 WORM

QuickSpecs

Technical Specifications

Tape Format	Recording method	16-channel linear serpentine	16-channel linear serpentine
	Recording format	LTO Ultrium 4 LTO Ultrium 3 [unencrypted]	LTO Ultrium 3 LTO Ultrium 2
	Data compression	LTO DC dual mode compression (an enhanced version of ALDC)	LTO DC dual mode compression (an enhanced version of ALDC)
	Error detection/correction	Reed-Solomon	Reed-Solomon
	Read Channel Technology	Partial Response Maximum Likelihood (PRML)	Partial Response Maximum Likelihood (PRML)
	Data Tracks	896	704
	Data Encoding Method	RLL 0,13/11	RLL 0,13/11
Interface	Interface type	Ultra320 SCSI (LVDS) or 3Gb/sec SAS	Ultra320 SCSI (LVDS)
	SCSI connector	SCSI Internal: 68-pin LVDS SCSI External: 68-pin HD LVDS SCSI Array module: 80-pin SCA (SCSI and power) SCSI Rack-mount: 68-pin HD LVDS SAS Internal: mini-SAS SFF8482 SAS External: mini-SAS SFF8088	Internal: 68-pin LVDS External: 68-pin HD LVDS Array module: 80-pin SCA (SCSI and power) Rack-mount: 68-pin HD LVDS

Power Specifications		LTO-4 Ultrium 1840	LTO-3 Ultrium 960
	Power requirements, Internal (including rack-mount model)	+5V@4.2A (typical) +5V@4.5A (max) +12V@0.75A (typical) +12V@2.5A (max)	+5V@3.5A (typical) +5V@4.5A (max) +12V@1.0A (typical) +12V@2.0A (max)
	Power requirements, External	100 to 240 VAC, 50-60 Hz, auto-ranging, 0.8A max	100 to 240 VAC, 50-60 Hz, auto-ranging, 0.8A max
	Power requirements, Array Module	+5V@4.2A (typical) +5V@4.5A (max) +12V@0.75A (typical) +12V@2.5A (max)	+5V@3.5A (typical) +5V@4.5A (max) +12V@1.0A (typical) +12V@2.0A (max)
	Power consumption	12 Watts idle 30 Watts typical 52 Watts max	12 Watts idle 30 Watts typical 35 Watts max

Technical Specifications

Environmental Specifications	Temperature range	Operating: 50° F to 95° F (10° C to 35° C) if 6 CFM airflow is provided 50° F to 104° F (10° C to 40° C) if 8CFM airflow is provided Non-Operating: -40° F to 151° F (-40° C to 66° C)
	Non-condensing humidity range	Operating: 20 to 80% RH (Non-condensing, max wet bulb temperature = 26C) Non-Operating: 10 to 95% RH (Non-condensing, max wet bulb temperature = 26C)

Standards Compliance	CSA Certification to C22.2, No.60950 (cCSAus) TÜV EN60950 (IEC 60950 and EN60950) CE Declaration of Conformity FCC 47 CFR Parts 15 NOM VCCI C-TICK RRL BSMI GOSH CB Certificate and Report (IEC 60950)

Front Panel LED Indicators	HP Ultrium tape drives have four LED indicators on the front panel: • Ready • Drive Error • Tape Error • Clean Please consult your HP StorageWorks Ultrium Tape Drive "Getting Started Guide" for more information on how to use these LED indicators for ascertaining drive status and for help in troubleshooting your HP Ultrium tape drive.