

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 memory for a system total of 16 GB. Host interface cards provide 12 Gb SAS, 10/25 Gb iSCSI, or 8/16/32 Gb FC connections.

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 10/25 Gb iSCSI SFP28, 8/16/32 Gb FC, or 12 Gb SAS, or 1/10 Gb iSCSI RJ-45 technologies.

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 system memory 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 1/10 Gb iSCSI or 4/8/16 Gb FC, and 12 Gb SAS, 10/25 Gb iSCSI, or 8/16/32 Gb FC 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, thin provisioning, and encryption (requires optional FIPS drives).
- 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 SSDs (1 drive write per day [DWD]): 3.84 TB, 7.68 TB, and 15.36 TB
- High performance SSDs (3 DWD): 800 GB, 1.6 TB
- High performance self-encrypting FIPS SSDs (3 DWD): 1.6 TB
- Performance-optimized, enterprise class HDDs: 1.2 TB and 1.8 TB 10K rpm
- Performance-optimized, enterprise class self-encrypting FIPS HDDs: 1.8 TB 10K rpm

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

- High-performance SSDs (3 DWD; 2.5" drive in a 3.5" drive tray): 800 GB
- High performance self-encrypting FIPS SSDs (3 DWD; 2.5" drive in a 3.5" drive tray): 1.6 TB
- High-capacity, archival-class nearline HDDs: 4 TB, 8 TB, 10 TB, 12 TB, and 16 TB 7.2K rpm
- High-capacity, archival-class nearline self-encrypting FIPS HDDs: 6 TB and 10 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.

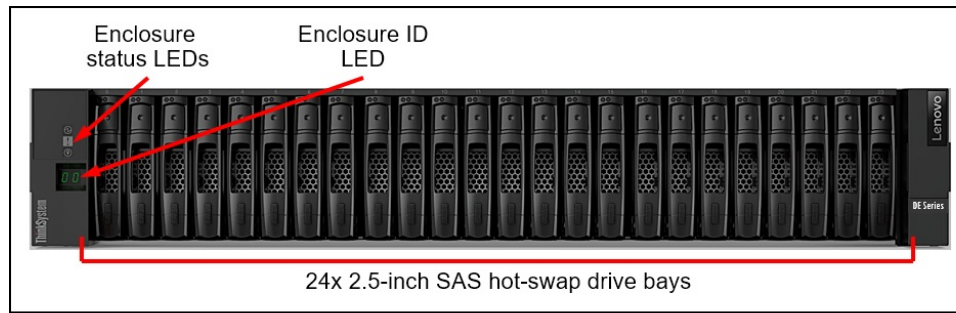


Figure 2. ThinkSystem DE2000H and DE240S 2U SFF enclosures front view

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.

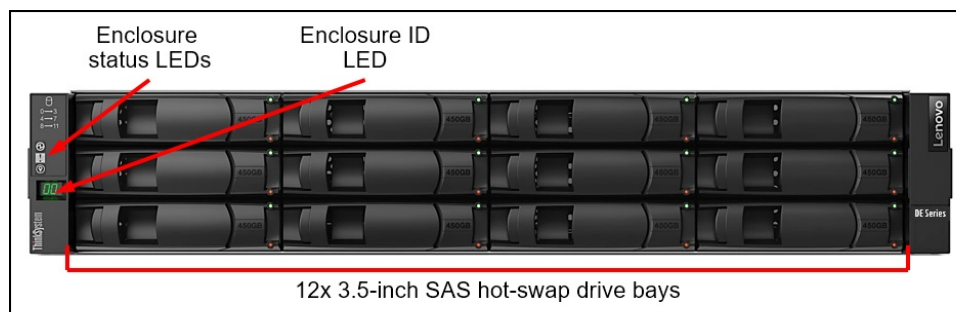


Figure 3. ThinkSystem DE2000H and DE120S 2U LFF enclosures front view

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 with two Gen2 controllers installed.

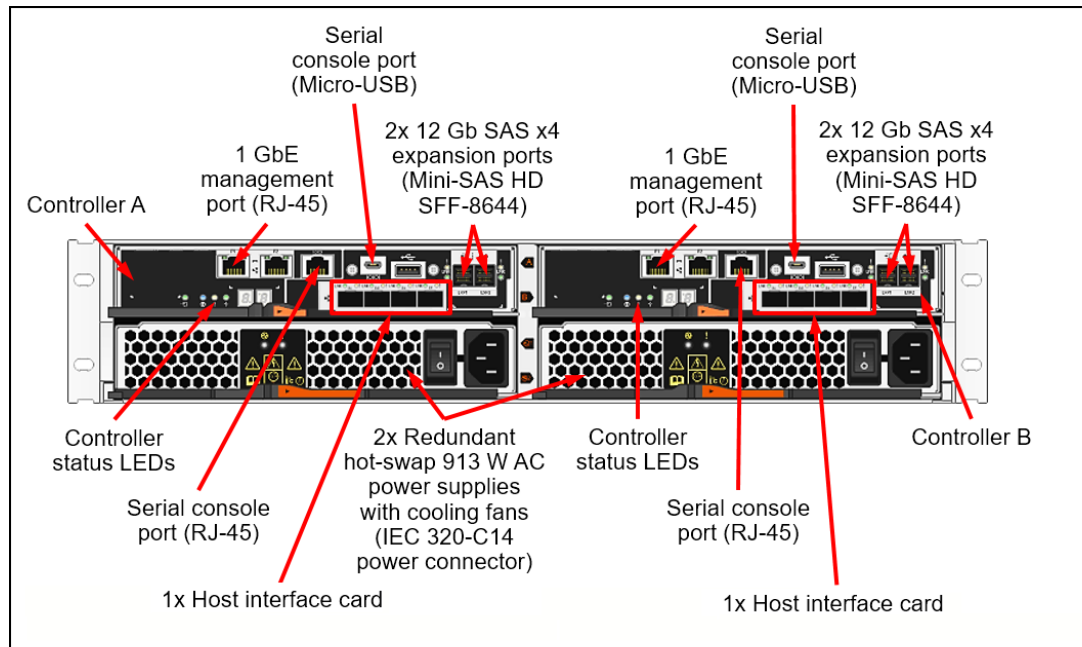


Figure 4. Rear view ThinkSystem DE2000H 2U controller enclosure with two Gen2 controllers installed

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

- Two redundant hot-swap controllers, each with the following ports:
 - One slot for a host interface card
 - Note:** The DE2000H Gen2 controllers no longer offers base ports
 - 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.

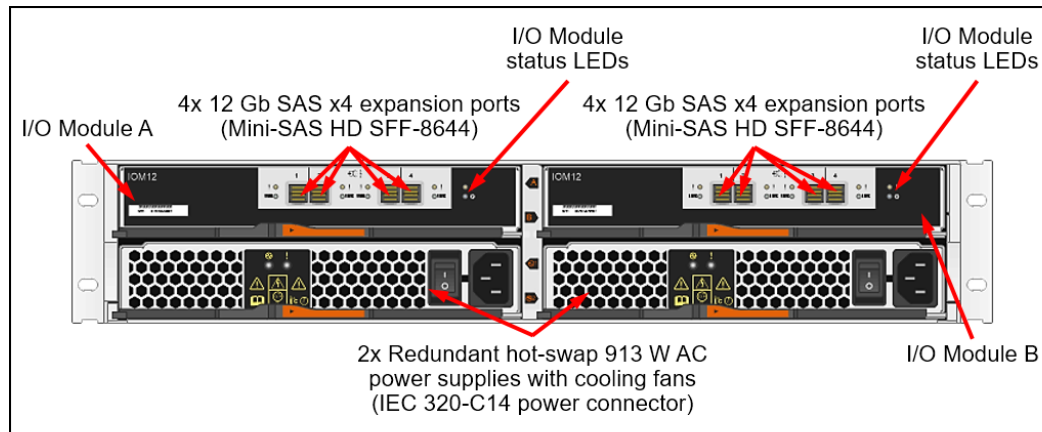


Figure 5. ThinkSystem DE240S or DE120S 2U expansion enclosure rear view

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, software features, and interoperability listed in this product guide are based on the software version 11.60. 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	<ul style="list-style-type: none"> • 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. Note: RAID 3 can be configured only through the CLI.
Controller system memory	16 GB per system (8 GB per controller). Cache mirroring between the controllers. Flash-backed cache protection (includes battery for destaging to flash).
Expansion enclosure support	<ul style="list-style-type: none"> • DE2000H 2U24 SFF controller: 3x DE120S or 3x DE240S • DE2000H 2U12 LFF controller: 3x DE120S or 3x DE240S • Expansion enclosures may be mixed up to a maximum of 3 expansion enclosures

Attribute	Specification
Drive bays	Up to 4 enclosures per system (Controller unit with up to 3 expansion units): <ul style="list-style-type: none"> ● 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 SFF enclosures) Intermix of 2U24 SFF and 2U12 LFF enclosures is supported.
Drive technology	<ul style="list-style-type: none"> ● 12 Gb SAS and NL SAS HDDs and FIPS HDDs, 12 Gb SAS SSDs and FIPS SSDs. ● Intermix of HDDs and SSDs is supported within a system. ● Intermix of HDDs and SSDs is <i>not</i> supported within a volume group or disk pool. ● Intermix of FIPS drives and non-FIPS drives is supported within a system. ● Intermix of FIPS drives and non-FIPS drives is <i>not</i> supported within a volume group or disk pool.
Drive expansion connectivity	<ul style="list-style-type: none"> ● 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: <ul style="list-style-type: none"> ● 10K rpm SAS HDDs ● 10K rpm SAS FIPS HDDs ● SAS SSDs (1 DWD) ● SAS SSDs (3 DWD) ● SAS FIPS SSDs (3 DWD) 2U12 LFF drives: <ul style="list-style-type: none"> ● 7.2K rpm NL SAS HDDs ● 7.2K rpm NL SAS FIPS HDDs ● SAS SSDs (3 DWD) ● SAS FIPS SSDs (3 DWD)
Storage capacity	All SFF drives: Up to 1.47 PB (96x 15.36 TB SFF SSDs) All LFF drives: Up to 864 TB (48x 18TB LFF HDDs)
Host connectivity	Host connectivity ports provided using host interface cards (HICs) (per controller enclosure with two controllers): <ul style="list-style-type: none"> ● 4x 12 Gb SAS host ports (Mini-SAS HD, SFF-8644) (2 ports per controller) ● 8x 12 Gb SAS host ports (Mini-SAS HD, SFF-8644) (4 ports per controller) ● 8x 10/25 Gb iSCSI SFP28 host ports (DAC or SW fiber optics [LC]) (4 ports per controller) ● 8x 8/16/32 Gb FC SFP+ host ports (SW fiber optics [LC]) (4 ports per controller) ● 4x 1/10 Gb iSCSI RJ-45 host ports (2 ports per controller) <p>Note: The DE2000H controller no longer offers base ports. Host connectivity is provided via the HICs</p>
Host operating systems	Microsoft Windows Server, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, VMware vSphere
Standard software features	Dynamic Disk Pools, SSD read cache, snapshots (up to 128 targets), volume copy, thin provisioning (DDP only), encryption (requires optional FIPS drives), and data assurance.
Optional software features	Snapshots (up to 512 targets), asynchronous mirroring.
Performance*	<ul style="list-style-type: none"> ● 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).

Attribute	Specification
Configuration maximums**	<ul style="list-style-type: none"> ● Maximum storage capacity: 1.47 PB ● Maximum number of logical volumes: 512 ● Maximum logical volume size: 4 PB ● Maximum thin-provisioned logical volume size (DDP only): 256 TB ● Maximum number of drives in a RAID volume group: <ul style="list-style-type: none"> ○ 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: 4 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.
Management ports	<ul style="list-style-type: none"> ● 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; 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.
Warranty and support	Three-year customer-replaceable unit and onsite limited warranty with 9x5 next business day (NBD) parts delivered. Also available are 9x5 NBD onsite response, 24x7 coverage with 2-hour or 4-hour onsite response, or 6-hour or 24-hour committed repair (select areas), YourDrive YourData, Premier Support, and 1-year or 2-year post-warranty extensions.
Software maintenance	Included in the base warranty and any Lenovo warranty extensions.
Dimensions	2U24 SFF enclosure: <ul style="list-style-type: none"> ● Height: 85 mm (3.4 in.) ● Width: 449 mm (17.7 in.) ● Depth: 553 mm (21.8 in.) 2U12 LFF enclosure: <ul style="list-style-type: none"> ● Height: 85 mm (3.4 in.) ● Width: 447 mm (17.6 in.) ● Depth: 483 mm (19.0 in.)
Weight	<ul style="list-style-type: none"> ● DE2000H 2U24 SFF controller enclosure (7Y71): 24.59 kg (54.2 lb) ● DE2000H 2U12 LFF controller enclosure (7Y70): 28.78 kg (63.4 lb) ● DE240S 2U24 SFF expansion enclosure (7Y68): 27.44 kg (60.5 lb) ● DE120S 2U12 LFF expansion enclosure (7Y63): 27.12 kg (59.8 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 Configure-to-Order (CTO) base models for the ThinkSystem DE2000H.

Table 2. ThinkSystem DE2000H CTO base models

Machine Type/Model	Base feature	Description
7Y70CTO2WW	BEY6	Lenovo ThinkSystem Storage 2U12 Chassis (with Gen2 controllers and 2x PSUs)
7Y71CTO2WW	BEY7	Lenovo ThinkSystem Storage 2U24 Chassis (with Gen2 controllers and 2x PSUs)

The following table lists the preconfigured models with Gen 2 controllers, available by market.

Table 3. Preconfigured models

Model	Market availability
DE2000H - 2U12 - 2x Gen2 Controllers	
7Y70A00YWW	All markets
7Y70A00YBR	Brazil
7Y70A00YJP	Japan
7Y70A00YLA	Latin America markets
7Y701008NA	North America markets
7Y70A00YCN	PRC
DE2000H - 2U24 - 2x Gen2 Controllers	
7Y71A00QWW	All markets
7Y70A00QBR	Brazil
7Y71A00QJP	Japan
7Y71A00QLA	Latin America markets
7Y71100CNA	North America markets
7Y71A00QCN	PRC

Configuration notes:

- Gen2 controllers do not include base ports. HICs must be ordered for host connectivity.
- For preconfigured models, two DE2000 Gen2 controllers (feature code BQ9Y) are included in the model configuration.
- For CTO models, two DE2000 Gen2 controllers (feature code BQ9Y) are selected by default in the configurator, and the selection 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
- Rack Mount Kit
- 2 m USB Cable (USB Type A to Micro-USB)
- Quick Installation Guide
- Electronic Publications Flyer
- Two power cables:
 - Models listed in Tables 2, 3, and 4: 1.5 m, 10A/100-250V, C13 to C14 rack power cables
 - CTO models: Customer-configured power cables

Note: Some models of the ThinkSystem DE2000H ship with SFP+ transceivers and cables. For models that ship without SFP+ transceivers, DAC cables, SAS cables, or RJ-45 UTP cables, the supported transceivers and cables 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 memory for a system total of 16 GB.

Each controller has one expansion slot for a host interface card (HIC).

Note: The DE2000H Gen2 controller does not include any base ports. You will need to select HICs for host connectivity.

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

- 4x 12 Gb SAS x4 host ports (Mini-SAS HD SFF-8644) (2 ports per HIC)
- 8x 12 Gb SAS host ports (Mini-SAS HD, SFF-8644) (4 ports per HIC)
- 8x 10/25 Gb iSCSI SFP28 host ports (DAC or SW fiber optics [LC]) (4 ports per HIC)
- 8x 8/16/32 Gb FC SFP+ host ports (SW fiber optics [LC]) (4 ports per HIC)
- 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:

- Both controllers must have the same type of the host interface card installed

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

Table 4. DE2000H controller and connectivity options

Part number	Feature code	Description	Maximum quantity per controller enclosure
Controllers			
CTO only*	BQ9Y	Lenovo ThinkSystem DE2000 Controller 8GB Gen2	2
Host interface cards (HICs)			
4C57A14376	B4B1	Lenovo ThinkSystem DE2000 HIC 10GBASE-T 2 Ports	2
4C57A14377	B4AN	Lenovo ThinkSystem DE2000 HIC 12Gb SAS 2-Ports	2

Part number	Feature code	Description	Maximum quantity per controller enclosure
4C57A14367	B4B8	Lenovo ThinkSystem DE2000/4000 HIC, 12Gb SAS,4-ports	2
4C57A14369	B4BA	Lenovo ThinkSystem DE2000/4000 HIC, 10/25GbE iSCSI,4-ports	2
4C57A14368	B4B9	Lenovo ThinkSystem DE2000/4000 HIC, 32Gb FC,4-ports	2
SFP+ options for 10 Gb iSCSI / 16 Gb FC host interface card / 32 Gb FC host interface card			
4M17A13527	B4B2	Lenovo 10Gb iSCSI/16Gb FC Universal SFP+ Module	8
SFP28 options for 10/25 Gb iSCSI host interface card			
4M17A13529	B4B4	Lenovo 10/25GbE iSCSI SFP28 Module	8
SFP+ options for 32 Gb FC host interface card			
4M17A13528	B4B3	Lenovo 32Gb FC SFP+ Transceiver	8
OM4 cable options for 16/32 Gb FC and 10/25 Gb iSCSI SW SFP+/SFP28 optical transceivers			
4Z57A10845	B2P9	Lenovo 0.5m LC-LC OM4 MMF Cable	4
4Z57A10846	B2PA	Lenovo 1m LC-LC OM4 MMF Cable	4
4Z57A10847	B2PB	Lenovo 3m LC-LC OM4 MMF Cable	4
4Z57A10848	B2PC	Lenovo 5m LC-LC OM4 MMF Cable	4
4Z57A10849	B2PD	Lenovo 10m LC-LC OM4 MMF Cable	4
4Z57A10850	B2PE	Lenovo 15m LC-LC OM4 MMF Cable	4
4Z57A10851	B2PF	Lenovo 25m LC-LC OM4 MMF Cable	4
4Z57A10852	B2PG	Lenovo 30m LC-LC OM4 MMF Cable	4
OM3 cable options for 16/32 Gb FC and 10/25 Gb iSCSI SW SFP+/SFP28 optical transceivers			
00MN499	ASR5	Lenovo 0.5m LC-LC OM3 MMF Cable	4
00MN502	ASR6	Lenovo 1m LC-LC OM3 MMF Cable	4
00MN505	ASR7	Lenovo 3m LC-LC OM3 MMF Cable	4
00MN508	ASR8	Lenovo 5m LC-LC OM3 MMF Cable	4
00MN511	ASR9	Lenovo 10m LC-LC OM3 MMF Cable	4
00MN514	ASRA	Lenovo 15m LC-LC OM3 MMF Cable	4
00MN517	ASRB	Lenovo 25m LC-LC OM3 MMF Cable	4
00MN520	ASRC	Lenovo 30m LC-LC OM3 MMF Cable	4
DAC cable options for 10 Gb iSCSI SFP+ host connectivity (iSCSI HICs)			
00D6288	A3RG	0.5m Passive DAC SFP+ Cable	4
90Y9427	A1PH	1m Passive DAC SFP+ Cable	4
00AY764	A51N	1.5m Passive DAC SFP+ Cable	4
00AY765	A51P	2m Passive DAC SFP+ Cable	4
90Y9430	A1PJ	3m Passive DAC SFP+ Cable	4
90Y9433	A1PK	5m Passive DAC SFP+ Cable	4
00D6151	A3RH	7m Passive DAC SFP+ Cable	4
DAC cable options for 25 Gb iSCSI SFP28 host connectivity (iSCSI HICs)			
7Z57A03557	AV1W	Lenovo 1m Passive 25G SFP28 DAC Cable	8
7Z57A03558	AV1X	Lenovo 3m Passive 25G SFP28 DAC Cable	8
SAS host connectivity cables: Mini-SAS HD (controller) to Mini-SAS HD (host)			

Part number	Feature code	Description	Maximum quantity per controller enclosure
00YL847	AU16	0.5m External MiniSAS HD 8644/MiniSAS HD 8644 Cable	4
00YL848	AU17	1m External MiniSAS HD 8644/MiniSAS HD 8644 Cable	4
00YL849	AU18	2m External MiniSAS HD 8644/MiniSAS HD 8644 Cable	4
00YL850	AU19	3m External MiniSAS HD 8644/MiniSAS HD 8644 Cable	4
UTP Category 6 cables for 1/10 Gb iSCSI RJ-45 connectivity and 1 GbE management ports			
00WE123	AVFW	0.75m Green Cat6 Cable	6
00WE127	AVFX	1.0m Green Cat6 Cable	6
00WE131	AVFY	1.25m Green Cat6 Cable	6
00WE135	AVFZ	1.5m Green Cat6 Cable	6
00WE139	AVG0	3m Green Cat6 Cable	6
90Y3718	A1MT	10m Green Cat6 Cable	6
90Y3727	A1MW	25m Green Cat6 Cable	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 5. ThinkSystem DE240S and DE120S relationship models

Description	Part number		
	Worldwide	European Union	Japan
Lenovo ThinkSystem DE240S 2U24 SFF Expansion Enclosure	7Y68A000WW	7Y68A004EA	7Y681001JP
Lenovo ThinkSystem DE120S 2U12 LFF Expansion Enclosure	7Y63A000WW	7Y63A003EA	7Y631000JP

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

Table 6. ThinkSystem DE240S and DE120S TopSeller models: Brazil and Latin America

Description	Part number	
	Latin America	Brazil
Lenovo ThinkSystem DE240S 2U24 SFF Expansion Enclosure (TopSeller)	7Y681002LA	7Y681002BR
Lenovo ThinkSystem DE120S 2U12 LFF Expansion Enclosure (TopSeller)	7Y631001LA	7Y631001BR

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	
		European Union	Other markets
Lenovo ThinkSystem Storage 2U24 Chassis (with 2x PSUs)	7Y68CTO1WW	BEY7	B38L
Lenovo ThinkSystem Storage 2U12 Chassis (with 2x PSUs)	7Y63CTO1WW	BEY6	B38M

Configuration notes:

- For Relationship and TopSeller 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 the selection 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 (Models listed in Tables 8 and 9)
- Rack Mount Kit
- *Quick Installation Guide*
- *Electronic Publications Flyer*
- Two power cables:
 - Models listed in Tables 8 and 9: 1.5 m, 10A/100-250V, C13 to C14 rack power cables
 - CTO models: Customer-configured power cables

Note: The Relationship and TopSeller models of the ThinkSystem DE240S and DE120S listed in this section ship with four 1 m SAS cables; additional SAS cables that are listed in this section can be purchased for the system, if needed.

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.

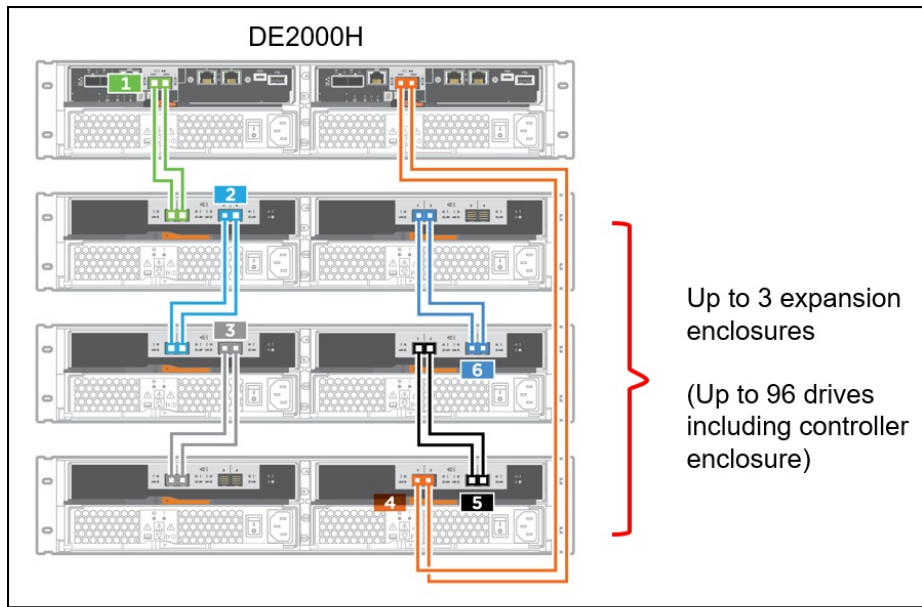


Figure 6. DE Series expansion enclosure connectivity topology

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 and TopSeller models of the ThinkSystem DE240S and DE120S listed in this section 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

Part number	Feature code	Description	Maximum quantity per 2U24 SFF enclosure
2.5-inch 12 Gbps SAS hot-swap HDDs			
4XB7A14112	B4BY	Lenovo ThinkSystem DE Series 1.2TB 10K 2.5" HDD 2U24	24
4XB7A14113	B4BZ	Lenovo ThinkSystem DE Series 1.8TB 10K 2.5" HDD 2U24	24
2.5-inch 12 Gbps SAS hot-swap FIPS HDDs (SED HDDs)			
4XB7A14114	B4C0	Lenovo ThinkSystem DE Series 1.8TB 10K 2.5" HDD FIPS 2U24	24
2.5-inch 12 Gbps SAS hot-swap SSDs (1 DWPD and 3 DWPD)			
4XB7A74948	BKUQ	Lenovo ThinkSystem DE Series 960GB 1DWD 2.5" SSD 2U24	24
4XB7A74951	BKUT	Lenovo ThinkSystem DE Series 1.92TB 1DWD 2.5" SSD 2U24	24
4XB7A74955	BKUK	Lenovo ThinkSystem DE Series 3.84TB 1DWD 2.5" SSD 2U24	24
4XB7A14176	B4RY	Lenovo ThinkSystem DE Series 7.68TB 1DWD 2.5" SSD 2U24	24
4XB7A14110	B4CD	Lenovo ThinkSystem DE Series 15.36TB 1DWD 2.5" SSD 2U24	24
2.5-inch 12 Gbps SAS hot-swap FIPS SSDs (SED SSDs)			
4XB7A14107	B4BV	Lenovo ThinkSystem DE Series 1.6TB 3DWD 2.5" SSD FIPS 2U24	24

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

Table 10. 2U12 LFF drive options

Part number	Feature code	Description	Maximum quantity per 2U12 LFF enclosure
3.5-inch 12 Gbps NL SAS hot-swap HDDs			
4XB7A14099	B4C3	Lenovo ThinkSystem DE Series 4TB 7.2K 3.5" HDD 2U12	12
4XB7A14101	B4C5	Lenovo ThinkSystem DE Series 8TB 7.2K 3.5" HDD 2U12	12
4XB7A14102	B4C6	Lenovo ThinkSystem DE Series 10TB 7.2K 3.5" HDD 2U12	12
4XB7A14104	B4C8	Lenovo ThinkSystem DE Series 12TB 7.2K 3.5" HDD 2U12	12
4XB7A74942	BHDP	Lenovo ThinkSystem DE Series 18TB 7.2K 3.5" HDD 2U12	12
3.5-inch 12 Gbps NL SAS hot-swap FIPS HDDs (SED HDDs)			
4XB7A14103	B4C7	Lenovo ThinkSystem DE Series 10TB 7.2K 3.5" HDD FIPS 2U12	12
3.5-inch 12 Gbps SAS hot-swap SSDs (1 DWPD and 3 DWPD) (2.5" drive in a 3.5" tray)			
4XB7A74946	BKUN	Lenovo ThinkSystem DE Series 960GB 1DWD 2.5" SSD 2U12	12
4XB7A74947	BKUP	Lenovo ThinkSystem DE Series 1.92TB 1DWD 2.5" SSD 2U12	12
4XB7A74954	BKUJ	Lenovo ThinkSystem DE Series 3.84TB 1DWD 2.5" SSD 2U12	12
3.5-inch 12 Gbps SAS hot-swap FIPS SSDs (SED SSDs) (2.5" drive in a 3.5" tray)			
4XB7A14098	B4C2	Lenovo ThinkSystem DE Series 1.6TB 3DWD 2.5" SSD FIPS 2U12	12

Configuration notes:

- Intermix of FIPS drives and non-FIPS drives is supported within a system.
- FIPS drives are not available in the following countries:
 - Belarus
 - Kazakhstan
 - People's Republic of China
 - Russia

Software

The following functions are included with every ThinkSystem DE2000H:

- **RAID levels 0, 1, 3, 5, 6, and 10** : Provide the flexibility to choose the level of performance and 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).

- **Encryption:** Provides encryption for data at rest for enhanced data security with the optional FIPS 140-2 Level 2 drives and embedded key management (AES-256) or an external key management server.
- **Automatic load balancing:** Provides automated I/O workload balancing of I/O traffic from the hosts across both controllers.
- **Data assurance:** Ensures industry-standard T10-PI 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 and support](#) for details).

Management

The DE2000H supports the following management interfaces:

- ThinkSystem 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, so there is no need for a separate console or plug-in. For more information, see the [System Manager Online Help](#).
- ThinkSystem SAN Manager, a host-installed GUI-based application, for centralized management of multiple storage systems. For more information, see the [SAN Manager Online Help](#).
- ThinkSystem DE Series Storage Plugin for vCenter. For more information, see the [DE Series vCenter Plugin Online Help](#).
- Command line interface (CLI) via SSH or through serial console. For more information, see the [CLI Online Help](#).
- Syslog, SNMP, and e-mail notifications.
- Optional Lenovo XClarity Administrator support for discovery, inventory, and monitoring.

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 and TopSeller models of the ThinkSystem DE2000H 2U24 SFF and 2U12 LFF, DE240S 2U24 SFF, and DE120S LFF enclosures listed in [Controller enclosures](#) and [Expansion enclosures](#) 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
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
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

Description	Part number	Feature code
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
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

Rack installation

The individually shipped ThinkSystem DE Series 2U12 enclosures ship with the ThinkSystem Storage Rack Mount Kit 2U12, and the individually shipped ThinkSystem DE Series 2U24 enclosures ship with the ThinkSystem Storage Rack Mount Kit 2U24/4U60. The rack mount kits are listed in the following table.

Table 13. 4-post rack mount kits

Description	Feature code	Quantity
Lenovo ThinkSystem Storage Rack Mount Kit 2U12	B38X	1
Lenovo ThinkSystem Storage Rack Mount Kit 2U24/4U60	B38Y	1

When the ThinkSystem DE Series enclosures are factory-integrated and shipped installed in a rack cabinet, the rack mount kits that support Ship-in-Rack (SIR) capabilities are derived by the configurator. The SIR-capable rack mount kits are listed in the following table.

Table 14. 4-post SIR rack mount kits

Description	Feature code	Quantity
Lenovo ThinkSystem Storage Rack Mount Kit 2U12	B38X	1
Lenovo ThinkSystem Storage SIR Rack Mount Kit (for 2U24 enclosures)	B6TH	1

The following table summarizes the rack mount kit features and specifications.

Table 15. Rack mount kit features and specifications summary

Attribute	Screw-in fixed rail with adjustable depth		
	2U12	2U24/4U60	2U24 SIR
Feature code	B38X	B38Y	B6TH
Enclosure support	DE2000H 2U LFF DE120S	DE2000H 2U SFF DE240S	DE2000H 2U SFF DE240S
Rail type	Fixed (static) with adjustable depth	Fixed (static) with adjustable depth	Fixed (static) with adjustable depth
Tool-less installation	No	No	No
In-rack maintenance	Yes*	Yes*	Yes*
Ship-in-rack (SIR) support	Yes	No	Yes
1U PDU support	Yes	Yes	Yes
0U PDU support	Limited**	Limited**	Limited**
Rack type	IBM or Lenovo 4-post, IEC standard-compliant	IBM or Lenovo 4-post, IEC standard-compliant	IBM or Lenovo 4-post, IEC standard-compliant
Mounting holes	Square or round	Square or round	Square or round
Mounting flange thickness	2 mm (0.08 in.) – 3.3 mm (0.13 in.)	2 mm (0.08 in.) – 3.3 mm (0.13 in.)	2 mm (0.08 in.) – 3.3 mm (0.13 in.)
Distance between front and rear mounting flanges [^]	605 mm (23.8 in.) – 812.8 mm (32 in.)	605 mm (23.8 in.) – 812.8 mm (32 in.)	605 mm (23.8 in.) – 812.8 mm (32 in.)

* The majority of the enclosure components can be serviced from the front or rear of the enclosure, which does not require the removal of the enclosure from the rack cabinet.

** If a 0U PDU is used, the rack cabinet must be at least 1000 mm (39.37 in.) deep for 2U12 and 2U24 enclosures.

[^] Measured when mounted on the rack, from the front surface of the front mounting flange to the rear most point of the rail.

Physical specifications

The ThinkSystem DE Series 2U24 SFF enclosures (7Y71) have the following dimensions:

- Height: 85 mm (3.4 in.)
- Width: 449 mm (17.7 in.)
- Depth: 553 mm (21.8 in.)

The ThinkSystem DE Series 2U12 LFF (7Y70) enclosures have the following dimensions:

- Height: 85 mm (3.4 in.)
- Width: 447 mm (17.6 in.)
- Depth: 483 mm (19.0 in.)

Weights (fully configured):

- DE2000H 2U24 SFF controller enclosure (7Y71): 24.59 kg (54.2 lb)
- DE2000H 2U12 LFF controller enclosure (7Y70): 28.78 kg (63.4 lb)
- DE240S 2U24 SFF expansion enclosure (7Y68): 27.44 kg (60.5 lb)
- DE120S 2U12 LFF expansion enclosure (7Y63): 27.12 kg (59.8 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:
 - 100 to 127 V AC (nominal); 50 Hz / 60 Hz
 - 200 to 240 V AC (nominal); 50 Hz / 60 Hz
- Acoustical noise emission:
 - DE2000H 2U24 SFF and DE120S 2U12 LFF: 6.8 bels
 - DE2000H 2U12 LFF and DE240S 2U24 SFF: 6.6 bels

The following table lists the maximum enclosure power load, inlet current, and heat output based on the source voltage.

Table 16. Enclosure power load, inlet current, and heat output

Enclosure	Source voltage (nominal)	Maximum power load	Current per inlet	Heat output
DE2000H 2U24 SFF	100 - 127 V AC	667 W	7.03 A	2276 BTU/hour
	200 - 240 V AC	578 W	3.05 A	1973 BTU/hour
DE2000H 2U12 LFF	100 - 127 V AC	570 W	6 A	1945 BTU/hour
	200 - 240 V AC	508 W	2.68 A	1734 BTU/hour
DE240S 2U24 SFF	100 - 127 V AC	389 W	4.1 A	1328 BTU/hour
	200 - 240 V AC	382 W	2.02 A	1304 BTU/hour
DE120S 2U12 LFF	100 - 127 V AC	306 W	3.3 A	1045 BTU/hour
	200 - 240 V AC	300 W	1.58 A	1024 BTU/hour

Warranty and support

The ThinkSystem DE Series enclosures have a three-year customer-replaceable unit (CRU) and onsite limited (for field-replaceable units [FRUs] only) warranty with standard call center support during normal business hours and 9x5 Next Business Day Parts Delivered.

Lenovo's additional support services provide a sophisticated, unified support structure for a customer's data center, with an experience consistently ranked number one in customer satisfaction worldwide.

The following Lenovo support services are available:

- **Premier Support** provides a Lenovo-owned customer experience and delivers direct access to technicians skilled in hardware, software, and advanced troubleshooting, in addition to the following capabilities:
 - Direct technician-to-technician access through a dedicated phone line.
 - 24x7x365 remote support.
 - Single point of contact service.
 - End to end case management.
 - 3rd Party collaborative software support.
 - Online case tools and live chat support.
 - On-demand remote system analysis.
- **Warranty Upgrades (Preconfigured Support)** are available to meet the on-site response time targets that match the criticality of customer's systems:
 - 3, 4, or 5 years of service coverage.
 - 1-year or 2-year post-warranty extensions.
 - **Foundation Service:** 9x5 service coverage with next business day onsite response, with optional YourDrive YourData.
 - **Essential Service:** 24x7 service coverage with 4-hour onsite response or 24-hour committed repair (available only in select regions), with optional YourDrive YourData.
 - **Advanced Service:** 24x7 service coverage with 2-hour onsite response or 6-hour committed repair (available only in select regions), with optional YourDrive YourData.
- **Managed Services**

Lenovo Managed Services provide continuous 24x7 remote monitoring (plus 24x7 call center availability) and proactive management of a customer's data center using state of the art tools, systems, and practices by a team of highly skilled and experienced Lenovo services professionals.

Quarterly reviews check error logs, verify firmware and operating system device driver levels, and software as needed. Lenovo will also maintain records of latest patches, critical updates, and firmware levels, to ensure customer's systems are providing business value through optimized performance.
- **Technical Account Management (TAM)**

A Lenovo Technical Account Manager helps customers optimize operations of their data centers based on a deep understanding of customer's business. Customers gain direct access to a Lenovo TAM, who serves as their single point of contact to expedite service requests, provide status updates, and furnish reports to track incidents over time. Also, a TAM helps proactively make service recommendations and manage service relationship with Lenovo to make certain that customer's needs are met.
- **YourDrive YourData**

Lenovo's YourDrive YourData service is a multi-drive retention offering that ensures that customer's data is always under their control, regardless of the number of drives that are installed in their Lenovo system. In the unlikely event of a drive failure, customers retain possession of their drive while Lenovo replaces the failed drive part. Customer's data stays safely on customer premises, in their hands. The YourDrive YourData service can be purchased in convenient bundles with Foundation, Essential, or Advanced Service upgrades and extensions.

- **Health Check**

Having a trusted partner who can perform regular and detailed health checks is central to maintaining efficiency and ensuring that customer systems and business are always running at their best. Health Check supports Lenovo-branded server, storage, and networking devices, as well as select Lenovo-supported products from other vendors that are sold by Lenovo or a Lenovo-Authorized Reseller.

Some regions might have different warranty terms and conditions than the standard warranty. This is due to local business practices or laws in the specific region. Local service teams can assist in explaining region-specific terms when needed. Examples of region-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 spare parts.

Lenovo support services are region-specific. Not all support services are available in every region. For information about Lenovo support services that are available in a specific region, refer to the following resources:

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

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

- Lenovo Statement of Limited Warranty for Infrastructure Solutions Group (ISG) 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>

Services

Lenovo Services is a dedicated partner to your success. Our goal is to reduce your capital outlays, mitigate your IT risks, and accelerate your time to productivity.

Note: Some service options may not be available in all markets or regions. For more information, go to <https://www.lenovo.com/services>. For information about Lenovo service upgrade offerings that are available in your region, contact your local Lenovo sales representative or business partner.

Here's a more in-depth look at what we can do for you:

- **Asset Recovery Services**

Asset Recovery Services (ARS) helps customers recover the maximum value from their end-of-life equipment in a cost-effective and secure way. On top of simplifying the transition from old to new equipment, ARS mitigates environmental and data security risks associated with data center equipment disposal. Lenovo ARS is a cash-back solution for equipment based on its remaining market value, yielding maximum value from aging assets and lowering total cost of ownership for your customers. For more information, see the ARS page, <https://lenovopress.com/lp1266-reduce-e-waste-and-grow-your-bottom-line-with-lenovo-ars>.

- **Assessment Services**

An Assessment helps solve your IT challenges through an onsite, multi-day session with a Lenovo technology expert. We perform a tools-based assessment which provides a comprehensive and thorough review of a company's environment and technology systems. In addition to the technology based functional requirements, the consultant also discusses and records the non-functional business requirements, challenges, and constraints. Assessments help organizations like yours, no matter how large or small, get a better return on your IT investment and overcome challenges in the ever-changing technology landscape.

- **Design Services**

Professional Services consultants perform infrastructure design and implementation planning to support your strategy. The high-level architectures provided by the assessment service are turned into low level designs and wiring diagrams, which are reviewed and approved prior to implementation. The implementation plan will demonstrate an outcome-based proposal to provide business capabilities through infrastructure with a risk-mitigated project plan.

- **Basic Hardware Installation**

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.

- **Deployment Services**

When investing in new IT infrastructures, you need to ensure your business will see quick time to value with little to no disruption. Lenovo deployments are designed by development and engineering teams who know our Products & Solutions better than anyone else, and our technicians own the process from delivery to completion. Lenovo will conduct remote preparation and planning, configure & integrate systems, validate systems, verify and update appliance firmware, train on administrative tasks, and provide post-deployment documentation. Customer's IT teams leverage our skills to enable IT staff to transform with higher level roles and tasks.

- **Integration, Migration, and Expansion Services**

Move existing physical & virtual workloads easily, or determine technical requirements to support increased workloads while maximizing performance. Includes tuning, validation, and documenting ongoing run processes. Leverage migration assessment planning documents to perform necessary migrations.

Regulatory compliance

The ThinkSystem DE Series enclosures conform to the following regulations:

- United States: FCC Part 15, Class A; UL 60950-1 and 62368-1
- Canada: ICES-003, Class A; CAN/CSA-C22.2 60950-1 and 62368-1
- Argentina: IEC60950-1
- Mexico NOM
- European Union: CE Mark (EN55032 Class A, EN55024, IEC/EN60950-1 and 62368-1); ROHS Directive 2011/65/EU
- Russia, Kazakhstan, Belarus: EAC
- China: CCC GB 4943.1, GB 17625.1, GB 9254 Class A; CELP; CECP
- India: BIS
- 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, 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 Storage Interoperation Center (LSIC): <https://datacentersupport.lenovo.com/us/en/lxic>

Use the LSIC to select the known components of your configuration and then get a list all other supported combinations, with details about supported hardware, firmware, operating systems, and drivers, plus any additional configuration notes. View results on screen or export them to Excel.

Fibre Channel SAN switches

Lenovo offers the ThinkSystem DB Series of Fibre Channel SAN switches for high-performance storage expansion. See the DB Series product guides for models and configuration options:

- ThinkSystem DB Series SAN Switches: <https://lenovopress.com/storage/switches/rack#rt=product-guide>

Rack cabinets

The following table lists the supported rack cabinets.

Table 17. Rack cabinets

Part number	Description
93072RX	25U Standard Rack (1000mm)
93072PX	25U Static S2 Standard Rack (1000mm)
7D6DA007WW	ThinkSystem 42U Onyx Primary Heavy Duty Rack Cabinet (1200mm)
7D6DA008WW	ThinkSystem 42U Pearl Primary Heavy Duty Rack Cabinet (1200mm)
93604PX	42U 1200mm Deep Dynamic Rack
93614PX	42U 1200mm Deep Static Rack
93634PX	42U 1100mm Dynamic Rack
93634EX	42U 1100mm Dynamic Expansion Rack
93074RX	42U Standard Rack (1000mm)
7D6EA009WW	ThinkSystem 48U Onyx Primary Heavy Duty Rack Cabinet (1200mm)
7D6EA00AWW	ThinkSystem 48U Pearl Primary Heavy Duty Rack Cabinet (1200mm)

For specifications about these racks, see the Lenovo Rack Cabinet Reference, available from:

<https://lenovopress.com/lp1287-lenovo-rack-cabinet-reference>

For more information, see the list of Product Guides in the Rack cabinets category:

<https://lenovopress.com/servers/options/racks>

Power distribution units

The following table lists the power distribution units (PDUs) that are offered by Lenovo.

Table 18. Power distribution units

Part number	Feature code	Description	ANZ	ASEAN	Brazil	EET	MEA	RUCIS	WE	HTK	INDIA	JAPAN	LA	NA	PRC
0U Basic PDUs															
00YJ776	ATZY	0U 36 C13/6 C19 24A 1 Phase PDU	N	Y	Y	N	N	N	N	N	N	Y	Y	Y	N
00YJ777	ATZZ	0U 36 C13/6 C19 32A 1 Phase PDU	Y	Y	N	Y	Y	Y	Y	Y	Y	N	N	Y	Y
00YJ778	AU00	0U 21 C13/12 C19 32A 3 Phase PDU	Y	Y	N	Y	Y	Y	Y	Y	Y	N	N	Y	Y
0U Switched and Monitored PDUs															
00YJ783	AU04	0U 12 C13/12 C19 Switched and Monitored 48A 3 Phase PDU	N	N	Y	N	N	N	Y	N	N	Y	Y	Y	N
00YJ781	AU03	0U 20 C13/4 C19 Switched and Monitored 24A 1 Phase PDU	N	N	Y	N	Y	N	Y	N	N	Y	Y	Y	N
00YJ782	AU02	0U 18 C13/6 C19 Switched and Monitored 32A 3 Phase PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y
00YJ780	AU01	0U 20 C13/4 C19 Switched and Monitored 32A 1 Phase PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y
1U Switched and Monitored PDUs															

Part number	Feature code	Description	ANZ	ASEAN	Brazil	EET	MEA	RUCIS	WE	HTK	INDIA	JAPAN	LA	NA	PRC
4PU7A81117	BNDV	1U 18 C19/C13 switched and monitored 48A 3P WYE PDU - ETL	N	N	N	N	N	N	N	N	N	N	N	Y	N
4PU7A77467	BLC4	1U 18 C19/C13 Switched and Monitored 80A 3P Delta PDU	N	N	N	N	N	N	N	N	N	Y	N	Y	N
4PU7A77469	BLC6	1U 12 C19/C13 switched and monitored 60A 3P Delta PDU	N	N	N	N	N	N	N	N	N	N	N	Y	N
4PU7A77468	BLC5	1U 12 C19/C13 switched and monitored 32A 3P WYE PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A81118	BNDW	1U 18 C19/C13 switched and monitored 48A 3P WYE PDU - CE	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y
1U Ultra Density Enterprise PDUs (9x IEC 320 C13 + 3x IEC 320 C19 outlets)															
71763NU	6051	Ultra Density Enterprise C19/C13 PDU 60A/208V/3PH	N	N	Y	N	N	N	N	N	N	Y	Y	Y	N
71762NX	6091	Ultra Density Enterprise C19/C13 PDU Module	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1U C13 Enterprise PDUs (12x IEC 320 C13 outlets)															
39M2816	6030	DPI C13 Enterprise PDU Plus Module (WW)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
39Y8941	6010	DPI C13 Enterprise PDU Module (WW)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1U C19 Enterprise PDUs (6x IEC 320 C19 outlets)															
39Y8948	6060	DPI C19 Enterprise PDU Module (WW)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1U Front-end PDUs (3x IEC 320 C19 outlets)															
39Y8938	6002	DPI Single-phase 30A/120V Front-end PDU (US)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
39Y8939	6003	DPI Single-phase 30A/208V Front-end PDU (US)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
39Y8934	6005	DPI Single-phase 32A/230V Front-end PDU (International)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
39Y8940	6004	DPI Single-phase 60A/208V Front-end PDU (US)	Y	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N
39Y8935	6006	DPI Single-phase 63A/230V Front-end PDU (International)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1U NEMA PDUs (6x NEMA 5-15R outlets)															
39Y8905	5900	DPI 100-127V NEMA PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Line cords for 1U PDUs that ship without a line cord															
40K9611	6504	4.3m, 32A/380-415V, EPDU/IEC 309 3P+N+G 3ph wye (non-US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9612	6502	4.3m, 32A/230V, EPDU to IEC 309 P+N+G (non-US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9613	6503	4.3m, 63A/230V, EPDU to IEC 309 P+N+G (non-US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9614	6500	4.3m, 30A/208V, EPDU to NEMA L6-30P (US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9615	6501	4.3m, 60A/208V, EPDU to IEC 309 2P+G (US) Line Cord	N	N	Y	N	N	N	Y	N	N	Y	Y	Y	N

Part number	Feature code	Description	ANZ	ASEAN	Brazil	EET	MEA	RUCIS	WE	HTK	INDIA	JAPAN	LA	NA	PRC
40K9617	6505	4.3m, 32A/230V, Souriau UTG Female to AS/NZ 3112 (Aus/NZ) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9618	6506	4.3m, 32A/250V, Souriau UTG Female to KSC 8305 (S. Korea) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

For more information, see the Lenovo Press documents in the PDU category:
<https://lenovopress.com/servers/options/pdu>

Uninterruptible power supply units

The following table lists the uninterruptible power supply (UPS) units that are offered by Lenovo.

Table 19. Uninterruptible power supply units

Part number	Description
55941AX	RT1.5kVA 2U Rack or Tower UPS (100-125VAC)
55941KX	RT1.5kVA 2U Rack or Tower UPS (200-240VAC)
55942AX	RT2.2kVA 2U Rack or Tower UPS (100-125VAC)
55942KX	RT2.2kVA 2U Rack or Tower UPS (200-240VAC)
55943AX	RT3kVA 2U Rack or Tower UPS (100-125VAC)
55943KX	RT3kVA 2U Rack or Tower UPS (200-240VAC)
55945KX	RT5kVA 3U Rack or Tower UPS (200-240VAC)
55946KX	RT6kVA 3U Rack or Tower UPS (200-240VAC)
55948KX	RT8kVA 6U Rack or Tower UPS (200-240VAC)
55949KX	RT11kVA 6U Rack or Tower UPS (200-240VAC)
55948PX	RT8kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC)
55949PX	RT11kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC)
55943KT†	ThinkSystem RT3kVA 2U Standard UPS (200-230VAC) (2x C13 10A, 2x GB 10A, 1x C19 16A outlets)
55943LT†	ThinkSystem RT3kVA 2U Long Backup UPS (200-230VAC) (2x C13 10A, 2x GB 10A, 1x C19 16A outlets)
55946KT†	ThinkSystem RT6kVA 5U UPS (200-230VAC) (2x C13 10A outlets, 1x Terminal Block output)
5594XKT†	ThinkSystem RT10kVA 5U UPS (200-230VAC) (2x C13 10A outlets, 1x Terminal Block output)

† Only available in China and the Asia Pacific market.

For more information, see the list of Product Guides in the UPS category:
<https://lenovopress.com/servers/options/ups>

Lenovo Financial Services

Lenovo Financial Services reinforces Lenovo's commitment to deliver pioneering products and services that are recognized for their quality, excellence, and trustworthiness. Lenovo Financial Services offers financing solutions and services that complement your technology solution anywhere in the world.

We are dedicated to delivering a positive finance experience for customers like you who want to maximize your purchase power by obtaining the technology you need today, protect against technology obsolescence, and preserve your capital for other uses.

We work with businesses, non-profit organizations, governments and educational institutions to finance their entire technology solution. We focus on making it easy to do business with us. Our highly experienced team of finance professionals operates in a work culture that emphasizes the importance of providing outstanding customer service. Our systems, processes and flexible policies support our goal of providing customers with a positive experience.

We finance your entire solution. Unlike others, we allow you to bundle everything you need from hardware and software to service contracts, installation costs, training fees, and sales tax. If you decide weeks or months later to add to your solution, we can consolidate everything into a single invoice.

Our Premier Client services provide large accounts with special handling services to ensure these complex transactions are serviced properly. As a premier client, you have a dedicated finance specialist who manages your account through its life, from first invoice through asset return or purchase. This specialist develops an in-depth understanding of your invoice and payment requirements. For you, this dedication provides a high-quality, easy, and positive financing experience.

For your region-specific offers, please ask your Lenovo sales representative or your technology provider about the use of Lenovo Financial Services. For more information, see the following Lenovo website:

<https://www.lenovo.com/us/en/landingpage/lenovo-financial-services/>

Related publications and links

For more information, see the following resources:

- Lenovo SAN Storage product page
<https://www.lenovo.com/us/en/c/data-center/storage/storage-area-network>
- ThinkSystem DE Hybrid Storage interactive 3D Tour
<https://lenovopress.com/lp0957-thinksystem-de-hybrid-interactive-3d-tour>
- ThinkSystem DE Hybrid Storage datasheet
<https://lenovopress.com/ds0049-lenovo-thinksystem-de-series-hybrid-array>
- 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:

- [DE Series Storage](#)
- [External Storage](#)
- [Lenovo Storage](#)

Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area. Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service. Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

Lenovo (United States), Inc.
8001 Development Drive
Morrisville, NC 27560
U.S.A.
Attention: Lenovo Director of Licensing

LENOVO PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary. Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk. Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

© Copyright Lenovo 2023. All rights reserved.

This document, LP0881, was created or updated on June 26, 2023.

Send us your comments in one of the following ways:

- Use the online Contact us review form found at:
<https://lenovopress.lenovo.com/LP0881>
- Send your comments in an e-mail to:
comments@lenovopress.com

This document is available online at <https://lenovopress.lenovo.com/LP0881>.

Trademarks

Lenovo and the Lenovo logo are trademarks or registered trademarks of Lenovo in the United States, other countries, or both. A current list of Lenovo trademarks is available on the Web at <https://www.lenovo.com/us/en/legal/copytrade/>.

The following terms are trademarks of Lenovo in the United States, other countries, or both:

Lenovo®
Flex System
Lenovo Services
System x®
ThinkSystem®
TopSeller
XClarity®

The following terms are trademarks of other companies:

Linux® is the trademark of Linus Torvalds in the U.S. and other countries.

Excel®, Microsoft®, Windows Server®, and Windows® are trademarks of Microsoft Corporation in the United States, other countries, or both.

Other company, product, or service names may be trademarks or service marks of others.