Lenovo ThinkSystem DE2000H Hybrid Storage Array
Product Guide

Lenovo ThinkSystem DE2000H is a low-cost, hybrid entry-level storage system that is designed to provide performance, simplicity, capacity, security, and high availability for small to large businesses. It delivers enterprise-class storage management capabilities with a wide choice of host connectivity options, flexible drive configurations, and enhanced data management features. The ThinkSystem DE2000H is a perfect fit for small offices and remote and branch offices of large enterprises that run a wide range of workloads, including big data and analytics, video surveillance, technical computing, backup and recovery, and other storage I/O-intensive applications.

ThinkSystem DE2000H models are available in a 2U rack form-factor with 24 small form-factor (2.5-inch SFF) drives (2U24 SFF) or 12 large form-factor (3.5-inch LFF) drives (2U12 LFF) and include two controllers, each with 8 GB cache for a system total of 16 GB. Universal 10 Gb iSCSI or 8/16 Gb Fibre Channel (FC) ports provide base host connectivity, with an option for 12 Gb SAS or 1/10 Gb iSCSI RJ-45 connections with the host interface cards.

The ThinkSystem DE2000H Storage Array scales up to 96 drives with the attachment of Lenovo ThinkSystem DE120S 2U12 and DE240S 2U24 SFF Expansion Enclosures. It also offers flexible drive configurations with the choice of 2.5-inch (SFF) and 3.5-inch (LFF) form factors, 10 K rpm SAS and 7.2 K rpm NL SAS hard disk drives (HDDs), and SAS solid-state drives (SSDs).



Figure 1. Lenovo ThinkSystem DE2000H 2U24 SFF (top) and 2U12 LFF (bottom) enclosures

Did you know?

The ThinkSystem DE2000H scales up to 1.47 PB of raw storage capacity.

The ThinkSystem DE2000H offers block storage connectivity with support for 10 Gb iSCSI SFP+, 8/16 Gb FC, 12 Gb SAS, or 1/10 Gb iSCSI RJ-45 technologies.

For the ThinkSystem DE2000H, customers can change the host port protocol from FC to iSCSI or from iSCSI to FC for the SFP+ host ports built into the controller (base host ports).

Key features

The ThinkSystem DE2000H offers the following key features and benefits:

- Low-cost, entry-level hybrid storage with dual active/active controller configurations with 8 GB cache per controller for high availability and performance.
- Improved performance and data protection with Dynamic Disk Pools (DDP) technology, as well as support for traditional RAID 0, 1, 3, 5, 6, and 10.
- Flexible host connectivity to match diverse client needs with support for 10 Gb iSCSI SFP+, 8/16 Gb FC, 12 Gb SAS, or 1/10 Gb iSCSI (RJ-45) connectivity.
- 12 Gb SAS drive-side connectivity with support for up to 24x 2.5-inch small form factor (SFF) drives in the 2U24 SFF enclosures or up to 12x 3.5-inch large form factor (LFF) drives in the 2U12 LFF enclosures.
- Scalability to up to 96 SFF or 48 LFF drives with the attachment of up to three expansion enclosures (ThinkSystem DE240S 2U24 SFF, or DE120S 2U12 LFF, or a combination of the DE240S and DE120S) to satisfy growing needs for storage capacity and performance.
- Rich set of standard storage management functions available at no extra cost, including Dynamic Disk Pools, SSD read cache, snapshots, volume copy, and thin provisioning.
- Optional licensed functions, including higher number of snapshots for greater scalability and asynchronous mirroring for continuous data availability.
- Intuitive, web-based GUI for easy system setup and management.
- Designed for 99.999% availability with redundant hot-swap components, including controllers and I/O modules, power supplies, proactive maintenance, and non-disruptive firmware upgrades.

The ThinkSystem DE2000H supports the complete range of data storage requirements, from highly used applications to high-capacity, low usage applications.

The following drives are supported in the 2U24 SFF enclosures:

- Capacity-optimized solid-state drives (1 drive write per day [DWD]): 7.68 TB and 15.36 TB
- High performance solid-state drives (3 DWD): 800 GB, 1.6 TB, and 3.2 TB
- Performance-optimized, enterprise class disk drives: 1.8 TB 10K rpm

The following drives are supported in the 2U12 LFF enclosures:

- High-performance solid-state drives (3 DWD; 2.5" drive in a 3.5" drive tray): 800 GB
- High-capacity, archival-class nearline HDDs: 4 TB, 8 TB, 10 TB, and 12 TB 7.2K rpm

All drives are dual-port and hot-swappable. Drives of the same form factor can be intermixed within the appropriate enclosure, which provides the flexibility to address performance and capacity needs within a single enclosure.

Up to three 2U expansion enclosures (ThinkSystem DE240S 2U24 SFF, or ThinkSystem DE120S 2U12 LFF, or a combination of the ThinkSystem DE240S and DE120S) are supported by a single ThinkSystem DE2000H system. Customers can intermix 2U24 SFF and 2U12 LFF expansion enclosures behind a 2U24 SFF or 2U12 LFF controller enclosure. This configuration delivers the added flexibility to mix 3.5-inch and 2.5-inch drives within a single system.

More drives and expansion enclosures are designed to be dynamically added with virtually no downtime, which helps to quickly and seamlessly respond to ever-growing capacity demands.

The ThinkSystem DE2000H offers high levels of system and data availability with the following technologies:

- Dual-active controller modules with automatic load balancing and failover
- Mirrored data cache with flash backup (battery-backed destaging to flash)
- Dual-port SAS HDDs and SSDs with automatic drive failure detection and rebuild with global hot spares
- Redundant, hot-swappable and customer replaceable hardware components, including SFP/SFP+ transceivers, controller and I/O modules, power supplies, and drives
- Automated path failover support for the data path between the host and the drives with multipathing software
- Non-disruptive controller and drive firmware upgrades

Components and connectors

The following figure shows the front of the ThinkSystem DE2000H and DE240S 2U SFF enclosures.

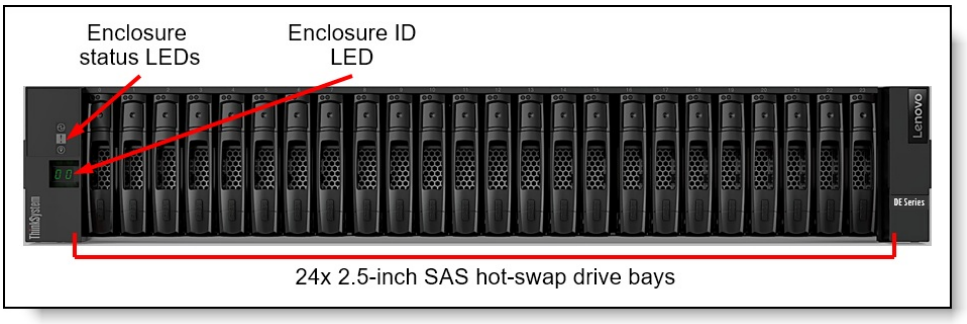


Figure 2. ThinkSystem DE2000H and DE240S 2U SFF enclosures front view

The front of the ThinkSystem DE2000H and DE240S 2U SFF enclosures includes the following components:

- 24 SFF hot-swap drive bays
- Enclosure status LEDs
- Enclosure ID LED

The following figure shows the front of the ThinkSystem DE2000H and DE120S 2U LFF enclosures.

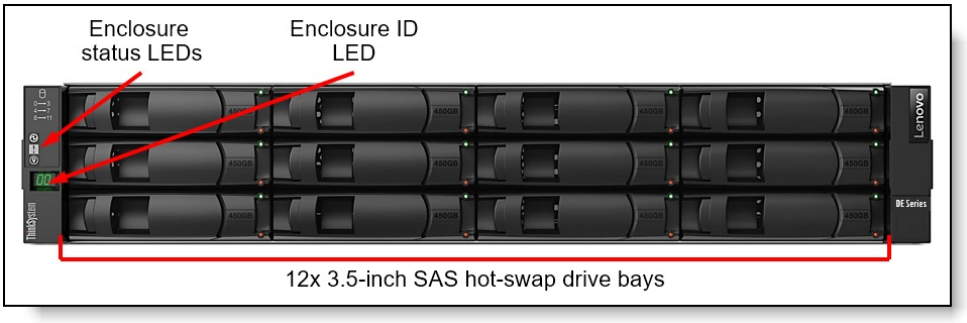


Figure 3. ThinkSystem DE2000H and DE120S 2U LFF enclosures front view

The front of the ThinkSystem DE2000H and DE120S 2U LFF enclosures includes the following components:

- 12 LFF hot-swap drive bays
- Enclosure status LEDs
- Enclosure ID LED

The following figure shows the rear of the ThinkSystem DE2000H 2U controller enclosure.

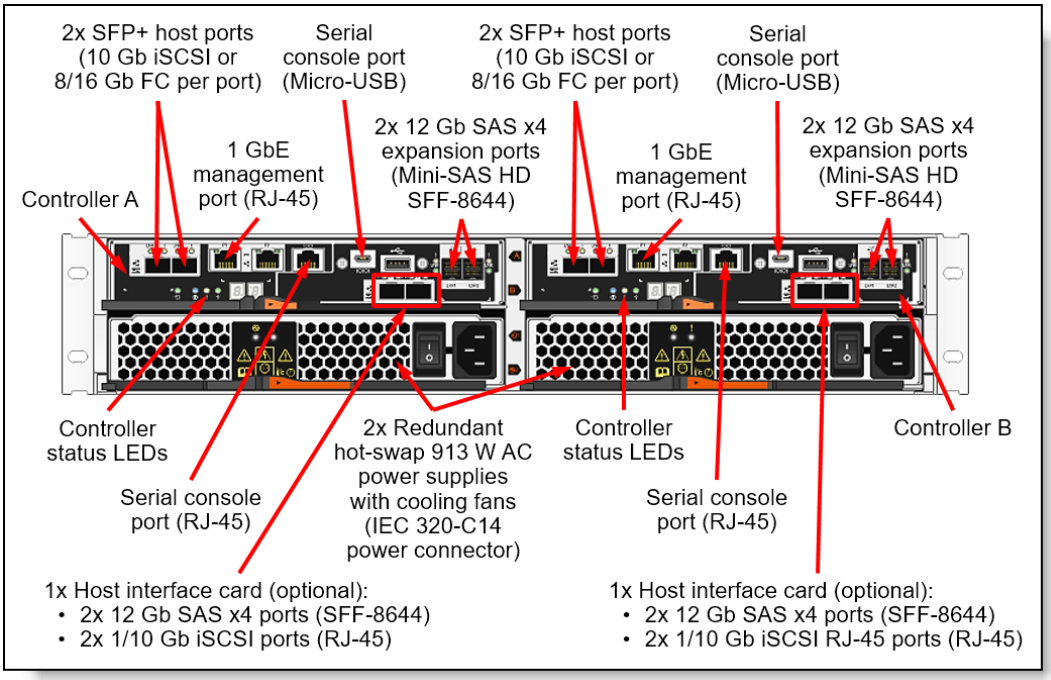


Figure 4. ThinkSystem DE2000H 2U controller enclosure rear view

The rear of the ThinkSystem DE2000H 2U controller enclosure includes the following components:

- Two redundant hot-swap controllers, each with the following ports:
  - Two SFP+ base host ports for 10 Gb iSCSI or 8/16 Gb FC connectivity.
  - One slot for the optional host interface card:
    - Two 12 Gb SAS x4 host ports (Mini-SAS HD SFF-8644).
    - Two 1/10 Gb iSCSI host ports (RJ-45)
  - Two 12 Gb SAS x4 expansion ports (Mini-SAS HD SFF-8644) for connections to the expansion enclosures.
  - One RJ-45 10/100/1000 Mb Ethernet port for out-of-band management.
    Note: The Ethernet port (P2) next to the GbE management port is not available for use.
  - Two serial console ports (RJ-45 and Micro-USB) for another means to configure the system.
  - One USB Type A port (reserved for factory use)
- Two redundant hot-swap 913 W (100 - 240 V) AC power supplies (IEC 320-C14 power connector) with integrated cooling fans.

The following figure shows the rear of the ThinkSystem DE240S or DE120S 2U expansion enclosure.

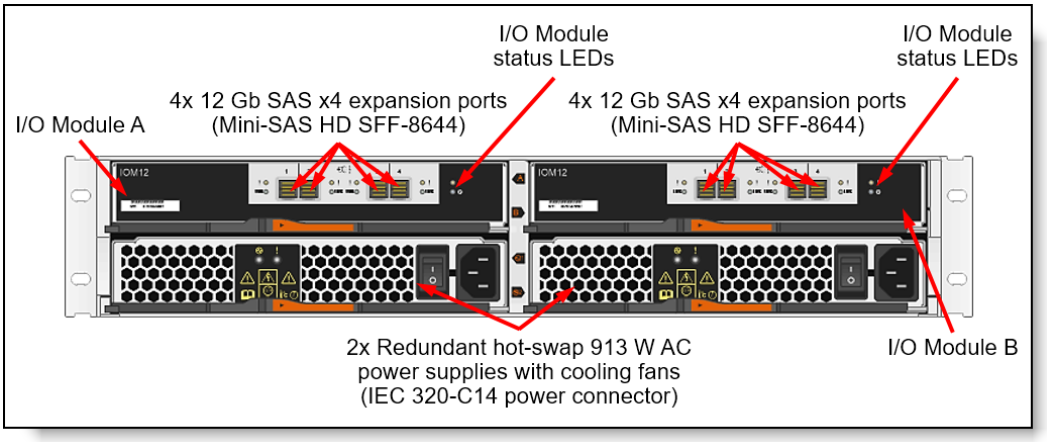


Figure 5. ThinkSystem DE240S or DE120S 2U expansion enclosure rear view

The rear of the ThinkSystem DE240S or DE120S 2U expansion enclosure includes the following components:

- Two redundant hot-swap I/O Modules; each I/O Module provides four 12 Gb SAS x4 expansion ports (Mini-SAS HD SFF-8644) for connections to the controller enclosures and for connecting the expansion enclosures between each other.
- Two redundant hot-swap 913 W (100 - 240 V) AC power supplies (IEC 320-C14 power connector) with integrated cooling fans.

System specifications

The following table lists the ThinkSystem DE2000H storage system specifications.

Note: The supported hardware options and software features listed in this product guide are based on the software version 11.50. For details about specific software releases that introduced support for certain hardware options and software features, refer to the Release notes of the particular software release for the ThinkSystem DE2000H that can be found at:
http://datacentersupport.lenovo.com

Table 1. ThinkSystem DE2000H system specifications

Attribute	Specification
Form factor	• DE2000H 2U24 SFF controller enclosure (Machine Type 7Y71): 2U rack mount. • DE2000H 2U12 LFF controller enclosure (Machine Type 7Y70): 2U rack mount. • DE240S 2U24 SFF expansion enclosure (Machine Type 7Y68): 2U rack mount. • DE120S 2U12 LFF expansion enclosure (Machine Type 7Y63): 2U rack mount.
Controller configuration	Dual active-active controller configuration with automatic load balancing.
RAID levels	RAID 0, 1, 3, 5, 6, and 10; Dynamic Disk Pools.
Controller cache	16 GB per system (8 GB per controller). Cache mirroring between the controllers. Flash-backed cache protection (includes battery for destaging to flash).
Drive bays	Up to 4 enclosures per system (Controller unit with up to 3 expansion units): • Up to 48 LFF hot-swap drive bays (Up to 4x 2U12 LFF enclosures) • Up to 96 SFF hot-swap drive bays (Up to 4x 2U24 LFF enclosures) Intermix of 2U24 SFF and 2U12 LFF enclosures is supported.

Attribute	Specification
Drive technology	• 12 Gb SAS and NL SAS HDDs, 12 Gb SAS SSDs. • Intermix of HDDs and SSDs is supported within a system. • Intermix of HDDs and SSDs is *not* supported within a volume group or disk pool.
Drive expansion connectivity	• 2x 12 Gb SAS x4 (Mini-SAS HD SFF-8644) expansion ports on each of two controllers in the controller enclosure for the attachment of the expansion enclosures. • 4x 12 Gb SAS x4 (Mini-SAS HD SFF-8644) expansion ports on each of two I/O modules in the expansion enclosure for the attachment to the controller enclosure and daisy chaining of the expansion enclosures.
Drives	2U24 SFF drives: • 1.8 TB 10K rpm SAS HDDs • 7.68 TB and 15.36 TB SAS SSDs (1 DWD) • 800 GB, 1.6 TB, and 3.2 TB SAS SSDs (3 DWD) 2U12 LFF drives: • 4 TB, 8 TB, 10 TB, and 12 TB 7.2K rpm NL SAS HDDs • 800 GB SAS SSDs (3 DWD)
Storage capacity	Up to 1.47 PB (96x 15.36 TB SFF SSDs).
Host connectivity	Base ports (per controller enclosure with two controllers): • 4x 10 Gb iSCSI (DAC or SW fiber optics, LC) or 8/16 Gb FC (SW fiber optics, LC) SFP+ host ports (2 ports per controller) Optional additional ports on host interface cards (per controller enclosure with two controllers): • 4x 12 Gb SAS host ports (Mini-SAS HD, SFF-8644) (2 ports per controller) • 4x 1/10 Gb iSCSI RJ-45 host ports (2 ports per controller)
Host operating systems	Microsoft Windows Server 2012 R2 and 2016; Red Hat Enterprise Linux (RHEL) 7; SUSE Linux Enterprise Server (SLES) 12; VMware vSphere 6.0 and 6.5.
Standard software features	Dynamic Disk Pools, SSD read cache, snapshots (up to 128 targets), volume copy, thin provisioning (DDP only), and data assurance.
Optional software features	Snapshots (up to 512 targets), asynchronous mirroring.
Performance*	• Up to 100 000 random read IOPS (4 KB blocks). • Up to 35 000 random write IOPS (4 KB blocks). • Up to 3 GBps sequential read throughput (64 KB blocks). • Up to 0.9 GBps sequential write throughput (64 KB blocks).

Configuration maximums**	• Maximum storage capacity: 1.47 PB
	• Maximum number of logical volumes: 512
	• Maximum logical volume size: 2 PB
	• Maximum thin-provisioned logical volume size (DDP only): 256 TB
	• Maximum number of drives in a RAID volume group:
	  ◦ RAID 0, 1/10: 96
	  ◦ RAID 3, 5, 6: 30
	• Maximum number of DDP arrays: 20
	• Maximum number of drives in a DDP array: 96 (11 drives minimum)
	• Maximum SSD read cache size: 5 TB
	• Maximum number of hosts: 256
	• Maximum number of snapshots: 512 (requires an optional license)
	• Maximum number of mirroring pairs: 32 (requires an optional license)

Cooling	Redundant cooling with the fans that are built into power supplies.
Power supply	Two redundant hot-swap 913 W (100 - 240 V) Platinum AC power supplies.
Hot-swap parts	Controllers, I/O modules, drives, power supplies, and SFP+ transceivers.

Attribute	Specification
Management ports	• 1x 1 GbE port (UTP, RJ-45) per controller for out-of-band management. • 2x Serial console ports (RJ-45 and Micro-USB) for system configuration. • In-band management via I/O path.
Management interfaces	System Manager web-based GUI; SAN Manager standalone GUI; SSH CLI; Serial console CLI; SMI-S Provider; SNMP, email, and syslog alerts; optional Lenovo XClarity.
Security features	Secure Socket Layer (SSL), Secure Shell (SSH), user level security, role-based access control (RBAC), LDAP authentication.
Hardware warranty	Three-year customer-replaceable unit and onsite limited warranty with 9x5 next business day terms. Optional warranty service upgrades are available through Lenovo: 24x7 coverage, 2-hour or 4-hour response time, 6-hour or 24-hour committed repair, 1-year or 2-year warranty extensions, YourDrive YourData, Premier support, Basic hardware installation services.
Software maintenance	Included in the base warranty and any Lenovo warranty extensions.
Dimensions	2U24 SFF enclosure: • Height: 85 mm (3.4 in.) • Width: 449 mm (17.7 in.) • Depth: 553 mm (21.8 in.) 2U12 LFF enclosure: • Height: 85 mm (3.4 in.) • Width: 447 mm (17.6 in.) • Depth: 483 mm (19.0 in.)
Weight	• 2U24 SFF enclosure (fully configured): 27.6 kg (60.8 lb) • 2U12 LFF enclosure (fully configured): 27.6 kg (60.8 lb)

* Estimated performance based on internal measurements.
** For a detailed list of configuration limits and restrictions for a specific version of the software, refer to the Lenovo Data Center Support website:
http://datacentersupport.lenovo.com

Controller enclosures

The following table lists the relationship models of the ThinkSystem DE2000H Hybrid Storage Array.

Table 2. ThinkSystem DE2000H relationship models

Description	Part number
2U24 SFF models	
Lenovo ThinkSystem DE2000H SAS Hybrid Flash Array SFF (4x 16 Gb FC base ports [no SFPs], 4x 12 Gb SAS HIC ports)	7Y71A000WW
Lenovo ThinkSystem DE2000H FC Hybrid Flash Array SFF (4x 16 Gb FC base ports [no SFPs])	7Y71A001WW
Lenovo ThinkSystem DE2000H 10GBASE-T Hybrid Flash Array SFF (4x 10 Gb iSCSI base ports [no SFPs], 4x 10 Gb iSCSI RJ-45 HIC ports)	7Y71A002WW
Lenovo ThinkSystem DE2000H iSCSI Hybrid Flash Array SFF (4x 10 Gb iSCSI base ports [no SFPs])	7Y71A003WW
2U12 LFF models	
Lenovo ThinkSystem DE2000H SAS Hybrid Flash Array LFF (4x 16 Gb FC base ports [no SFPs], 4x 12 Gb SAS HIC ports)	7Y70A000WW
Lenovo ThinkSystem DE2000H FC Hybrid Flash Array LFF (4x 16 Gb FC base ports [no SFPs])	7Y70A002WW
Lenovo ThinkSystem DE2000H 10GBASE-T Hybrid Flash Array LFF (4x 10 Gb iSCSI base ports [no SFPs], 4x 10 Gb iSCSI RJ-45 HIC ports)	7Y70A003WW
Lenovo ThinkSystem DE2000H iSCSI Hybrid Flash Array LFF (4x 10 Gb iSCSI base ports [no SFPs])	7Y70A004WW

The following table lists the CTO base models for the ThinkSystem DE2000H.

Table 3. ThinkSystem DE2000H CTO base models

Description	Machine Type/Model	Feature code
Lenovo ThinkSystem Storage 2U24 Chassis (with 2x PSUs)	7Y71CTO1WW	B38L
Lenovo ThinkSystem Storage 2U12 Chassis (with 2x PSUs)	7Y70CTO1WW	B38M

Configuration notes:

- For Relationship models, two DE2000 controllers (feature code B4AX) are included in the model configuration.
- For CTO models, two DE2000 controllers (feature code B4AX) are selected by default in the configurator, and this cannot be changed.

The models of the ThinkSystem DE2000H ship with the following items:

- One chassis with the following components:
  - Two controllers
  - Two power supplies
  - Two host interface cards (some Relationship models listed in Table 2; CTO models, if configured)
- Lenovo ThinkSystem Storage Rack Mount Kit 2U24/4U60
- Lenovo ThinkSystem Storage USB Cable (USB Type A to Micro-USB) 2 m
- *Quick Installation Guide*
- *Electronic Publications Flyer*
- Two power cables:
  - Relationship models: 1.5 m, 10A/100-250V, C13 to IEC 320-C14 rack power cables
  - CTO models: Customer-configured power cables

Note: The Relationship models of the ThinkSystem DE2000H ship without SFP+ optical transceivers, DAC cables, SAS cables, or RJ-45 UTP cables; they should be purchased for the system (see Controllers for details).

Controllers

The ThinkSystem DE2000H controller enclosures ship with two DE2000 controllers. A *controller* provides interfaces for host connectivity, management, and internal drives, and it runs storage management software. Each DE2000 controller ships with 8 GB cache for a system total of 16 GB.

The ThinkSystem DE2000H controller enclosures ship with four universal ports (two ports per controller) for 10 Gb iSCSI or 8/16 Gb FC host connectivity. Each controller also has one expansion slot for an optional host interface card (HIC).

The following host interfaces can be added to the ThinkSystem DE2000H controller enclosures with optional HICs:

- 4x 12 Gb SAS x4 (Mini-SAS HD SFF-8644) ports (2 ports per HIC) for SAS connectivity
- 4x 1/10 Gb iSCSI RJ-45 ports (2 ports per HIC) for iSCSI connectivity

Each DE2000 controller also provide two 12 Gb SAS x4 expansion ports (Mini-SAS HD SFF-8644 connectors) for the attachment of the ThinkSystem DE Series expansion units.

Configuration notes:

- All four SFP+ base ports in the system must have the same connectivity type (either iSCSI or FC, but not both types) and the same type of SFP+ media (either optical transceivers or DAC cables, but not both types).
- Both controllers must have the same type of the host interface card installed (12 Gb SAS SFF-8644 or 10 Gb iSCSI RJ-45).

The following table lists the supported host port configurations for the ThinkSystem DE2000H controller enclosures.

Table 4. ThinkSystem DE2000H host port configurations

Port type and total number of ports		
12 Gb SAS (SFF-8644)	**10 Gb iSCSI (SFP+) or 16 Gb FC (SFP+)**	**1/10 Gb iSCSI (RJ-45)**
Base ports		
-	4 (2 per controller)	-
Additional HIC ports		
4 (2 per controller)	-	-
-	-	4 (2 per controller)

The following table lists the DE2000H controller and supported connectivity options.

Table 5. DE2000H controller and connectivity options

Description	Part number	Feature code	Maximum quantity per controller enclosure
Controllers			
Lenovo ThinkSystem DE2000 Controller	None*	B4AX	2
Host interface cards			
Lenovo ThinkSystem DE2000 HIC 10GBASE-T 2 Ports	None*	B4B1	2
Lenovo ThinkSystem DE2000 HIC 12Gb SAS 2 Ports	None*	B4AN	2
SFP+ options for base ports			
Lenovo 10Gb iSCSI/16Gb FC Universal SFP+ Module	4M17A13527	B4B2	4
OM3 cable options for 16 Gb FC and 10 Gb iSCSI SW SFP+ optical transceivers			
Lenovo 0.5m LC-LC OM4 MMF Cable	4Z57A10845	B2P9	4
Lenovo 1m LC-LC OM4 MMF Cable	4Z57A10846	B2PA	4
Lenovo 3m LC-LC OM4 MMF Cable	4Z57A10847	B2PB	4
Lenovo 5m LC-LC OM4 MMF Cable	4Z57A10848	B2PC	4
Lenovo 10m LC-LC OM4 MMF Cable	4Z57A10849	B2PD	4
Lenovo 15m LC-LC OM4 MMF Cable	4Z57A10850	B2PE	4
Lenovo 25m LC-LC OM4 MMF Cable	4Z57A10851	B2PF	4
Lenovo 30m LC-LC OM4 MMF Cable	4Z57A10852	B2PG	4
OM4 cable options for 16/32 Gb FC and 10/25 Gb iSCSI SW SFP+/SFP28 optical transceivers			
Lenovo 0.5m LC-LC OM3 MMF Cable	00MN499	ASR5	4
Lenovo 1m LC-LC OM3 MMF Cable	00MN502	ASR6	4
Lenovo 3m LC-LC OM3 MMF Cable	00MN505	ASR7	4
Lenovo 5m LC-LC OM3 MMF Cable	00MN508	ASR8	4
Lenovo 10m LC-LC OM3 MMF Cable	00MN511	ASR9	4
Lenovo 15m LC-LC OM3 MMF Cable	00MN514	ASRA	4
Lenovo 25m LC-LC OM3 MMF Cable	00MN517	ASRB	4
Lenovo 30m LC-LC OM3 MMF Cable	00MN520	ASRC	4
DAC cable options for 10 Gb iSCSI SFP+ host connectivity (base ports and iSCSI HICs)			
0.5m Passive DAC SFP+ Cable	00D6288	A3RG	4
1m Passive DAC SFP+ Cable	90Y9427	A1PH	4
1.5m Passive DAC SFP+ Cable	00AY764	A51N	4
2m Passive DAC SFP+ Cable	00AY765	A51P	4
3m Passive DAC SFP+ Cable	90Y9430	A1PJ	4
5m Passive DAC SFP+ Cable	90Y9433	A1PK	4
7m Passive DAC SFP+ Cable	00D6151	A3RH	4
SAS host connectivity cables: Mini-SAS HD (controller) to Mini-SAS HD (host)			
0.5m External MiniSAS HD 8644/MiniSAS HD 8644 Cable	00YL847	AU16	4
1m External MiniSAS HD 8644/MiniSAS HD 8644 Cable	00YL848	AU17	4
2m External MiniSAS HD 8644/MiniSAS HD 8644 Cable	00YL849	AU18	4

Description	Part number	Feature code	Maximum quantity per controller enclosure
3m External MiniSAS HD 8644/MiniSAS HD 8644 Cable	00YL850	AU19	4
UTP Category 6 cables for 1/10 Gb iSCSI RJ-45 connectivity and 1 GbE management ports			
0.75m Green Cat6 Cable	00WE123	AVFW	6
1.0m Green Cat6 Cable	00WE127	AVFX	6
1.25m Green Cat6 Cable	00WE131	AVFY	6
1.5m Green Cat6 Cable	00WE135	AVFZ	6
3m Green Cat6 Cable	00WE139	AVG0	6
10m Green Cat6 Cable	90Y3718	A1MT	6
25m Green Cat6 Cable	90Y3727	A1MW	6

* Factory-installed only.

Expansion enclosures

The ThinkSystem DE2000H supports attachment of up to three 2U expansion enclosures (ThinkSystem DE240S 2U24 SFF, ThinkSystem DE120S 2U12 LFF, or a combination of the ThinkSystem DE240S and DE120S). Intermix of 2U24 SFF and 2U12 LFF expansion enclosures behind a 2U24 SFF or 2U12 LFF controller enclosure is supported. The expansion enclosures can be added to the system non-disruptively.

The following table lists the relationship models of the supported ThinkSystem DE Series expansion enclosures.

Table 6. ThinkSystem DE240S and DE120S relationship models

Description	Part number
2U24 SFF models	
Lenovo ThinkSystem DE240S 2U24 SFF Expansion Enclosure	7Y68A000WW
2U12 LFF models	
Lenovo ThinkSystem DE120S 2U12 LFF Expansion Enclosure	7Y63A000WW

The following table lists the CTO base models for the ThinkSystem DE Series expansion enclosures.

Table 7. ThinkSystem DE240S and DE120S CTO base models

Description	Machine Type/Model	Feature code
Lenovo ThinkSystem Storage 2U24 Chassis (with 2x PSUs)	7Y68CTO1WW	B38L
Lenovo ThinkSystem Storage 2U12 Chassis (with 2x PSUs)	7Y63CTO1WW	B38M

Configuration notes:

- For Relationship models, two I/O expansion modules (feature code B4BS) are included in the model configuration.
- For CTO models, two I/O expansion modules (feature code B4BS) are selected by default in the configurator, and this cannot be changed.

The models of the ThinkSystem DE240S and DE120S ship with the following items:

- One chassis with the following components:
  - Two I/O modules
  - Two power supplies
- Four 1 m MiniSAS HD 8644/MiniSAS HD 8644 cables (Relationship models listed in Table 6)
- Lenovo ThinkSystem Storage Rack Mount Kit 2U24/4U60 or 2U12
- *Quick Installation Guide*
- *Electronic Publications Flyer*
- Two power cables:
  - Relationship models: 1.5 m, 10A/100-250V, C13 to IEC 320-C14 cables
  - CTO models: Customer-configured power cables

Note: The Relationship models of the ThinkSystem DE240S and DE120S listed in Table 6 ship with four 1 m SAS cables; additional SAS cables can be purchased for the system, if needed (see Table 8 for details).

Each ThinkSystem DE Series expansion enclosure ships with two SAS I/O expansion modules. Each *I/O expansion module* provides four external 12 Gb SAS x4 ports (Mini-SAS HD SFF-8644 connectors labelled Port 1-4) that are used for connections to the ThinkSystem DE2000H and for daisy chaining the expansion enclosures between each other.

Two expansion ports on the Controller A are connected to the Ports 1 and 2 on the I/O Module A in the first expansion enclosure in the chain, and the Ports 3 and 4 on the I/O Module A in the first expansion enclosure are connected to the Ports 1 and 2 on the I/O Module A in the adjacent expansion enclosure, and so on.

Two expansion ports on the Controller B are connected to the Ports 1 and 2 on the I/O Module B in the last expansion enclosure in the chain, and the Ports 3 and 4 on the I/O Module B in the expansion enclosure are connected to the Ports 1 and 2 on the I/O Module B in the adjacent expansion enclosure, and so on.

The connectivity topology for the DE Series expansion enclosures is shown in the following figure.

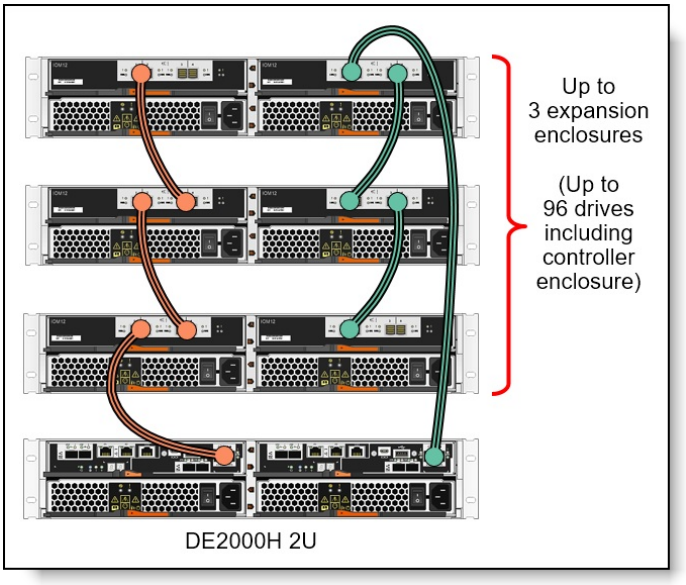


Figure 6. DE Series expansion enclosure connectivity topology

The following table lists ordering information for the supported expansion enclosure connectivity options.

Table 8. Expansion unit connectivity options

Description	Part number	Feature code	Quantity per one expansion enclosure
External MiniSAS HD 8644/MiniSAS HD 8644 0.5M Cable	00YL847	AU16	4
External MiniSAS HD 8644/MiniSAS HD 8644 1M Cable	00YL848	AU17	4
External MiniSAS HD 8644/MiniSAS HD 8644 2M Cable	00YL849	AU18	4
External MiniSAS HD 8644/MiniSAS HD 8644 3M Cable	00YL850	AU19	4

Configuration notes:

- The Relationship models of the ThinkSystem DE240S and DE120S listed in Table 6 ship with four 1 m SAS cables.
- Four SAS cables are needed per each expansion enclosure (two SAS cables per I/O Module) for connections to the controller enclosure and for daisy chaining of the expansion enclosures.

Drives

The ThinkSystem DE Series 2U24 SFF enclosures support up to 24 SFF hot-swap drives, and the 2U12 LFF enclosures support up to 12 LFF hot-swap drives.

The following table lists supported drive options for the 2U24 SFF controller and expansion enclosures.

Table 9. 2U24 SFF drive options

Description	Part number	Feature code	Maximum quantity per 2U24 SFF enclosure
2.5-inch 12 Gbps SAS hot-swap HDDs			
Lenovo ThinkSystem DE Series 1.8TB 10K 2.5" HDD 2U24	4XB7A14113	B4BZ	24
2.5-inch 12 Gbps SAS hot-swap SSDs (1 Drive Write per Day)			
Lenovo ThinkSystem DE Series 7.68TB 1DWD 2.5" SSD 2U24	4XB7A14176	B4RY	24
Lenovo ThinkSystem DE Series 15.36TB 1DWD 2.5" SSD 2U24	4XB7A14110	B4CD	24
2.5-inch 12 Gbps SAS hot-swap SSDs (3 Drive Writes per Day)			
Lenovo ThinkSystem DE Series 800GB 3DWD 2.5" SSD 2U24	4XB7A14105	B4BT	24
Lenovo ThinkSystem DE Series 1.6TB 3DWD 2.5" SSD 2U24	4XB7A14106	B4BU	24
Lenovo ThinkSystem DE Series 3.2TB 3DWD 2.5" SSD 2U24	4XB7A14108	B4BW	24

The following table lists supported drive options for the 2U12 LFF controller and expansion enclosures.

Table 10. 2U12 LFF drive options

Description	Part number	Feature code	Maximum quantity per 2U12 LFF enclosure
3.5-inch 12 Gbps NL SAS hot-swap HDDs			
Lenovo ThinkSystem DE Series 4TB 7.2K 3.5" HDD 2U12	4XB7A14099	B4C3	12
Lenovo ThinkSystem DE Series 8TB 7.2K 3.5" HDD 2U12	4XB7A14101	B4C5	12
Lenovo ThinkSystem DE Series 10TB 7.2K 3.5" HDD 2U12	4XB7A14102	B4C6	12
Lenovo ThinkSystem DE Series 12TB 7.2K 3.5" HDD 2U12	4XB7A14104	B4C8	12
3.5-inch 12 Gbps SAS hot-swap SSDs (3 Drive Writes per Day)			
Lenovo ThinkSystem DE Series 800GB 3DWD 2.5" SSD 2U12	4XB7A14097	B4C1	12

Software

The following functions are included with every ThinkSystem DE2000H:

- **RAID levels 1, 5, 6, and 10**: Provide the flexibility to choose the level of data protection required.
- **Dynamic Disk Pools (DDP) technology**: Helps improve performance and availability with significantly faster rebuild time and reduced exposure to multiple drive failures by allowing data and built-in spare capacity to be distributed across all physical drives in the storage pool.
- **SSD Read Cache**: Helps accelerate performance of read-centric workloads.
- **Thin provisioning**: Optimizes efficiency of Dynamic Disk Pools by allocating storage space based on the minimum space required by each application at any given time, so that applications consume only the space they are actually using, not the total space that has been allocated to them, which allows customers to purchase storage they need today and add more as application requirements grow.
- **Snapshots**: Enables creation of copies of data for backup, parallel processing, testing, and development, and have the copies available almost immediately (up to 128 snapshot targets per system).
- **Automatic load balancing:** Provides automated I/O workload balancing of I/O traffic from the hosts across both controllers.
- **Data assurance:** Ensures end-to-end data integrity in the storage system (from the host ports to the drives).
- **Dynamic volume and capacity expansion:** Allows the capacity of a volume to be expanded by adding new physical drives or making use of unused space on existing drives.

The ThinkSystem DE2000H capabilities can be expanded with optional licensed functions. Optional licensed functions include:

- **Snapshots upgrade**: Increase the supported number of snapshot targets to 512.
- **Asynchronous mirroring:** Provides storage system-based data replication between the storage systems containing primary (local) and secondary (remote) volumes by using asynchronous data transfers over iSCSI or Fibre Channel communication links at set intervals (both storage systems must have licenses for asynchronous mirroring).

Note: The asynchronous mirroring feature of the ThinkSystem DE2000H interoperate with other ThinkSystem DE Series storage arrays.

The following table lists the Feature on Demand (FoD) upgrades for the ThinkSystem DE2000H to enable optional software features. Each optional DE2000H function is licensed on a per-system basis and covers both controller enclosure and all attached expansion enclosures.

Table 11. Optional software features

Description	Part number	Feature code
Lenovo ThinkSystem DE2000H Snapshot Upgrade 512	4ZN7A14703	B4AP
Lenovo ThinkSystem DE2000H Asynchronous Mirroring	4ZN7A14705	B4AQ

Software maintenance is included in the ThinkSystem DE2000H base warranty and optional warranty extensions, which provides 3-year software support with the option to extend it up to 5 years in 1-year or 2-year increments (see Warranty services and upgrades for details).

Management

The ThinkSystem DE2000H supports the following management interfaces:

- Lenovo System Manager, a web-based interface via HTTPS for single-system management, that runs on the storage system itself and requires only a supported browser (Microsoft Internet Explorer, Google Chrome, or Mozilla Firefox), so there is no need for a separate console or plug-in.
- Lenovo SAN Manager, a host-installed GUI-based application, for centralized management of multiple storage systems.
- Command line interface (CLI) via SSH or through serial console.
- Syslog, SNMP, and e-mail notifications.
- Optional Lenovo XClarity for discovery, inventory, monitoring, and alerts.

Power supplies and cables

The ThinkSystem DE Series 2U24 SFF and 2U12 LFF enclosures ship with two redundant hot-swap 913 W (100 - 240 V) Platinum AC power supplies, each with an IEC 320-C14 connector. The Relationship models of the ThinkSystem DE2000H 2U24 SFF and 2U12 LFF, DE240S 2U24 SFF, and DE120S LFF enclosures listed in Table 2 and Table 6 ship with two 1.5 m, 10A/100-250V, C13 to IEC 320-C14 rack power cables.

The CTO models require the selection of two power cables.

The following table lists the rack power cable and line cord options that can be ordered for the DE Series 2U24 SFF and 2U12 LFF enclosures (two power cords per enclosure).

Table 12. Power cables for DE Series 2U24 SFF and 2U12 LFF enclosures

Description	Part number	Feature code
Rack power cables		
1.0m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	00Y3043	A4VP
1.0m, 13A/100-250V, C13 to IEC 320-C14 Rack Power Cable	4L67A08367	B0N5
1.5m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	39Y7937	6201
1.5m, 13A/100-250V, C13 to IEC 320-C14 Rack Power Cable	4L67A08368	B0N6
2.0m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	4L67A08365	B0N4
2.0m, 13A/125V-10A/250V, C13 to IEC 320-C14 Rack Power Cable	4L67A08369	6570
2.8m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	4L67A08366	6311

Description	Part number	Feature code
2.8m, 13A/125V-10A/250V, C13 to IEC 320-C14 Rack Power Cable	4L67A08370	6400
2.8m, 10A/100-250V, C13 to IEC 320-C20 Rack Power Cable	39Y7938	6204
4.3m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	39Y7932	6263
4.3m, 13A/125V-10A/250V, C13 to IEC 320-C14 Rack Power Cable	4L67A08371	6583
Country-specific line cords		
Argentina 2.8m, 10A/250V, C13 to IRAM 2073 Line Cord	39Y7930	6222
Argentina 4.3m, 10A/250V, C13 to IRAM 2073 Line Cord	81Y2384	6492
Australia/New Zealand 2.8m, 10A/250V, C13 to AS/NZS 3112 Line Cord	39Y7924	6211
Australia/New Zealand 4.3m, 10A/250V, C13 to AS/NZS 3112 Line Cord	81Y2383	6574
Brazil 2.8m, 10A/250V, C13 to NBR 14136 Line Cord	69Y1988	6532
Brazil 4.3m, 10A/250V, C13 to NBR14136 Line Cord	81Y2387	6404
China 2.8m, 10A/250V, C13 to GB 2099.1 Line Cord	39Y7928	6210
China 4.3m, 10A/250V, C13 to GB 2099.1 Line Cord	81Y2378	6580
Denmark 2.8m, 10A/250V, C13 to DK2-5a Line Cord	39Y7918	6213
Denmark 4.3m, 10A/250V, C13 to DK2-5a Line Cord	81Y2382	6575
Europe 2.8m, 10A/250V, C13 to CEE7-VII Line Cord	39Y7917	6212
Europe 4.3m, 10A/250V, C13 to CEE7-VII Line Cord	81Y2376	6572
India 2.8m, 10A/250V, C13 to IS 6538 Line Cord	39Y7927	6269
India 4.3m, 10A/250V, C13 to IS 6538 Line Cord	81Y2386	6567
Israel 2.8m, 10A/250V, C13 to SI 32 Line Cord	39Y7920	6218
Israel 4.3m, 10A/250V, C13 to SI 32 Line Cord	81Y2381	6579
Italy 2.8m, 10A/250V, C13 to CEI 23-16 Line Cord	39Y7921	6217
Italy 4.3m, 10A/250V, C13 to CEI 23-16 Line Cord	81Y2380	6493
Japan 2.8m, 12A/125V, C13 to JIS C-8303 Line cord	46M2593	A1RE
Japan 2.8m, 12A/250V, C13 to JIS C-8303 Line Cord	4L67A08357	6533
Japan 4.3m, 12A/125V, C13 to JIS C-8303 Line Cord	39Y7926	6335
Japan 4.3m, 12A/250V, C13 to JIS C-8303 Line Cord	4L67A08362	6495
Korea 2.8m, 12A/250V, C13 to KS C8305 Line Cord	39Y7925	6219
Korea 4.3m, 12A/250V, C13 to KS C8305 Line Cord	81Y2385	6494
South Africa 2.8m, 10A/250V, C13 to SABS 164 Line Cord	39Y7922	6214
South Africa 4.3m, 10A/250V, C13 to SABS 164 Line Cord	81Y2379	6576
Switzerland 2.8m, 10A/250V, C13 to SEV 1011-S24507 Line Cord	39Y7919	6216
Switzerland 4.3m, 10A/250V, C13 to SEV 1011-S24507 Line Cord	81Y2390	6578
Taiwan 2.8m, 10A/125V, C13 to CNS 10917-3 Line Cord	23R7158	6386
Taiwan 2.8m, 10A/250V, C13 to CNS 10917-3 Line Cord	81Y2375	6317
Taiwan 2.8m, 15A/125V, C13 to CNS 10917-3 Line Cord	81Y2374	6402
Taiwan 4.3m, 10A/125V, C13 to CNS 10917-3 Line Cord	4L67A08363	AX8B
Taiwan 4.3m, 10A/250V, C13 to CNS 10917-3 Line Cord	81Y2389	6531
Taiwan 4.3m, 15A/125V, C13 to CNS 10917-3 Line Cord	81Y2388	6530
United Kingdom 2.8m, 10A/250V, C13 to BS 1363/A Line Cord	39Y7923	6215
United Kingdom 4.3m, 10A/250V, C13 to BS 1363/A Line Cord	81Y2377	6577

Description	Part number	Feature code
United States 2.8m, 10A/125V, C13 to NEMA 5-15P Line Cord	90Y3016	6313
United States 2.8m, 10A/250V, C13 to NEMA 6-15P Line Cord	46M2592	A1RF
United States 2.8m, 13A/125V, C13 to NEMA 5-15P Line Cord	00WH545	6401
United States 4.3m, 10A/125V, C13 to NEMA 5-15P Line Cord	4L67A08359	6370
United States 4.3m, 10A/250V, C13 to NEMA 6-15P Line Cord	4L67A08361	6373
United States 4.3m, 13A/125V, C13 to NEMA 5-15P Line Cord	4L67A08360	AX8A

Physical specifications

The ThinkSystem DE Series 2U24 SFF enclosures have the following dimensions and weight (approximate):

- Height: 85 mm (3.4 in.)
- Width: 449 mm (17.7 in.)
- Depth: 553 mm (21.8 in.)
- Weight (fully configured): 27.6 kg (60.8 lb)

The ThinkSystem DE Series 2U12 LFF enclosures have the following dimensions and weight (approximate):

- Height: 85 mm (3.4 in.)
- Width: 447 mm (17.6 in.)
- Depth: 483 mm (19.0 in.)
- Weight (fully configured): 27.6 kg (60.8 lb)

Operating environment

The ThinkSystem DE Series 2U24 SFF and 2U12 LFF enclosures are supported in the following environment:

- Air temperature:
  - Operating:
    - DE2000H and DE240S 2U24 SFF: 5 °C - 45 °C (41 °F - 113 °F)
    - DE2000H and DE120S 2U12 LFF: 10 °C - 40 °C (50 °F - 104 °F)
  - Non-operating: -10 °C - +50 °C (14 °F - 122 °F)
  - Maximum altitude: 3050 m (10,000 ft)
- Relative humidity:
  - Operating: 8% - 90% (non-condensing)
  - Non-operating: 10% - 90% (non-condensing)
- Electrical power:
  - DE2000H 2U24 SFF and 2U12 LFF
    - 100 to 127 (nominal) V AC; 50 Hz or 60 Hz; 4.31 A
    - 200 to 240 (nominal) V AC; 50 Hz or 60 Hz; 2.15 A
    - Maximum system power load: 409 W
  - DE240S 2U24 SFF
    - 100 to 127 (nominal) V AC; 50 Hz or 60 Hz; 4.11 A
    - 200 to 240 (nominal) V AC; 50 Hz or 60 Hz; 2.05 A
    - Maximum system power load: 390 W
  - DE120S 2U12 LFF
    - 100 to 127 (nominal) V AC; 50 Hz or 60 Hz; 3.56 A
    - 200 to 240 (nominal) V AC; 50 Hz or 60 Hz; 1.78 A
    - Maximum system power load: 338 W
- Heat dissipation:
  - DE2000H 2U24 SFF and 2U12 LFF: 1396 BTU/hour
  - DE240S 2U24 SFF: 1331 BTU/hour
  - DE120S 2U12 LFF: 1153 BTU/hour
- Acoustical noise emission:
  - DE2000H 2U24 SFF and DE120S 2U12 LFF: 6.8 bels
  - DE2000H 2U12 LFF and DE240S 2U24 SFF: 6.6 bels

Warranty services and upgrades

The ThinkSystem DE Series enclosures have a three-year Customer Replaceable Unit (CRU) and onsite warranty with 9x5/next business day (NBD) terms.

Some countries might have different warranty terms and conditions than the standard warranty. This is due to local business practices or laws in the specific country. Local service teams can assist in explaining country-specific terms when needed. Examples of country-specific warranty terms are second or longer business day parts delivery or parts-only base warranty.

If warranty terms and conditions include onsite labor for repair or replacement of parts, Lenovo will dispatch a service technician to the customer site to perform the replacement. Onsite labor under base warranty is limited to labor for replacement of parts that have been determined to be field-replaceable units (FRUs). Parts that are determined to be customer-replaceable units (CRUs) do not include onsite labor under base warranty.

If warranty terms include parts-only base warranty, Lenovo is responsible for delivering only replacement parts that are under base warranty (including FRUs) that will be sent to a requested location for self-service. Parts-only service does not include a service technician being dispatched onsite. Parts must be changed at customer's own cost and labor and defective parts must be returned following the instructions supplied with the spares parts.

Also available are Lenovo Services warranty upgrades and post-warranty maintenance agreements, with a well-defined scope of services, including service hours, response time, term of service, and service agreement terms and conditions.

Lenovo warranty service upgrade offerings are country-specific. Not all warranty service upgrades are available in every country. For information about Lenovo warranty service upgrade offerings that are available in your country or area, refer to the following resources:

- Service part numbers in Lenovo Data Center Solution Configurator (DCSC):
  http://dcsc.lenovo.com/#/services
- Lenovo Services Availability Locator
  http://lenovolocator.com/

In general, the following Lenovo warranty service upgrades are available:

- Warranty and maintenance service upgrades:
  - 3, 4, or 5 years of warranty service coverage
  - 1-year or 2-year post-warranty extensions
  - Foundation Service: 9x5 service coverage with next business day onsite response
  - Essential Service: 24x7 service coverage with 4-hour onsite response or 24-hour committed repair (available only in select countries)
  - Advanced Service: 24x7 service coverage with 2-hour onsite response or 6-hour committed repair (available only in select countries)
- Premier Support
  Premier Support service offers single point of contact for end-to-end problem resolution and collaborative third-party software support with direct access to Lenovo's most advanced technicians for faster troubleshooting.
- YourDrive YourData
  Lenovo's YourDrive YourData service (where applicable) is a multi-drive retention offering that ensures your data is always under your control, regardless of the number of drives that are installed in your Lenovo system. In the unlikely event of a drive failure, you retain possession of your drive while Lenovo replaces the failed drive part. Your data stays safely on your premises, in your hands. The YourDrive YourData service can be purchased in convenient bundles with Foundation, Essential, or Advanced Service upgrades and extensions.
- Basic Hardware Installation Services
  Lenovo experts can seamlessly manage the physical installation of your server, storage, or networking hardware. Working at a time convenient for you (business hours or off shift), the technician will unpack and inspect the systems on your site, install options, mount in a rack cabinet, connect to power and network, check and update firmware to the latest levels, verify operation, and dispose of the packaging, allowing your team to focus on other priorities.

For service definitions, country-specific details, and service limitations, please refer to the following documents:

- Lenovo Statement of Limited Warranty for Data Center Group (DCG) Servers and System Storage
  http://pcsupport.lenovo.com/us/en/solutions/ht503310
- Lenovo Data Center Services Agreement
  http://support.lenovo.com/us/en/solutions/ht116628

Regulatory compliance

The ThinkSystem DE Series enclosures conform to the following regulations:

- United States: FCC Part 15, Class A; UL 60950-1
- Canada: ICES-003, Class A; CAN/CSA-C22.2 60950-1
- Mexico NOM
- European Union: CE Mark (EN55032 Class A, EN55024, IEC/EN60950-1); ROHS Directive 2011/65/EU
- Russia, Kazakhstan, Belarus: EAC
- China: CCC GB 4943.1, GB 17625.1, GB 9254 Class A; CELP; CECP
- Japan: VCCI, Class A
- Taiwan: BSMI CNS 13438, Class A; CNS 14336-1
- Korea KN32/35, Class A
- Australia/New Zealand: AS/NZS CISPR 22 Class A

Interoperability

Lenovo provides end-to-end storage compatibility testing to deliver interoperability throughout the network. The ThinkSystem DE2000H Hybrid Storage Array supports attachment to Lenovo ThinkSystem, System x, ThinkServer, and Flex System hosts by using SAS, iSCSI, or Fibre Channel storage connectivity protocols.

For end-to-end storage configuration support, refer to the Lenovo ThinkSystem DE2000H Interoperability Matrix that can be found on the ThinkSystem DE2000H Documentation page on the Lenovo Data Center Support web site:
http://datacentersupport.lenovo.com

The following sections list adapters and Ethernet LAN and FC SAN switches that are currently offered by Lenovo that can be used with the ThinkSystem DE2000H Hybrid Storage Array in IT solutions:

- Adapters
- Ethernet LAN switches
- Fibre Channel SAN switches

Note: Tables that are provided in these sections are for ordering reference purposes only. End-to-end storage configuration support *must* be verified through the Lenovo ThinkSystem DE2000H Interoperability Matrix.

Adapters

This section lists the adapters for the following types of storage connectivity:

- SAS connectivity
- iSCSI connectivity
- Fibre Channel connectivity

SAS connectivity

The following table lists currently available SAS adapters for Lenovo servers that are compatible with the ThinkSystem DE2000H SAS storage (direct attach). Other SAS HBAs also might be supported (see the Interoperability Matrix for details).

Table 13. SAS adapters

Description	Part number
ThinkSystem SAS HBAs	
ThinkSystem 430-8e SAS/SATA 12Gb HBA	7Y37A01090
ThinkSystem 430-16e SAS/SATA 12Gb HBA	7Y37A01091
System x SAS HBAs	
N2225 SAS/SATA HBA (12Gb)	00AE912
N2226 SAS/SATA HBA (12Gb)	00AE916
ThinkServer SAS HBAs	
ThinkServer 9300-8e PCIe 12Gb 8 Port External SAS Adapter by LSI	4XB0F28703

iSCSI connectivity

The ThinkSystem DE2000H supports iSCSI attachments via standard 1 Gb Ethernet or 10 Gb Ethernet connections (direct attach or switch-based). Any compatible Ethernet switch, including Lenovo ThinkSystem and RackSwitch Ethernet switches and embedded Flex System Ethernet I/O modules, can be used to provide iSCSI connectivity for the ThinkSystem DE2000H storage.

With software iSCSI initiators, any supported 1 Gb Ethernet or 10 Gb Ethernet adapter for Lenovo servers is compatible with the ThinkSystem DE2000H iSCSI storage.

Fibre Channel connectivity

The ThinkSystem DE2000H supports direct FC attachments and FC switch-based attachments. Lenovo B Series and DB Series FC SAN switches and directors can be used to provide FC connectivity.

Currently available FC adapters for Lenovo servers that are compatible with the ThinkSystem DE2000H FC storage are listed in the following table. Other FC HBAs also might be supported (see the Interoperability Matrix for details).

Table 14. Fibre Channel adapters

Description	Part number
ThinkSystem HBAs: 32 Gb FC	
ThinkSystem Emulex LPe32000-M6-LP PCIe 32Gb 1-Port SFP+ Fibre Channel Adapter	7ZT7A00517
ThinkSystem Emulex LPe32002-M6-LP PCIe 32Gb 2-Port SFP+ Fibre Channel Adapter	7ZT7A00519
ThinkSystem QLogic QLE2740 PCIe 32Gb 1-Port SFP+ Fibre Channel Adapter	7ZT7A00516

Description	Part number
ThinkSystem QLogic QLE2742 PCIe 32Gb 2-Port SFP+ Fibre Channel Adapter	7ZT7A00518
ThinkSystem HBAs: 8 Gb FC	
Emulex LPe12000-M8-L PCIe 8Gb 1-Port SFP+ FC HBA	4XC7A08220
Emulex LPe12002-M8-L PCIe 8Gb 2-Port SFP+ FC HBA	4XC7A08221
System x HBAs: 16 Gb FC	
Emulex 16Gb Gen6 FC Single-port HBA (LPe31000)	01CV830
Emulex 16Gb Gen6 FC Dual-port HBA (LPe31002)	01CV840
Emulex 16Gb FC Single-port HBA (LPe16000)	81Y1655
Emulex 16Gb FC Dual-port HBA (LPe16002)	81Y1662
QLogic 16Gb Enhanced Gen5 FC Single-port HBA (QLE2690)	01CV750
QLogic 16Gb Enhanced Gen5 FC Dual-port HBA (QLE2692)	01CV760
QLogic 16Gb FC Single-port HBA (QLE2660)	00Y3337
QLogic 16Gb FC Dual-port HBA (QLE2662)	00Y3341
System x HBAs: 8 Gb FC	
Emulex 8Gb FC Single-port HBA (LPe12000)	42D0485
Emulex 8Gb FC Dual-port HBA (LPe12002)	42D0494
QLogic 8Gb FC Single-port HBA (QLE2560)	42D0501
QLogic 8Gb FC Dual-port HBA (QLE2562)	42D0510
ThinkServer HBAs: 16 Gb FC	
ThinkServer LPe16000B Single Port 16Gb Fibre Channel HBA by Emulex	4XB0F28653
ThinkServer LPe16002B Dual Port 16GB Fibre Channel HBA by Emulex	4XB0F28650
ThinkServer LPe16002B-M6-L PCIe 16Gb 2 Port Fibre Channel Adapter by Emulex	4XB0F28705
ThinkServer LPe16004B-M6-L PCIe 16Gb 4 Port Fibre Channel Adapter by Emulex	4XB0F28681
ThinkServer LPm16002-M6-L AnyFabric 16Gb 2 Port Fibre Channel Adapter by Emulex	4XB0F28706
ThinkServer QLE2672 PCIe 16Gb 2 Port Fibre Channel Adapter by QLogic	4XC0F28745
ThinkServer HBAs: 8 Gb FC	
ThinkServer LPe12002 PCIe 8Gb 2 Port Fibre Channel Adapter by Emulex	0C19478
ThinkServer LPe16000B Single Port 8Gb Fibre Channel HBA by Emulex	4XB0F28652
ThinkServer LPe16002B Dual Port 8Gb Fibre Channel HBA by Emulex	4XB0F28643
ThinkServer LPe16002B-M8-L PCIe 8Gb 2 Port Fibre Channel Adapter by Emulex	4XB0F28704
ThinkServer QLE2560 Single Port 8Gb Fibre Channel HBA by QLogic	4XB0F28649
ThinkServer QLE2562 Dual Port 8Gb Fibre Channel HBA by QLogic	0C19482
Flex System HBAs: 16 Gb FC	
ThinkSystem Emulex LPm16002B-L Mezz 16Gb 2-Port Fibre Channel Adapter	7ZT7A00521
ThinkSystem Emulex LPm16004B-L Mezz 16Gb 4-Port Fibre Channel Adapter	7ZT7A00522
ThinkSystem QLogic QML2692 Mezz 16Gb 2-Port Fibre Channel Adapter	7ZT7A00520
Flex System FC5052 2-port 16Gb FC Adapter	95Y2386
Flex System FC5054 4-port 16Gb FC Adapter	95Y2391

Ethernet LAN switches

The following table lists currently available rack-mount Ethernet switches that are currently offered by Lenovo that can be used with the ThinkSystem DE2000H Hybrid Storage Array in IT solutions.

Table 15. Ethernet rack-mount switches

Description	Part number
1 Gb Ethernet (iSCSI connectivity)	
Lenovo RackSwitch G7028 (Rear to Front)	7159BAX
Lenovo RackSwitch G7052 (Rear to Front)	7159CAX
Lenovo RackSwitch G8052 (Rear to Front)	7159G52
10 Gb Ethernet (iSCSI connectivity)	
Lenovo ThinkSystem NE1032 RackSwitch (Rear to Front)	7159A1X
Lenovo ThinkSystem NE1032T RackSwitch (Rear to Front)	7159B1X
Lenovo ThinkSystem NE1072T RackSwitch (Rear to Front)	7159C1X
Lenovo RackSwitch G8124E (Rear to Front)	7159BR6
Lenovo RackSwitch G8264 (Rear to Front)	7159G64
Lenovo RackSwitch G8272 (Rear to Front)	7159CRW
Lenovo RackSwitch G8296 (Rear to Front)	7159GR6
25 Gb Ethernet (support for 10 GbE for iSCSI connectivity)	
Lenovo ThinkSystem NE2572 RackSwitch (Rear to Front)	7159E1X
40 Gb Ethernet (4x 10 GbE breakout connectivity out of a 40 Gb port; iSCSI connectivity)	
Lenovo RackSwitch G8332 (Rear to Front)	7159BRX
100 Gb Ethernet (support for 40 GbE with 4x 10 GbE breakout connectivity; iSCSI connectivity)	
Lenovo ThinkSystem NE10032 RackSwitch (Rear to Front)	7159D1X

For more information, see the list of Product Guides in the Top-of-rack Switches category: http://lenovopress.com/servers/options/switches#rt=product-guide

The following table lists currently available embedded Ethernet switches and pass-thru modules for Flex System that can be used with the ThinkSystem DE2000H Hybrid Storage Array in IT solutions.

Table 16. Embedded Ethernet switches for Flex System

Description	Part number
1 Gb Ethernet (iSCSI connectivity)	
Lenovo Flex System EN2092 1Gb Ethernet Scalable Switch	49Y4294
10 Gb Ethernet (iSCSI connectivity)	
Lenovo Flex System Fabric EN4093R 10Gb Scalable Switch	00FM514
Lenovo Flex System SI4091 10Gb System Interconnect Module	00FE327
Lenovo Flex System Fabric SI4093 System Interconnect Module	00FM518
Cisco Nexus B22 Fabric Extender for Flex System*	94Y5350
Cisco Nexus B22 Fabric Extender with FET bundle for Flex System*	94Y5355
25 Gb Ethernet (support for 10 Gb Ethernet for iSCSI connectivity)	
Lenovo ThinkSystem NE2552E Flex Switch	4SG7A08868

Description	Part number
Pass-thru modules (require a compatible external switch)	
Lenovo Flex System EN4091 10Gb Ethernet Pass-thru	88Y6043

* Requires a supported Cisco Nexus top of rack switch.

For more information, see the list of Product Guides in the Blade Network Modules category:
http://lenovopress.com/servers/blades/networkmodule#rt=product-guide

Fibre Channel SAN switches

The following table lists currently available rack-mount Fibre Channel SAN switches that are offered by Lenovo that can be used with the ThinkSystem DE2000H Hybrid Storage Array in IT solutions.

Table 17. Rack-mount Fibre Channel SAN switches

Description	Part number
8 Gb FC	
Lenovo B300, 8 ports activated, 8x 8Gb SWL SFPs, 1 PS, Rail Kit	3873AR3
Lenovo B300, E_Port License included, 8 ports activated, 8x 8Gb SWL SFPs, 1 PS, Rail Kit	3873AR6
16 Gb FC	
Lenovo ThinkSystem DB610S, 8 ports activated, 8x 16Gb SWL SFPs, 1 PS, Rail Kit	6559D2Y
Lenovo ThinkSystem DB610S, 24 ports activated, 24x 16Gb SWL SFP, Enterprise SW, 1 PS, Rail Kit	6559D1Y
Lenovo B6505, 12 ports activated w/ 16Gb SWL SFPs, 1 PS, Rail Kit	3873AR5
Lenovo B6510, 24 ports activated w/ 16Gb SWL SFPs, 2 PS, Rail Kit	3873BR3
32 Gb FC	
Lenovo ThinkSystem DB610S, 8 ports activated, 1 PS, Rail Kit	6559D3Y
Lenovo ThinkSystem DB620S, 24 ports activated, No SFPs, 2 PS, Rail Kit	6415G3A
Lenovo ThinkSystem DB620S, 24 ports activated, 24x 32Gb SWL SFPs, 2 PS, Rail Kit	6415G11
Lenovo ThinkSystem DB620S, 48 ports activated, 48x 32Gb SWL SFPs, 2 PS, Rail Kit	6415G2A
Lenovo ThinkSystem DB400D 32Gb FC Director, up to 192 ports, 8U, Enterprise SW	6684B2A
Lenovo ThinkSystem DB800D 32Gb FC Director, up to 384 ports, 14U, Enterprise SW	6682B1A

For more information, see the list of Product Guides in the Rack SAN Switches category:
http://lenovopress.com/storage/switches/rack#rt=product-guide

The following table lists currently available embedded Fibre Channel SAN switches for Flex System that can be used with the ThinkSystem DE2000H Hybrid Storage Array in IT solutions.

Table 18. Embedded FC SAN switches for Flex System

Description	Part number
16 Gb FC	
Lenovo Flex System FC5022 16Gb SAN Scalable Switch	88Y6374
Lenovo Flex System FC5022 24-port 16Gb SAN Scalable Switch (includes two 16 Gb SFPs)	00Y3324
Lenovo Flex System FC5022 24-port 16Gb ESB SAN Scalable Switch	90Y9356

For more information, see the list of Product Guides in the Blade Storage Modules category:
http://lenovopress.com/servers/blades/storagemodule#rt=product-guide

Operating systems

The ThinkSystem DE2000H supports host attachments to the Lenovo servers running the following operating systems:

- Microsoft:
  - Microsoft Windows Server 2016
  - Microsoft Windows Server 2012 R2
- Red Hat:
  - Red Hat Enterprise Linux 7 Update 3
- SUSE:
  - SUSE Linux Enterprise Server 12 SP2
- VMware:
  - VMware vSphere 6.5
  - VMware vSphere 6.0 Update 3

Rack cabinets

The following table lists the rack cabinets that are offered by Lenovo that can be used with the ThinkSystem DE2000H Hybrid Storage Array in IT solutions.

Table 19. Rack cabinets

Description	Part number
25U S2 Standard Rack (1000 mm deep; 2 sidewall compartments)	93072RX
25U Static S2 Standard Rack (1000 mm deep; 2 sidewall compartments)	93072PX
42U S2 Standard Rack (1000 mm deep; 6 sidewall compartments)	93074RX
42U 1100mm Enterprise V2 Dynamic Rack (6 sidewall compartments)	93634PX
42U 1100mm Enterprise V2 Dynamic Expansion Rack (6 sidewall compartments)	93634EX
42U 1200mm Deep Dynamic Rack (6 sidewall compartments)	93604PX
42U 1200mm Deep Static Rack (6 sidewall compartments)	93614PX
42U Enterprise Rack (1105 mm deep; 4 sidewall compartments)	93084PX
42U Enterprise Expansion Rack (1105 mm deep; 4 sidewall compartments)	93084EX

Configuration note: The ThinkSystem DE Series storage arrays cannot be shipped installed in a rack cabinet.

For more information, see the list of Product Guides in the Rack cabinets category:
http://lenovopress.com/servers/options/racks#rt=product-guide

Power distribution units

The following table lists the power distribution units (PDUs) that are offered by Lenovo that can be used with the ThinkSystem DE2000H Hybrid Storage Array in IT solutions.

Table 20. Power distribution units

Description	Part number
0U Basic PDUs	
0U 36 C13/6 C19 24A/200-240V 1 Phase PDU with NEMA L6-30P line cord	00YJ776
0U 36 C13/6 C19 32A/200-240V 1 Phase PDU with IEC60309 332P6 line cord	00YJ777
0U 21 C13/12 C19 32A/200-240V/346-415V 3 Phase PDU with IEC60309 532P6 line cord	00YJ778
0U 21 C13/12 C19 48A/200-240V 3 Phase PDU with IEC60309 460P9 line cord	00YJ779
Switched and Monitored PDUs	
0U 20 C13/4 C19 Switched and Monitored 24A/200-240V/1Ph PDU w/ NEMA L6-30P line cord	00YJ781
0U 20 C13/4 C19 Switched and Monitored 32A/200-240V/1Ph PDU w/ IEC60309 332P6 line cord	00YJ780
0U 18 C13/6 C19 Switched / Monitored 32A/200-240V/346-415V/3Ph PDU w/ IEC60309 532P6 cord	00YJ782
0U 12 C13/12 C19 Switched and Monitored 48A/200-240V/3Ph PDU w/ IEC60309 460P9 line cord	00YJ783
1U 9 C19/3 C13 Switched and Monitored DPI PDU (without line cord)	46M4002
1U 9 C19/3 C13 Switched and Monitored 60A 3Ph PDU with IEC 309 3P+Gnd cord	46M4003
1U 12 C13 Switched and Monitored DPI PDU (without line cord)	46M4004
1U 12 C13 Switched and Monitored 60A 3 Phase PDU with IEC 309 3P+Gnd line cord	46M4005
Ultra Density Enterprise PDUs (9x IEC 320 C13 + 3x IEC 320 C19 outlets)	
Ultra Density Enterprise C19/C13 PDU Module (without line cord)	71762NX
Ultra Density Enterprise C19/C13 PDU 60A/208V/3ph with IEC 309 3P+Gnd line cord	71763NU
C13 Enterprise PDUs (12x IEC 320 C13 outlets)	
DPI C13 Enterprise PDU+ (without line cord)	39M2816
DPI Single Phase C13 Enterprise PDU (without line cord)	39Y8941
C19 Enterprise PDUs (6x IEC 320 C19 outlets)	
DPI Single Phase C19 Enterprise PDU (without line cord)	39Y8948
DPI 60A 3 Phase C19 Enterprise PDU with IEC 309 3P+G (208 V) fixed line cord	39Y8923
Front-end PDUs (3x IEC 320 C19 outlets)	
DPI 30amp/125V Front-end PDU with NEMA L5-30P line cord	39Y8938
DPI 30amp/250V Front-end PDU with NEMA L6-30P line cord	39Y8939
DPI 32amp/250V Front-end PDU with IEC 309 2P+Gnd line cord	39Y8934
DPI 60amp/250V Front-end PDU with IEC 309 2P+Gnd line cord	39Y8940
DPI 63amp/250V Front-end PDU with IEC 309 2P+Gnd line cord	39Y8935
Universal PDUs (7x IEC 320 C13 outlets)	
DPI Universal 7 C13 PDU (with 2 m IEC 320-C19 to C20 rack power cord)	00YE443
NEMA PDUs (6x NEMA 5-15R outlets)	
DPI 100-127V PDU with fixed NEMA L5-15P line cord	39Y8905
Line cords for PDUs that ship without a line cord	
DPI 30a Line Cord (NEMA L6-30P)	40K9614
DPI 32a Line Cord (IEC 309 P+N+G)	40K9612

Description	Part number
DPI 32a Line Cord (IEC 309 3P+N+G)	40K9611
DPI 60a Cord (IEC 309 2P+G)	40K9615
DPI 63a Cord (IEC 309 P+N+G)	40K9613
DPI Australian/NZ 3112 Line Cord (32A)	40K9617
DPI Korean 8305 Line Cord (30A)	40K9618

For more information, see the list of Product Guides in the PDU category:
http://lenovopress.com/servers/options/pdu#rt=product-guide

Uninterruptible power supply units

The following table list the uninterruptible power supply (UPS) units that are currently offered by Lenovo that can be used with the ThinkSystem DE2000H Hybrid Storage Array in IT solutions.

Table 21. Uninterruptible power supply units

Description	Part number
Worldwide models	
RT1.5kVA 2U Rack or Tower UPS (100-125VAC) (8x NEMA 5-15R 12A outlets)	55941AX
RT1.5kVA 2U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A outlets)	55941KX
RT2.2kVA 2U Rack or Tower UPS (100-125VAC) (8x NEMA 5-20R 16A outlets)	55942AX
RT2.2kVA 2U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A, 1x IEC 320 C19 16A outlets)	55942KX
RT3kVA 2U Rack or Tower UPS (100-125VAC) (6x NEMA5-20R 16A, 1x NEMA L5-30R 24A outlets)	55943AX
RT3kVA 2U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A, 1x IEC 320 C19 16A outlets)	55943KX
RT5kVA 3U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A, 2x IEC 320 C19 16A outlets)	55945KX
RT6kVA 3U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A, 2x IEC 320 C19 16A outlets)	55946KX
RT8kVA 6U Rack or Tower UPS (200-240VAC) (4x IEC 320-C19 16A outlets)	55948KX
RT11kVA 6U Rack or Tower UPS (200-240VAC) (4x IEC 320-C19 16A outlets)	55949KX
RT8kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC) (4x IEC 320-C19 16A outlets)	55948PX
RT11kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC) (4x IEC 320-C19 16A outlets)	55949PX
ASEAN, HTK, INDIA, and PRC models	
ThinkSystem RT3kVA 2U Standard UPS (200-230VAC) (2x C13 & 2x GB 10A, 1x C19 16A outlets)	55943KT
ThinkSystem RT3kVA 2U Long Backup UPS (200-230VAC) (2x C13 & 2x GB 10A, 1x C19 16A outlets)	55943LT
ThinkSystem RT6kVA 5U UPS (200-230VAC) (2x C13 10A outlets, 1x Terminal Block output)	55946KT
ThinkSystem RT10kVA 5U UPS (200-230VAC) (2x C13 10A outlets, 1x Terminal Block output)	5594XKT

For more information, see the list of Product Guides in the Uninterruptible Power Supply Units category:
http://lenovopress.com/servers/options/ups#rt=product-guide

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For more information about your region-specific offers, contact your Lenovo sales representative or your technology provider about the use of Lenovo Financial Services. For more information, see the following Lenovo website:
http://www.lenovofs.com

Related publications and links

For more information, see the following resources:

- Lenovo Data Center SAN Storage product page
  http://www.lenovo.com/us/en/c/storage-area-network
- Lenovo Data Center Solution Configurator
  http://dcsc.lenovo.com
- Lenovo Data Center Support
  http://datacentersupport.lenovo.com

Related product families

Product families related to this document are the following:

- Lenovo Storage
- External Storage

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