

IBM System Storage TS2900 Tape Autoloader Express

IBM Redbooks Product Guide

This IBM® Redbooks® Product Guide describes the IBM System Storage® TS2900 Tape Autoloader, designed for entry-level automation in small-to-medium business environments. With a low-profile, high-density storage capacity, the TS2900 is ideally suited for backup and archival operations. The TS2900 is available with IBM Linear Tape-Open (LTO) Ultrium 6 Half-High, LTO Ultrium 5 Half-High, and LTO Ultrium 4 Half-High SAS tape technology for a high-capacity, entry-priced tape storage solution.

The TS2900 Tape Autoloader is shown in Figure 1.



Figure 1. TS2900 Tape Autoloader

The TS2900 is equipped with standard features designed to provide ease-of-use and secured data backup. Web-based remote management, a bar code reader, and a removable tape magazine help provide ease of use. The TS2900 can be used in a rack system or on a desktop next to a server in an office. These types of features help reduce the requirements of IT personnel staff, and also help centralize backup in the data center. The TS2900 also supports the encryption of sensitive user data in combination with LTO Ultrium 6, 5, or 4 Half-High tape technology from IBM. With 6 Gbps SAS attach, the TS2900 is supported on IBM Power Systems™, IBM System x®, Intel, and other competitive open system server platforms.

Did you know?

The TS2900 1U slim profile rack system environment is designed for automated, high-capacity tape storage and has the lowest entry price of any IBM tape automation offering IBM Half-High tape technology. The IBM LTO Ultrium Half-High technology delivers reliable performance for small-to-medium open system environments. The single I/O station helps support continuous backup and archive library operations, and the removable magazine facilitates the offsite relocation of cartridges and archival data. The design of the remote library management through a standard web interface offers flexibility and greater administrative control of storage operations without the need to touch the unit.

Highlights

The TS2900 has a nine-data-slot cartridge capacity for a total storage capacity of up to 56.25 TB with 2:5:1 compression, and also a single I/O station to provide undisturbed library operation when extracting or inserting data cartridges. The library uses one IBM LTO Ultrium Half-High tape drive (in these TS2900 models, an LTO Ultrium 6 S6H/S6R, LTO Ultrium 5 S5H/S5H, or an LTO Ultrium 4 S4H/S4R). The TS2900 is shipped as a rack mount unit, with the option of a desktop conversion kit. The TS2900 includes, as standard, a bar-code reader, which supports the operations in sequential or random access mode. Remote administration and management capabilities are possible through the web interface that is also included as standard.

LTO technology

With its use of LTO Ultrium 6 Half-High, LTO Ultrium 5 Half-High, or one Ultrium LTO Ultrium 4 Half-High tape drive and a nine-tape cartridge capacity, the TS2900 can store up to 56.25 TB compressed (22.5 TB native). The IBM LTO Ultrium 6 tape drive supports data transfer rates up to 160 MBps. The IBM LTO Ultrium 5 tape drive supports up to 140 MBps native data-transfer. IBM LTO standards leadership continues with the LTO Ultrium 6 tape drive technology and LTO Ultrium 6 media with a compressed capacity of up to 6.25 TB with 2.5 to 1 compression (up to 2.5 native capacity) compared to previous LTO Ultrium 5 compressed capacity of up to 3.0 TB with 2:1 compression (up to 1.5 TB native capacity) per tape cartridge.

The drives are backward compatible as follows: LTO Ultrium 6 Half-High tape drives can read and write to LTO Ultrium 5 media and read LTO Ultrium 4 media; LTO Ultrium 5 Half-High tape drives can read and write to LTO Ultrium 4 media and read LTO Ultrium 3 media. They have speed-matching and channel calibration for improved performance. They support the leading operating systems and popular backup software.

Security

Data is one of the most highly valued resources in a competitive business environment. Protecting that data, controlling access to it, and verifying its authenticity while maintaining its availability are priorities in our security-conscious world. Increasing regulatory requirements are also helping to direct the need for the adequate security of data. LTO Ultrium 4, 5, and 6 tape drive technology helps address security and compliance requirements with its continued Write Once Read Many (WORM) and Application Managed Encryption (AME) capability.

Advanced encryption through Library Managed Encryption (LME) and System Managed Encryption (SME) are available as optional Transparent LTO Encryption feature 5900. For key management for encryption, IBM Security Key Lifecycle Manager V2 (formerly IBM Tivoli® Key Lifecycle Manager) is required. Whether encryption is application- or hardware-based, vital data can securely be stored to help ensure compliancy with data security, information disclosure, and privacy regulations for data at rest. For LTO Ultrium 6 and 5, IBM Security Key Lifecycle Manager is required for enabling LME and SME.

IBM Linear Tape File System (LTFS)

IBM Linear Tape File System™ (LTFS) is the first file system that works in conjunction with LTO generation 5 tape technology to set a new standard for ease-of-use and portability for open systems tape storage. This drive is the first LTO generation to introduce media partitioning, which allows LTO Ultrium 5 media to be divided into segments, improving accessibility by providing the ability to quickly locate data to retrieve or update. IBM LTFS Library Edition and IBM LTFS Storage Manager are separately ordered software offerings that are supported on TS2900 models S6H and S5H.

With LTFS, accessing data stored on an IBM tape cartridge became as easy and intuitive as using a USB flash drive. With LTFS file manager, reading data on a tape cartridge can be as easy as dragging and dropping. Users can run any application designed for disk files against tape data without being concerned that the data is physically stored on tape. Originally built on the LTO Ultrium 5 format standard, IBM Linear Tape File System Library Edition provides a direct, intuitive, graphical access to data stored in IBM tape drives and libraries using LTO Ultrium 6 or 5 tape cartridges.

Benefits of LTFS Library Edition (LE) are as follows:

- The graphical user interface helps reduce complexity by enabling an icon-based view of an LTO Ultrium 5 or 6 library, including tape cartridges and files using the operating system's file manager.
- LE can help reduce costs because it does not require any additional tape management software or utilities.
- The file system API of the operating system is used to provide a basic read/write interface to the tape library for applications without any extra operating system enhancements such as “plug-ins” or service packs.
- “Mount-less” cartridge inquiry for fast access is achieved after the tape library is inventoried. Tape cartridges do not have to be remounted to retrieve content index data, and basic cartridge information, such as volume name, serial number, and others.
- LTFS LE software can be ordered concurrently with hardware or as software only for installed supported tape libraries. LTFS LE for LTO Ultrium 5 and 6 tape drives can be ordered as product identifier (PID) software base order number 5639-LT1. The feature number is 5806.

Benefits of LTFS Storage Manager (SM) are as follows:

- Eliminate the need for additional tape management and software to access data.
- Accessing data stored on an IBM tape cartridge (instead of on disk) is transparent.
- Use hierarchical storage management functionality to load balance resources for file writes and recalls.
- Create operational storage tiers with tape, rather than storing static, unchanging files on costly disk.
- Take advantage of on-disk metadata support, which allows faster searches for archived files based on user-defined metadata.
- Easily integrate with user applications through web-services application programming interface.

Part number information

Table 1 lists part numbers and feature codes for the TS2900.

Table 1. TS2900 Tape Autoloader ordering information

Description		HVEC	MTM
TS2900 Tape Autoloader with Ultrium 6 Half-High SAS tape drive		3572S6R	3572-S6H
TS2900 Tape Autoloader with Ultrium 5 Half-High SAS tape drive		3572S5R	3572-S5H
TS2900 Tape Autoloader with Ultrium 4 Half-High SAS tape drive		3572S4R	3572-S4H
Optional feature codes		Part number	Feature code
Transparent LTO Encryption		45E3797	5900 (5901 for LTO-6)
Rack mount kit		45E3785	7006
Deskside covers		45E3789	7010
Additional Magazine		45E3793	8111
Ultrium Tape Cartridges WORM media*	Ultrium 6 media 5-packs	35P1902	8605
	Ultrium 5 media 5-packs	46C2084	8505
	Ultrium 4 media 5-packs	95P4278	8405
	Ultrium 3 media 5-packs	95P2020	8305
Ultrium Cleaning Cartridge		23R7008	8002
Attachments			
2.0 m SAS/Mini-SAS 1x Cable		95P4711	5402
2.0 m Mini-SAS/Mini-SAS 1x Cable		95P4713	5502

* Ultrium 3, 4, 5, and 6 WORM media and tape cartridge options can be ordered at:
<http://www.ibm.com/systems/storage/media/>

The IBM Ultrium WORM cartridges (Machine Type 3589) were designed for applications, such as archiving and data retention, and for applications that require an audit trail. IBM Ultrium 3, 4, 5, and 6 tape drive WORM support allows vital data to be stored in a non-erasable, non-rewritable format provided for these types of applications. The IBM Ultrium WORM cartridges work with the IBM System Storage LTO Ultrium tape drives to help prevent the alteration or deletion of user data. In addition, IBM took several steps to reduce the possibility of tampering with the information:

- The bottom of the cartridge is molded in a different color than rewritable cartridges.
- The special cartridge memory helps protect the WORM nature of the media.
- A unique format is factory-written on each WORM cartridge.

Table 2 lists the specifications for the TS2900.

Table 2. TS2900 specifications

Specifications	
Tape drive type	1 Ultrium 4 Half-High or 1 Ultrium 5 Half-High or 1 Ultrium 6 Half-High
Number of tape cartridges	9
Number of I/O slots	1
Tape media physical capacity	<ul style="list-style-type: none"> Up to 6.25 TB per cartridge with 2.5 to 1 compression; 2.5 TB native with LTO-6 media Up to 3.0 TB per cartridge compressed; 1.5 TB native with LTO-5 media Up to 1.6 TB per cartridge compressed; 800 GB native with LTO-4 media Up to 800 GB per cartridge compressed; 400 GB native with LTO-3 media
Data transfer rate (per drive)	<ul style="list-style-type: none"> Up to 160 MBps native with Ultrium LTO-6 tape drive Up to 140 MBps native with Ultrium LTO-5 tape drive Up to 120 MBps native with Ultrium LTO-4 tape drive
Tape Autoloader Capacity	<ul style="list-style-type: none"> Up to 56.25 TB with 2.5:1 compression; 22.5 TB native with LTO-6 media Up to 27 TB per tape library compressed; 13.5 TB native with LTO-5 media Up to 14.4 TB per tape library compressed; 7.2 TB native with LTO-4 media Up to 7.2 TB per tape Library compressed; 3.6 TB native with LTO-3 media
Attachment support	6 Gbps SAS
Warranty	One-year, Customer Replaceable Unit (CRU) service in most countries
Operating environment	
Dimensions (W x H x D)	17.6 in (445 mm) x 1.7 in (43.6 mm) x 33.3 in (847 mm)
Weight	<ul style="list-style-type: none"> 28.66 lb (13 kg) with no drive and no cartridge 39.7 lb (18 kg) with drive and cartridge
Temperature	50 to 100 degrees F (10 to 38 degrees C)
Relative humidity	20% RH to 80% RH
Electrical power	1.3 amps at 100 V ac; 0.7 amps at 240 V ac 0.1 KVA
Noise level	6.6 dBA (idle); 6.8 dBA

What's in the TS2900 shipping box?

The group box contains the following items:

- Tape autoloader with Ultrium 4 Half-High (Model S4H/S4R) or Ultrium 5 Half-High tape drive (Model S5H/S5R) or Ultrium 6 Half-High tape drive (Model S6H/S6R)
- Rack mount kit with device to PDU line cord or Deskside Cover (one must be selected)
- SAS wrap tool
- Drive includes two Mini-SAS (SFF-8088) connectors
- One removable nine-cartridge magazine
- Power cord (must be selected)
- One IBM Ultrium Cleaning Cartridge (universal)

- *IBM System Storage TS2900 Tape Autoloader Setup, Operator, and Service Guide*, GC27-2212-02
- *IBM System Storage TS2900 Tape Autoloader Installation Quick Reference Guide*, GA76-0423-00
- Quality hotline card
- Device Driver readme sheet
- IBM System Storage Translated Safety Notices
- Multi-language Statement of Limited Warranty
- Statement of Limited Warranty Pointer Sheet
- Misc documents CD

Supported hardware platforms

Supported hardware platforms for the TS2900 are as follows:

- IBM BladeCenter®
- IBM Power Systems® (p6 and newer)
- IBM System i®
- IBM System p® (p5 and older)
- IBM System x®
- Advanced Micro Devices (AMD)
- Hewlett Packard
- Intel (x86 and x86_64)
- Oracle Solaris and Sun

Supported operating systems

Supported operating systems for the TS2900 are as follows:

- IBM AIX® 6.1 TL7
- IBM AIX 7.1 TL1
- IBM i 6.1.1
- IBM i 7.1
- IBM i 7.1 TR8
- IBM i 7.2
- Novell SUSE Linux Enterprise 11 SP2
- Novell SUSE Linux Enterprise 11 SP3
- Oracle Solaris 11.1
- Red Hat Enterprise Linux 5.9
- Red Hat Enterprise Linux 6.4
- Red Hat Enterprise Linux 6.5
- Sun Solaris 10

Check the latest support levels and configuration information for LTO tape drives, platforms, operating systems, and attachments at the IBM Systems Storage Interoperation Center (SSIC):

<http://www.ibm.com/systems/support/storage/config/ssic>

Supported software products

The TS2900 supported software products are as follows:

- IBM Linear Tape File System Library Edition
- IBM Linear Tape File System Storage Manager
- IBM Security Storage Manager
- IBM Security Key Lifecycle Manager
- Atempo Time Navigator 4.1/4.2
- CA ARCserve Backup
- CommVault Systems: Galaxy
- Dell NetVault (formerly BakBone Software NetVault)
- EMC NetWorker
- Symantec Backup Exec 12.5 and 2010
- Symantec NetBackup
- Thales Encryption Manager for Storage
- Yosemite Backup

For current IBM software products and independent software vendor products that support TS2900, see the Independent Software Vendor (ISV) matrix for 3592 and LTO tape drives:

http://www.ibm.com/systems/resources/lto_isv_matrix.pdf

Warranty period and warranty service

Every TS2900 is covered by the following warranty:

- System one year

Optional IBM features initially installed in an IBM system carry the same warranty and warranty service support category as the system. If installed after the initial system installation, they carry the balance of the system warranty or the optional feature warranty, whichever is greater.

Customer replaceable unit (CRU) service

IBM provides replacement CRUs for you to install. CRU information and replacement instructions are included with your machine and are available from IBM upon your request.

Table 3 lists the various warranty options for models of the TS2900 Tape Autoloader.

Table 3. Warranties and maintenance

IBM ServicePac®	TS2900 LTO Ultrium 4 Half-High tape drive	TS2900 LTO Ultrium 5 Half-High tape drive	TS2900 LTO Ultrium 6 Half-High tape drive
Warranty and maintenance option			
3 Year Onsite Exchange 24x7 4 Hour Response	96P2905	91Y6413	00AA248
3 Year Onsite Exchange 9x5 Next Business Day	96P2904	91Y6412	00AA247
5 Year Onsite Exchange 24x7 4 Hour Response	29R5166	91Y6411	00AA249
Maintenance agreement			
1 Year Onsite Exchange 24x7 4 Hour Response	44J8933	91Y6415	00AA251
1 Year Onsite Exchange 9x5 Next Business Day	44J8932	91Y6414	00AA250
2 Year Onsite Exchange 24x7 4 Hour Response	44J8935	91Y6417	00AA253
2 Year Onsite Exchange 9x5 Next Business Day	44J8934	91Y6416	00AA252
Remote technical support			
RTS for Tape Devices: 1-year	91Y8855	91Y8855	91Y8855
RTS for Tape Devices: 3-year	91Y8856	91Y8856	91Y8856

Note: Each ServicePac is country-specific and is valid only when purchased and registered in the country in which IBM service will be provided. For a complete list of ServicePac part numbers that are specific to your country, see the IBM ServicePac Worldwide Product Matrix:

<https://www-304.ibm.com/sales/gss/download/spst/servicepac/extProductSelectorWWW.do>

Related publications

For more information, see the following resources:

- *IBM System Storage interactive product guide*
<http://public.dhe.ibm.com/common/ssi/ecm/en/tso00364usen/TSO00364USEN.PDF>
- *IBM System Storage TS2900 Tape Autoloader Setup, Operator, and Service Guide*, GC27-2212
<http://www.ibm.com/support/docview.wss?uid=ssg1S7002624>
- *IBM System Storage TS2900 Tape Autoloader Installation Quick Reference Guide*, GA76-0423
<http://www.ibm.com/e-business/linkweb/publications/servlet/pbi.wss>
- IBM Linear Tape-Open: LTO Ultrium tape drives, libraries, and autoloaders
<http://www.ibm.com/systems/storage/tape/index.html>
- *IBM System Storage Tape Library Guide for Open Systems*, SG24-5946
<http://www.redbooks.ibm.com/abstracts/sg245946.html>
- *IBM Half-High LTO Generation 6 SAS Tape Drive, IBM Redbooks Product Guide*, TIPS0978
<http://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/tips0978.html>
- *IBM Linear Tape File System Installation and Configuration*, SG24-8090
<http://www.redbooks.ibm.com/abstracts/sg248090.html>
- IBM System Storage TS2900 Tape Autoloader Express
<http://www.ibm.com/systems/storage/tape/ts2900/>
- IBM LTO Ultrium 6 Data Cartridge
http://www.ibm.com/systems/storage/media/lto_6/index.html
- IBM LTO Ultrium 5 1.5 TB Data Cartridge
http://www.ibm.com/systems/storage/media/lto_5/index.html
- IBM Linear Tape File System
<http://www.ibm.com/systems/storage/tape/lufs/index.html>
- IBM Security Key Lifecycle Manager
<http://www.ibm.com/software/products/en/key-lifecycle-manager>
- *IBM Systems and Technology data sheet: IBM Linear Tape File System*
<http://public.dhe.ibm.com/common/ssi/ecm/en/tsd03128usen/TSD03128USEN.PDF>

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