

Lenovo ThinkSystem DE6400F and DE6400H Storage Arrays

Product Guide

Lenovo ThinkSystem DE6400F and DE6400H are industry-leading end to end NVMe Storage solutions designed to provide high performance, simplicity, capacity, security, and high availability for midrange to highend block NVMe large segment.

The DE6400F and DE6400H deliver enterprise-class storage management capabilities in performance-optimized systems with a wide choice of host connectivity options, flexible drive configurations, and enhanced data management features. The DE6400F and DE6400H are a perfect fit for a wide range of enterprise workloads, including big data and analytics, video surveillance, technical computing, backup and recovery, and other storage I/O-intensive applications.

DE6400F and DE6400H models are available in a 2U rack form-factor with 24 small form-factor (2.5-inch SFF) NVMe drives and include two controllers, each with 16 GB system memory for a system total of 32 GB. Host interface cards provide 10/25Gb iSCSI, 16/32Gb FC/NVMe-FC, 100Gb IB/NVMe-RoCE host connections and 12Gb SAS expansions.

The Lenovo DE6400F 2U24 SFF enclosure is shown in the following figure. DE6400H looks just like it.

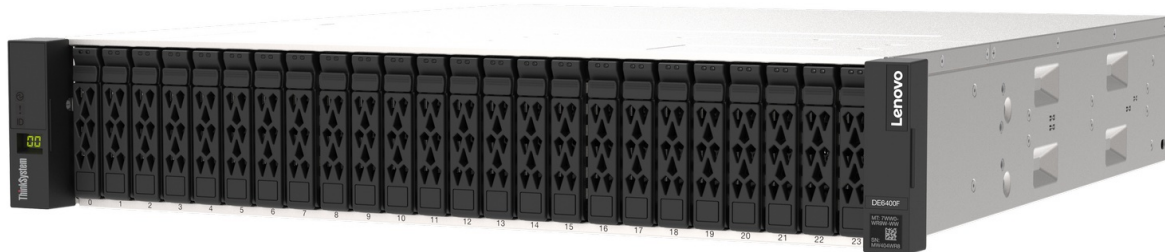


Figure 1. Lenovo DE6400F enclosure controller

Did you know?

The DE6400F and DE6400H are the new NVMe offerings under the Lenovo enterprise flash storage systems.

A single DE6400F or DE6400H scales up to 367TB (NVMe) of raw storage capacity, expandable to 1.798 PiB all-SSD for an all-flash system and expandable to 4.577 PiB for a hybrid system.

The DE6400F and DE6400H are entry all-flash and hybrid systems ideal for midsized businesses and remote offices that stream media and run-data analytics.

The DE6400F and DE6400H support multiple storage connectivity protocols with a choice of iSCSI, Fibre Channel, NVMe over Fibre Channel, or NVMe over RoCE.

Key features

The ThinkSystem DE6400F and DE6400H offer the following key features and benefits:

- Scalable, high performance mid-range all-flash and hybrid storage with dual active/active controller configurations with 16 GB system memory per controller for high availability and performance.
- Faster application response times with support for NVMe over Fabrics.
- 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 storage protocols to match diverse client needs with support for 10/25Gb iSCSI, 16/32Gb FC/NVMe-FC, 100Gb IB/NVMe-RoCE host connectivity.
- The dual controller enclosure scales up to 368TB (NVMe).
- SAS expansion connectivity to expand scalability and capacity.
- 12 Gb SAS drive-side connectivity with support for up to 24x 2.5-inch small form factor (SFF) drives in the 2U24 SFF expansion enclosure, up to 12x 3.5-inch large form factor (LFF) drives in the 2U12 LFF expansion enclosure, or up to 60x 3.5-inch LFF drives in the 4U60 LFF expansion enclosure.
- For "All-Flash" a maximum scalability to up to 120 SFF drives by attaching up to four ThinkSystem DE240S 2U24 SFF expansion enclosures.
- For "Hybrid" a maximum scalability to up to 264 drives by attaching up to four ThinkSystem DE600S 4U60 LFF expansion enclosures to satisfy growing needs.
- Rich set of standard storage management functions available at no extra cost, including Dynamic Disk Pools, snapshots, volume copy and encryption.
- Optional licensed functions, including higher number of drives and snapshots for greater scalability for continuous data availability.
- Intuitive, web-based GUI for easy system setup and management.
- Designed for 99.9999% availability with redundant hot-swap components, including controllers and I/O modules, power supplies, cooling modules (4U60 LFF enclosures only), proactive maintenance, and non-disruptive firmware upgrades.

The ThinkSystem DE6400F and DE6400H support the complete range of data storage requirements, from highly used applications to high-capacity, low usage applications.

The DE6400F and DE6400H 2U24 SFF expansion enclosure and expansion enclosures offer a variety of drives. Refer to the drives section for a list of supported drives. All drives are dual-port and hot-swappable. For the DE6400F system HDD Intermix (within enclosure) is not supported. For the DE6400H system HDD Intermix (within enclosure) is supported which provides the flexibility to address performance and capacity needs within a single enclosure.

Customers can intermix 2U24 SFF, 2U12 LFF, and 4U60 LFF expansion enclosures behind a 2U24 SFF 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 DE6400F and DE6400H offer 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, cooling modules (4U60 LFF only), 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

Note: HDD SAS 10k rpm are not supported for the ThinkSystem DE6400F and DE6400H.

Comparing the DE6400F and DE6400H to the previous generation

This section compares the Lenovo ThinkSystem DE6400F and DE6400H to the DE6600, as well as the previous generation DE6000.

Table 1. Comparing the DE6400F to the DE6600F and the previous generation DE6000F

Feature	DE6000F	DE6400F	DE6600F	Benefits
Segment	Entry midrange AFA	Midrange NVMe	High-end NVMe	<ul style="list-style-type: none"> • The new DE All-Flash solutions are Lenovo's first NVMe offering for the DE Series. They provide faster connection, throughput, and extreme performance for business-critical and high-performance workloads like database, analytics, and technical computing.
Controller	SAS base	NVMe base	NVMe base	<ul style="list-style-type: none"> • Seamless transition to next generation NVMe.
Expansions	DE240S SAS	DE240S SAS	DE240S SAS	<ul style="list-style-type: none"> • Mid-range NVMe All Flash Array.
IOPS	Up to 1M IOPS	Up to 670K IOPS	Up to 2M IOPS	<ul style="list-style-type: none"> • To support business-critical workloads and applications such as Database and Analytics • Extreme Performance with affordable pricing. • 2X better Performance & Latency.

Feature	DE6000F	DE6400F	DE6600F	Benefits
Networking	Flexible IO (100 Gb NVMe/IB)	Flexible IO (100 Gb NVMe/IB)	Flexible IO (100 Gb NVMe/IB)	<ul style="list-style-type: none"> Investment protection (NVMe/IB, NVMe/RoCE, and NVMe/FC) to meet future demands without forklift upgrades. iSCSI options for compatibility with existing SAN infrastructure.
Scale out	Up to 120 drives (4xDE240S SAS SSD+ 1 enclosure controller SAS SSD)	Up to 120 drives (4xDE240S SAS SSD+ 1 enclosure controller SAS SSD)	Up to 120 drives (4xDE240S SAS SSD+ 1 enclosure controller SAS SSD)	<ul style="list-style-type: none"> Entry and Mid range SAN Block All Flash storage portfolio.

Table 2. Comparing the DE6400H to the DE6600H and the previous generation DE6000H

Feature	DE6000H	DE6400H	DE6600H	Benefits
Segment	Entry midrange AFA	Midrange NVMe	High-end NVMe	<ul style="list-style-type: none"> The new Lenovo's first NVMe offering for the DE Series. They provide faster connection, throughput, and extreme performance for business-critical and high-performance workloads like database, analytics, and technical computing.
Controller	SAS base	NVMe base	NVMe base	<ul style="list-style-type: none"> Seamless transition to next generation NVMe.
Expansions	DE240S SAS DE120S SAS DE600S SAS	DE240S SAS DE120S SAS DE600S SAS	DE240S SAS DE120S SAS DE600S SAS	<ul style="list-style-type: none"> Mid-range NVMe hybrid Array. Increase density.
IOPS	Up to 1M IOPS	Up to 670K IOPS	Up to 2M IOPS	<ul style="list-style-type: none"> To support business-critical workloads and applications such as Database and Analytics Extreme Performance with affordable pricing. 2X better Performance & Latency.

Feature	DE6000H	DE6400H	DE6600H	Benefits
Networking	Flexible IO (100 Gb NVMe/IB)	Flexible IO (100 Gb NVMe/IB)	Flexible IO (100 Gb NVMe/IB)	<ul style="list-style-type: none"> Investment protection (NVMe/IB, NVMe/RoCE, and NVMe/FC) to meet future demands without forklift upgrades. iSCSI options for compatibility with existing SAN infrastructure.
Scale out	Up to 480 drives (3xDE240S SAS SSD+ 1 enclosure controller SAS 4U60)	Up to 264 drives (4xDE600S SAS + 1 enclosure controller NVMe)	Up to 444 drives (7xDE600S SAS + 1 enclosure controller NVMe)	<ul style="list-style-type: none"> Entry and Mid range SAN Block hybrid storage portfolio.

Components and connectors

The following figure shows the front of the DE6400F enclosure controller and DE6400H looks just like it with DE6400H label.

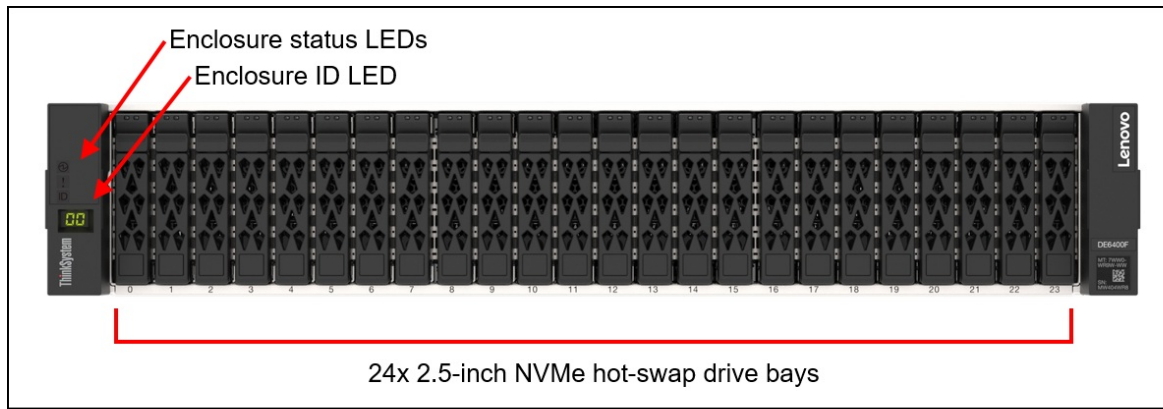


Figure 2. DE6400F enclosure controller front view.

The following figure shows the rear of the ThinkSystem DE6400F and DE6400H 2U SFF controller enclosure.

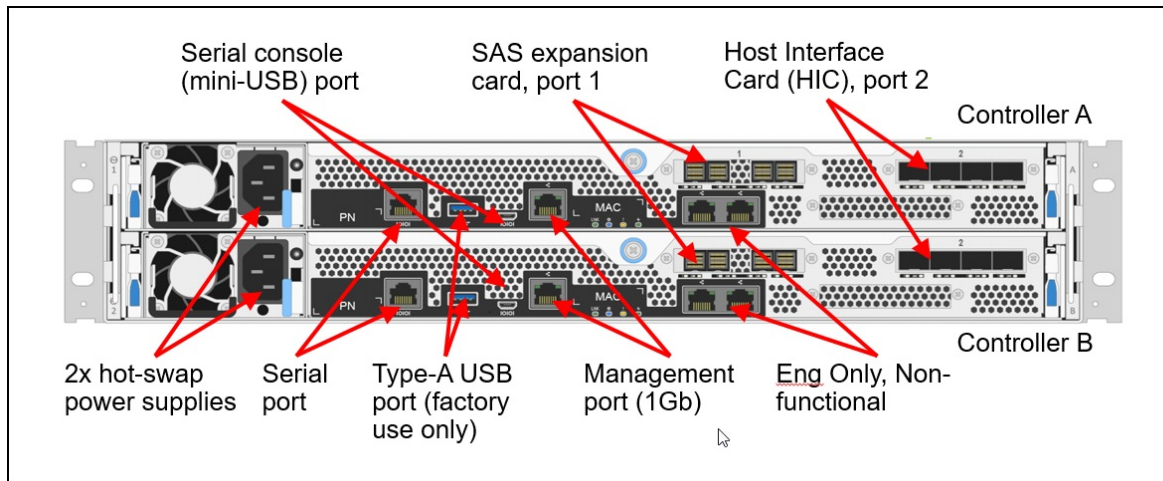


Figure 3. ThinkSystem DE6400F and DE6400H 2U SFF controller enclosure rear view

The rear of the ThinkSystem DE6400F and DE6400H 2U SFF controller enclosure includes the following components:

- Two controllers. Each controller with the following ports:
 - One Serial (RS-232) port.
 - **Note:** The DE6400F and DE6400H controllers no longer offers base ports
 - One service (USB) (Not functional) port.
 - One serial console (mini-USB) port.
 - One management (1GbE) port.
 - Eng only (Not functional) ports.
 - Bay 1/port 1 reserved for SAS expansion card only (optional)
 - Bay 2/port 2 will always have HIC in it (for host connections (FC, iSCSI, IB))
- Two redundant hot-swap 1181W AC (220V) power supplies (IEC 320-C14 power connector).
- PSU and system fans are installed in the controller enclosure (not chassis).

The following figure shows the front of the DE240S 2U SFF expansion enclosure.

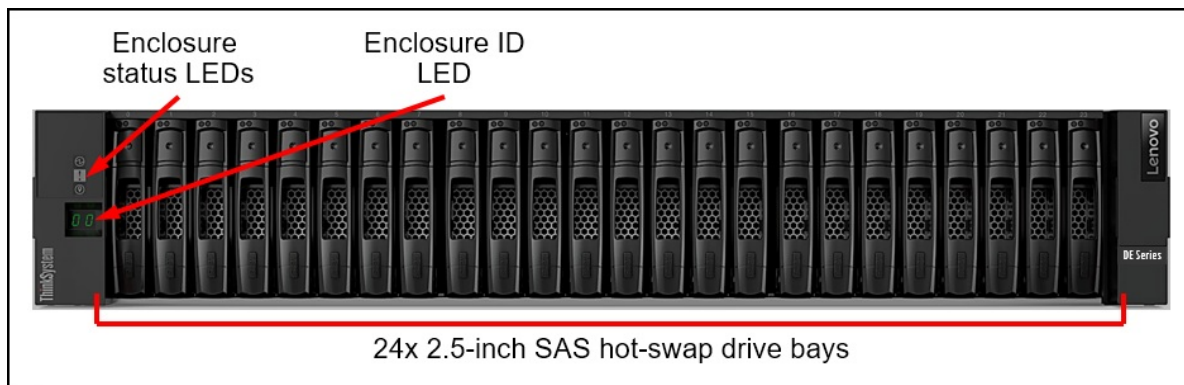


Figure 4. DE240S 2U SFF expansion enclosure front view.

The front of the DE240S 2U SFF expansion enclosure 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 DE120S 2U LFF expansion enclosure.

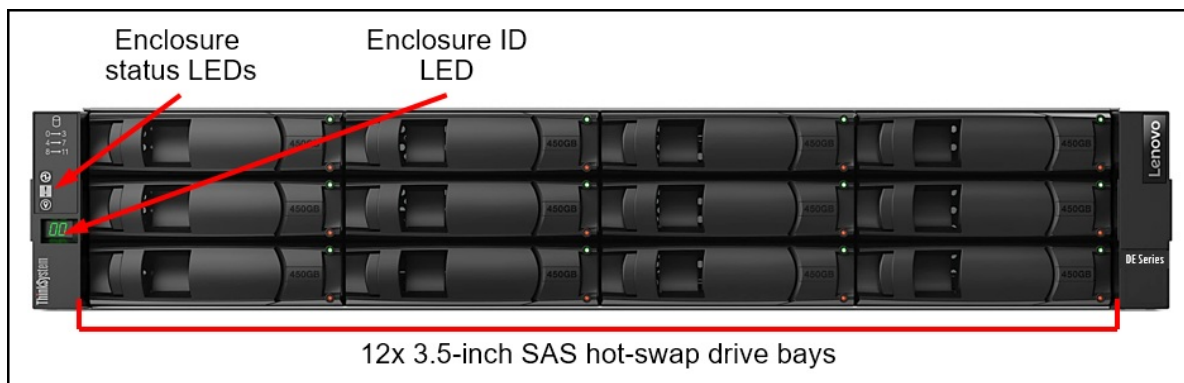


Figure 5. ThinkSystem DE120S 2U LFF expansion enclosure front view.

The front of the ThinkSystem DE120S 2U LFF expansion enclosure 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 DE240S and DE120S 2U expansion enclosures.

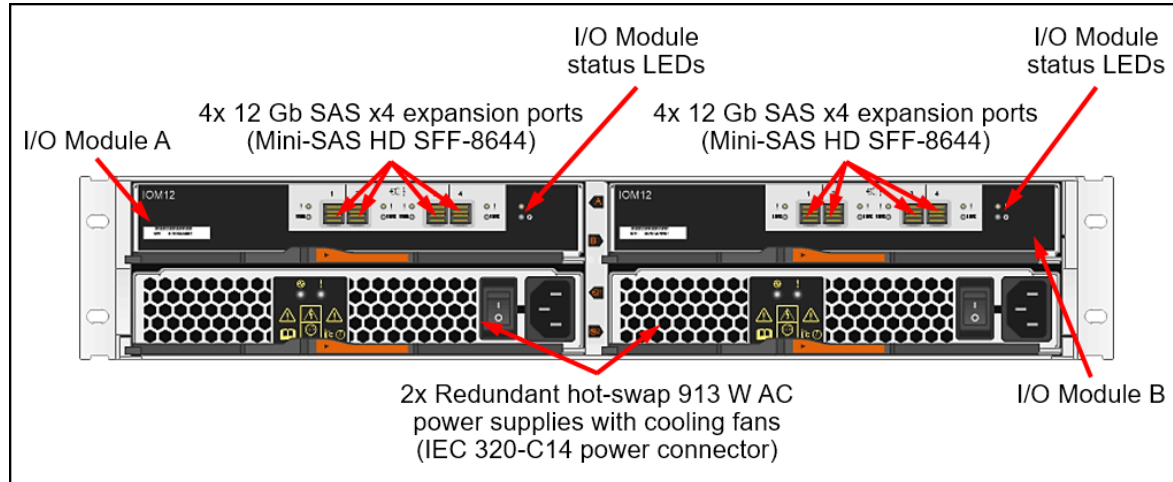


Figure 6. ThinkSystem DE240S and DE120S 2U expansion enclosures rear view

The rear of the ThinkSystem DE240S and DE120S 2U expansion enclosures 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 AC (100 - 240 V) power supplies (IEC 320-C14 power connector) with integrated cooling fans.

The following figure shows the rear of the ThinkSystem DE600S 4U LFF expansion enclosure.

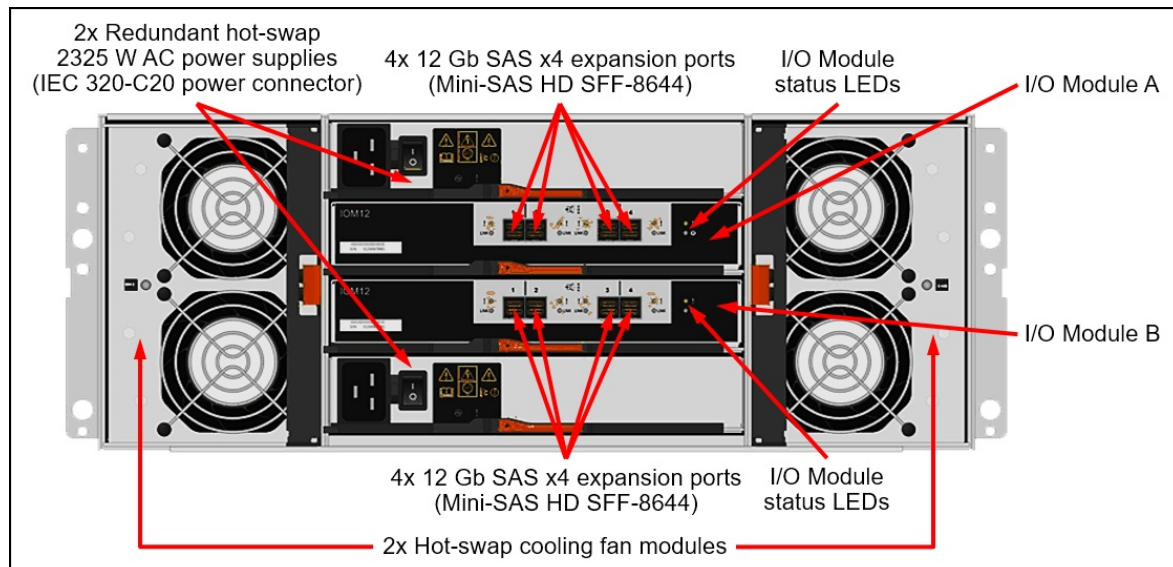


Figure 7. ThinkSystem DE600S 4U LFF expansion enclosure rear view

The rear of the ThinkSystem DE600S 4U LFF 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 2325 W AC (200 - 240 V) power supplies (IEC 320-C20 power connector)
- Two hot-swap cooling fan modules; each module has two fans.
Note: The failed cooling module should be replaced as soon as possible.

System specifications

The following table lists the ThinkSystem DE6400F and DE6400H storage system specifications.

Note: The supported hardware options, software features, and interoperability listed in this product guide are based on the Lenovo SAN OS 11.70.4. 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 DE6400F and DE6400H that can be found at: <http://datacentersupport.lenovo.com>

Table 3. System specifications

Attribute	DE6400F (All-flash)	DE6400H (Hybrid)
Machine type	Controller enclosure: 7DB6 Expansion enclosures: <ul style="list-style-type: none"> • DE240S: 7Y68 	Controller enclosure: 7DB6 Expansion enclosures: <ul style="list-style-type: none"> • DE240S: 7Y68 • DE120S: 7Y63 • DE600S: 7Y69
Form factor	Controller enclosure: 2U rack mount Expansion enclosure: <ul style="list-style-type: none"> • DE240S: 2U rack mount 	Controller enclosure: 2U rack mount Expansion enclosure: <ul style="list-style-type: none"> • DE240S: 2U rack mount • DE120S: 2U rack mount • DE600S: 4U 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 Storage Manager Command Line (SMcli).	
Controller system memory	32 GB per system (16 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"> • 4x DE240S (SAS SSD only) 	<ul style="list-style-type: none"> • 4x DE120S • 4x DE240S • 4x DE600S • Expansion enclosures intermix up to a maximum of 4 expansion enclosures
Drive bays	<ul style="list-style-type: none"> • Up to 120 drives (24x NVMe drives in DE6400F controller enclosure + 96 SFF SSD hot-swap drive bays (4x DE240S SFF expansion enclosures). • DE240S SAS SSD only supported. 	<ul style="list-style-type: none"> • Up to 264 drives (24 x NVMe drives in DE6400H controller enclosure + 240 LFF hot-swap drive bays (4x 4U60 LFF expansion enclosures).

Attribute	DE6400F (All-flash)	DE6400H (Hybrid)
Drive technology	Controller enclosure <ul style="list-style-type: none"> NVMe only Expansion enclosures: <ul style="list-style-type: none"> NL SAS HDDs (DE6400H only), 12 Gb SAS SSDs and FIPS SSDs drives are supported. A maximum of 120 SAS SSDs is supported. Intermix of drives is supported within a system. 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. No intermix with NVMe and SAS SSD in volume group or disk pool. There is no support for expansion to a second enclosure containing NVMe drives. 	
Drive expansion connectivity	<ul style="list-style-type: none"> 8x 12 Gb SAS host ports (Mini-SAS HD, SFF-8644) (4 ports per controller) for expansion scale-out, daisy chaining of the expansion enclosures. 2 x SAS expansion cards are required and must be installed in port1 only of the DE6400 enclosure controller. One in controller A, one in controller B. 	
Drives	Controller enclosure: 2U24 SFF drives: <ul style="list-style-type: none"> NVMe DE240S Expansion enclosure: 2U24 SFF drives*: <ul style="list-style-type: none"> SAS SSDs (1 DWD) SAS SSDs (3 DWD) SAS FIPS SSDs (3 DWD) 	Controller enclosure: 2U24 SFF drives: <ul style="list-style-type: none"> NVMe DE240S Expansion enclosure: 2U24 SFF drives*: <ul style="list-style-type: none"> SAS SSDs (1 DWD) SAS SSDs (3 DWD) SAS FIPS SSDs (3 DWD) DE120S Expansion enclosure: 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) DE600S Expansion enclosure: 4U60 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	<ul style="list-style-type: none"> Controller enclosure (367.2TB) + 4 x DE240S (1474.5TB) = 1841.5 TB Scale out requires installation of a SAS expander card into slot 1 only 	<ul style="list-style-type: none"> Controller enclosure (367.2TB) + 4 x DE600S (4320TB) = 4687 TB Scale out requires installation of a SAS expander card into slot 1 only
Storage protocols	SAN (Block access): FC, iSCSI, iSER/IB, NVMe/FC, NVMe/IB, NVMe/RoCE, and SRP/IB.	
Host connectivity	Host connectivity ports provided using host interface cards (HICs). A controller enclosure has two controllers. Supported HICs are: <ul style="list-style-type: none"> 8x 10/25 Gb iSCSI SFP28 host ports (DAC or SW fiber optics, LC) (4 ports per controller) (1 port per controller, supported in bay 2/ port 2 only) 8x 16/32 Gb FC SFP+ host ports (SW fiber optics, LC) (4 ports per controller) (1 port per controller, supported in bay 2/ port 2 only) 2x 40/100 Gb NVMe/RoCE QSFP28 host ports (DAC cable or SW fiber optics, MPO) (1 port per controller, supported in bay 2/ port 2 only) <p>Note: The controllers no longer offers base ports. Host connectivity is provided with a pair of HICs.</p>	

Attribute	DE6400F (All-flash)	DE6400H (Hybrid)
Host operating systems	Microsoft Windows Server, Red Hat Enterprise Linux (RHEL), SUSE Linux Enterprise Server (SLES), VMware vSphere. Reference LSIC for details.	
Performance (NVMe drives only)**	<ul style="list-style-type: none"> Up to 670 000 random read IOPS (4 KB blocks). Up to 100 000 random write IOPS (4 KB blocks). Up to 20 GBps sequential read throughput. Up to 7 GBps sequential write throughput. 	
Configuration maximums	<ul style="list-style-type: none"> Maximum hosts/partitions: 512 Maximum volumes per partition: 256 Maximum volumes per system: 1024 RAID capacity (dependent on drive capacity): <ul style="list-style-type: none"> 30 drives (RAID 5 and RAID 6) All drives RAID 10 Maximum number of drives in a RAID volume group: <ul style="list-style-type: none"> 24 NVMe, 240 SAS (RAID 0 and RAID 1) 24 NVMe, 30 SAS (all other RAID levels) RAID volumes per volume group: 256 Disk pools per system: 20 Volumes per disk pool: 1024 	
Cooling	Controller enclosure: Five cooling fans per enclosure controller. DE600S expansion: Redundant cooling with two cooling modules DE120S, DE240S: Fans that are built into power supplies	
Power supply	Two redundant hot-swap 1181 W (220 V) 2U24 controller enclosure. Each expansion enclosure also supports 2 power supply.	
Hot-swap parts	Controllers, I/O modules, drives, power supplies and SFP+/SFP28/QSFP28 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. 	
Management interfaces	System Manager web-based GUI; SAN Manager standalone GUI; SSH CLI for service only; SMcli; SMI-S Provider; SNMP, email, and syslog alerts; XClarity integration supporting storage alerts.	
Security features	Secure Socket Layer (SSL), Secure Shell (SSH) for service only, 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.	
Dimension (controller enclosure)	2U24 SFF enclosure: Height: 87 mm, Width: 447 mm, Depth: 543 mm (3.4 x 17.6 x 21.3 inches)	
Dimension (expansion enclosure)	<ul style="list-style-type: none"> 2U24 SFF enclosure: Height: 85 mm, Width: 449 mm, Depth: 552 mm (3.3 x 17.7 x 21.8 inches) 2U12 LFF enclosure: Height: 85 mm, Width: 447 mm, Depth: 483 mm (3.3 x 17.6 x 19.0 inches) 4U60 LFF enclosure: Height: 176 mm, Width: 449 mm, Depth: 922 mm (6.9 x 17.7 x 36.4 inches) 	
Weight	<ul style="list-style-type: none"> DE6400F and DE6400H 2U24 SFF controller enclosure (7DB6): 25.07 kg (55.3 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) DE600S 4U60 LFF expansion enclosure (7Y69): 112.2 kg (247.4 lb) 	

- * There is no support for 10k SAS drives.
- ** Estimated performance based on internal measurements

Controller enclosures

The following table lists the CTO base models for the ThinkSystem DE6400F and DE6400H.

Table 4. ThinkSystem DE6400F and DE6400H CTO base models

Machine Type/Model	Base feature	Description
7DB6CTO1WW	7DB6	Lenovo ThinkSystem DE6400 All Flash NVMe 2U24
7DB6CTO2WW	7DB6	Lenovo ThinkSystem DE6400 Hybrid NVMe 2U24

Configuration notes:

- Note: No mixing of host protocols

The models of the ThinkSystem DE6400F and DE6400H 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)
- Two power cables:
 - Relationship models listed in this section:
 - 2U24 SFF: 1.5 m, 10A/100-250V, C13 to IEC 320-C14 rack power cables
 - CTO models: Customer-configured power cables

Controllers

The ThinkSystem DE6400F and DE6400H enclosures ship with two controllers, and each controller provides 16 GB system memory for a system total of 32 GB respectively. A *controller* provides interfaces for host connectivity, management, and internal drives, and it runs storage management software.

- Each controller has two bays or ports for host interface card (HIC).
- Each controller supports 1 x (optional) SAS expansion card in bay1/port1 (mini-SAS HD SFF-8644 connectors) for the attachment of the ThinkSystem DE Series expansion units. 4 ports per controller.

The following host interfaces can be added to the ThinkSystem DE6400F and DE6400H controller enclosures with HICs:

- 8x 10/25 GbE SFP28 ports (4 ports per HIC) for 10/25 Gb iSCSI connectivity (require optical transceivers or DAC cables that should be purchased for the HICs).
- 8x 16/32 Gb FC SFP+ ports (4 ports per HIC) for FC or NVMe/FC connectivity (require optical transceivers that should be purchased for the HICs).
- 4x 100Gb NVMe-IB/RoCE, SRP, QSFP28 ports (2 ports per HIC) for NVMe/RoCE connectivity (require optical transceivers or DAC cables that should be purchased for the HIC).

Configuration notes:

- Both controllers must have the same system memory: 16 GB.
- Two host interface cards are required for selection in bay2/port2 (one per controller).
- No mixing of host protocols
- Both controllers must have the same type of the host interface card installed (16/32 Gb FC SFP+, 10/25

Gb iSCSI SFP28, or 100 GbE NVMe/RoCE QSFP28), and both cards must have SFP+/SFP28/QSFP28 media of the same type (either optical transceivers or DAC cables, but not both types).

The following table lists the DE6400F and DE6400H controllers and supported connectivity options.

Table 5. DE6400F and DE6400H controllers and connectivity options

Part number	Feature code	Description	Maximum quantity per enclosure
Controllers			
None*	7DB6	Lenovo ThinkSystem DE6400 Controller 16GB	2
SAS expansion card			
4C57A72918	BHL2	Lenovo ThinkSystem DE6400/6600 HIC, 12Gb SAS EXP,4-ports	2
Host interface cards			
4C57A85945	BT4B	Lenovo ThinkSystem DE 6400/6600 HIC, 10/25GbE iSCSI,4-ports	2
4C57A14374	B6WA	Lenovo ThinkSystem DE6400/6600 HIC, 16/32Gb NVMe Over FC,4-ports	2
4XC7A85322	BS3G	Lenovo ThinkSystem DE6400/6600 HIC, 100GB NVMe Over ROCE,2-Ports	2
Transceiver options			
4M17A13527	B4B2	Lenovo 10Gb iSCSI/16Gb FC Universal SFP+ Module	8
4M17A13529	B4B4	Lenovo 10/25GbE iSCSI SFP28 Module (for 10/25 Gb iSCSI HIC ports)	8
4M17A13528	B4B3	Lenovo 32Gb FC SFP+ Transceiver (for 32 Gb FC HIC ports)	8
OM4 cables 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	8
4Z57A10846	B2PA	Lenovo 1m LC-LC OM4 MMF Cable	8
4Z57A10847	B2PB	Lenovo 3m LC-LC OM4 MMF Cable	8
4Z57A10848	B2PC	Lenovo 5m LC-LC OM4 MMF Cable	8
4Z57A10849	B2PD	Lenovo 10m LC-LC OM4 MMF Cable	8
4Z57A10850	B2PE	Lenovo 15m LC-LC OM4 MMF Cable	8
4Z57A10851	B2PF	Lenovo 25m LC-LC OM4 MMF Cable	8
4Z57A10852	B2PG	Lenovo 30m LC-LC OM4 MMF Cable	8
OM3 cables 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	8
00MN502	ASR6	Lenovo 1m LC-LC OM3 MMF Cable	8
00MN505	ASR7	Lenovo 3m LC-LC OM3 MMF Cable	8
00MN508	ASR8	Lenovo 5m LC-LC OM3 MMF Cable	8
00MN511	ASR9	Lenovo 10m LC-LC OM3 MMF Cable	8
00MN514	ASRA	Lenovo 15m LC-LC OM3 MMF Cable	8
00MN517	ASRB	Lenovo 25m LC-LC OM3 MMF Cable	8
00MN520	ASRC	Lenovo 30m LC-LC OM3 MMF Cable	8
DAC cables for iSCSI HIC ports			
00D6288	A3RG	0.5m Passive DAC SFP+ Cable	8
90Y9427	A1PH	1m Passive DAC SFP+ Cable	8
00AY764	A51N	1.5m Passive DAC SFP+ Cable	8
00AY765	A51P	2m Passive DAC SFP+ Cable	8

Part number	Feature code	Description	Maximum quantity per enclosure
90Y9430	A1PJ	3m Passive DAC SFP+ Cable	8
90Y9433	A1PK	5m Passive DAC SFP+ Cable	8
00D6151	A3RH	7m Passive DAC SFP+ Cable	8
DAC cables for 25 Gb iSCSI SFP28 HIC ports			
7Z57A03557	AV1W	Lenovo 1m Passive 25G SFP28 DAC Cable	8
7Z57A03558	AV1X	Lenovo 3m Passive 25G SFP28 DAC Cable	8
7Z57A03559	AV1Y	Lenovo 5m Passive 25G SFP28 DAC Cable	8
DAC cables for 100 Gb NVMe/RoCE QSFP28 HIC ports			
7Z57A03561	AV1Z	Lenovo 1m Passive 100G QSFP28 DAC Cable	4
7Z57A03562	AV20	Lenovo 3m Passive 100G QSFP28 DAC Cable	4
7Z57A03563	AV21	Lenovo 5m Passive 100G QSFP28 DAC Cable	4
SAS host connectivity cables: Mini-SAS HD (controller) to Mini-SAS HD (host)			
00YL847	AU16	0.5m External MiniSAS HD 8644/MiniSAS HD 8644 Cable	8
00YL848	AU17	1m External MiniSAS HD 8644/MiniSAS HD 8644 Cable	8
00YL849	AU18	2m External MiniSAS HD 8644/MiniSAS HD 8644 Cable	8
00YL850	AU19	3m External MiniSAS HD 8644/MiniSAS HD 8644 Cable	8
1 GbE management ports			
00WE123	AVFW	0.75m Green Cat6 Cable	2
00WE127	AVFX	1.0m Green Cat6 Cable	2
00WE131	AVFY	1.25m Green Cat6 Cable	2
00WE135	AVFZ	1.5m Green Cat6 Cable	2
00WE139	AVG0	3m Green Cat6 Cable	2
90Y3718	A1MT	10m Green Cat6 Cable	2
90Y3727	A1MW	25m Green Cat6 Cable	2

* Factory-installed only.

Expansion enclosures

In the base configuration, the ThinkSystem DE6400F and DE6400H supports attachment of up to four expansions: 4xDE600S 4U60 LFF, or 4xDE240S 2U24 SFF, or 4xDE120S 2U12 LFF. These expansions can be mixed up to the aforementioned maximums.

Maximum drives:

- All Flash- 120 (1 x DE6400F controller NVMe + 4xDE240S SAS, SSD)
- Hybrid- 264 (1 x DE6400H controller NVMe + 4xDE600S SAS, SSD)

Note: DE120S and DE600S are not supported with All Flash controller.

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

Table 6. ThinkSystem DE240S, DE120S, and DE600S CTO base models

Description	Machine Type/Model	Feature code		
		European Union	Other markets	World Wide
Lenovo ThinkSystem Storage DE240S 2U24 Chassis (with 2x PSUs)	7Y68CTO1WW	BEY7	B38L	-
Lenovo ThinkSystem Storage DE120S 2U12 Chassis (with 2x PSUs)	7Y63CTO1WW	BEY6	B38M	-
Lenovo ThinkSystem Storage DE600S 4U60 Chassis (with 2x PSUs)	7Y69CTO2WW	-	-	BQ9W

Configuration notes:

- For CTO models, two I/O expansion modules are selected by default in the configurator, and the selection cannot be changed.

The models of the ThinkSystem DE240S, DE120S, and DE600S ship with the following items:

- One chassis with the following components:
 - Two I/O modules
 - Two power supplies
 - Two cooling modules (4U60 LFF only)
- Four 1 m MiniSAS HD 8644/MiniSAS HD 8644 cables (Models listed in Tables 6 and 7)
- Rack Mount Kit
- *Quick Installation Guide*
- *Electronic Publications Flyer*
- Two power cables:
 - CTO models: Customer-configured power cables

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 DE6400F and DE6400H 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.

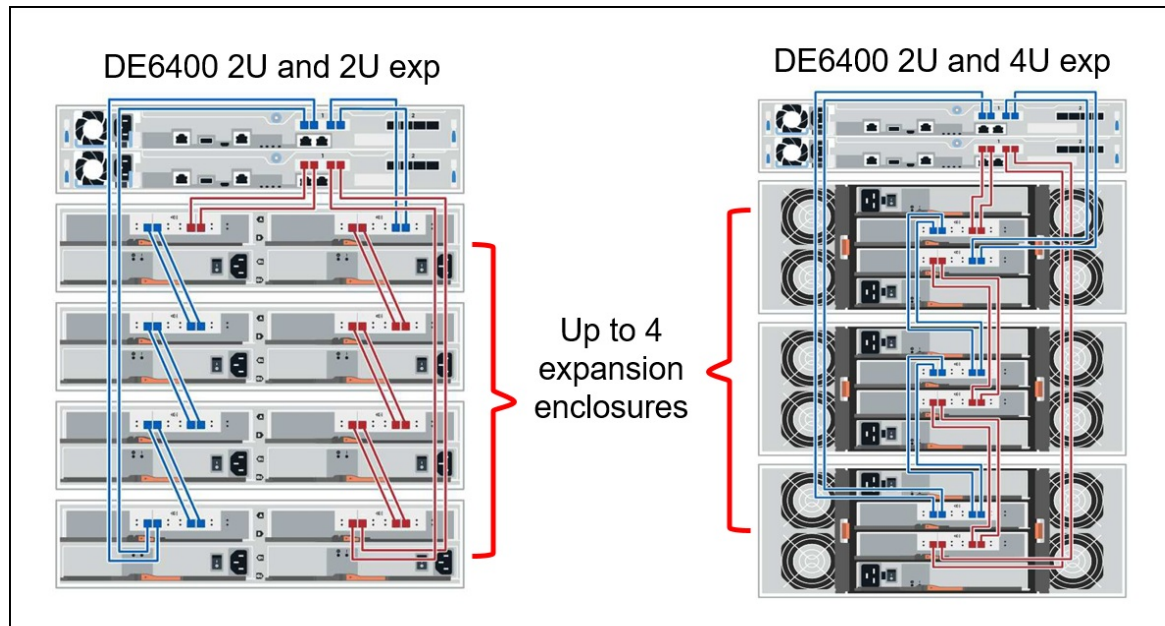


Figure 8. ThinkSystem DE6400F and DE6400H expansion enclosure connectivity topology

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

Table 7. 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	8
External MiniSAS HD 8644/MiniSAS HD 8644 1M Cable	00YL848	AU17	8
External MiniSAS HD 8644/MiniSAS HD 8644 2M Cable	00YL849	AU18	8
External MiniSAS HD 8644/MiniSAS HD 8644 3M Cable	00YL850	AU19	8

Configuration notes:

- 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.
- The length of the SAS cables that connect a 2U24 or 2U12 enclosure to an adjacent 4U60 enclosure should be at least 1 meter.

Drives

The ThinkSystem DE6400F and DE6400H controller enclosure support up to 24 NVMe drives.

Expansion enclosure support is as follows:

- The DE240S 2U24 SFF expansion enclosure supports 24 SFF drives.
- The DDE120S 2U12 LFF expansion enclosure supports 12 LFF drives.
- The DE600S 4U60 LFF expansion enclosure supports 60 LFF drives.

Shipping requirement: 2U12 and 2U24 enclosures can be shipped with all drive bays populated, however the 4U60 enclosures must be shipped with drives removed.

The following table lists supported drive options for the ThinkSystem DE6400F and DE6400H controller enclosure.

Table 8. DE6400 2U24 SFF controller enclosure drive options

Part number	Feature code	Description	Maximum quantity per 2U24 SFF enclosure
Single 1DWD 2.5" NVME SED			
4XB7A38085	B6WC	Lenovo ThinkSystem DE 1.9TB 1DWD 2.5" NVME SED 2U24	24
4XB7A38087	B6WE	Lenovo ThinkSystem DE 3.8TB 1DWD 2.5" NVME SED 2U24	24
4XB7A38093	B6WL	Lenovo ThinkSystem DE 7.6TB 1DWD 2.5" NVME SED 2U24	24
4XB7A38095	B6WN	Lenovo ThinkSystem DE 15.3TB 1DWD 2.5" NVME SED 2U24	24
Single 1DWD 2.5" NVME non-SED			
4XB7A38097	B7F5	Lenovo ThinkSystem DE 1.9TB 1DWD 2.5" NVME non-SED 2U24	24
4XB7A38091	B6WJ	Lenovo ThinkSystem DE 3.8TB 1DWD 2.5" NVME non SED 2U24	24
Single 1DWD 2.5" NVME SED FIPS			
4XB7A38089	B6WG	Lenovo ThinkSystem DE 3.8TB 1DWD 2.5" NVME SED FIPS 2U24	24
Six drive packs 2.5" NVME SED			
4XB7A38086	B6WD	Lenovo ThinkSystem DE 11.4TB Pack (6x 1.9TB NVME SED)	4
4XB7A38094	B6WM	Lenovo ThinkSystem DE 45.6TB Pack (6x 7.6TB NVME SED)	4
4XB7A38096	B6WP	Lenovo ThinkSystem DE 91.8TB Pack (6x 15.3TB NVME SED)	4
4XB7A38088	B6WF	Lenovo ThinkSystem DE 22.8TB Pack (6x 3.8TB NVME SED)	4
Six drive packs 2.5" NVME non SED			
4XB7A38098	B7F6	Lenovo ThinkSystem DE 11.4TB Pack (6x 1.9TB NVME non-SED)	4
4XB7A38092	B6WK	Lenovo ThinkSystem DE 22.8TB Pack (6x 3.8TB NVME non SED)	4
Six drive packs 2.5" NVME SED FIPS			
4XB7A38090	B6WH	Lenovo ThinkSystem DE 22.8TB Pack (6x 3.8TB NVME SED FIPS)	4

The following table lists supported drive options for the DE240S 2U24 SFF expansion enclosure.

Table 9. Drive options for the DE240S 2U24 SFF expansion enclosure.

Part number	Feature code	Description	Maximum quantity per 2U24 SFF enclosure
2.5-inch 12 Gbps SAS hot-swap SSDs (1 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 SSDs (3 DWPD)			
4XB7A14105	B4BT	Lenovo ThinkSystem DE Series 800GB 3DWD 2.5" SSD 2U24	24
4XB7A14106	B4BU	Lenovo ThinkSystem DE Series 1.6TB 3DWD 2.5" SSD 2U24	24
2.5-inch 12 Gbps SAS hot-swap FIPS SSDs (SED SSDs) (3 DWPD)			
4XB7A14107	B4BV	Lenovo ThinkSystem DE Series 1.6TB 3DWD 2.5" SSD FIPS 2U24	24

The following table lists supported drive options for the DE120S 2U12 LFF expansion enclosure.

Table 10. Drive options for the DE120S 2U12 LFF expansion enclosure.

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
4XB7A64875	BCVY	Lenovo ThinkSystem DE Series 16TB 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 (3 DWPD)			
4XB7A14097	B4C1	Lenovo ThinkSystem DE Series 800GB 3DWD 2.5" SSD 2U12	12
3.5-inch 12 Gbps SAS hot-swap FIPS SSDs (SED SSDs) (3 DWPD) (2.5" drive in a 3.5" tray)			
4XB7A14098	B4C2	Lenovo ThinkSystem DE Series 1.6TB 3DWD 2.5" SSD FIPS 2U12	12

The following table lists supported drive options for the DE600S 4U60 LFF expansion enclosure.

Table 11. Drive options for the DE600S 4U60 LFF expansion enclosure.

Part number	Feature code	Description	Maximum quantity per 4U60 LFF enclosure
3.5-inch 12 Gbps NL SAS hot-swap HDDs			
4XB7A14124	B4GG	Lenovo ThinkSystem DE Series 4TB 7.2K 3.5" HDD 4U60	60
4XB7A14125	B4GH	Lenovo ThinkSystem DE Series 8TB 7.2K 3.5" HDD 4U60	60
4XB7A14126	B4GJ	Lenovo ThinkSystem DE Series 10TB 7.2K 3.5" HDD 4U60	60
4XB7A14128	B4GL	Lenovo ThinkSystem DE Series 12TB 7.2K 3.5" HDD 4U60	60
4XB7A64876	BCUC	Lenovo ThinkSystem DE Series 16TB 7.2K 3.5" HDD 4U60	60
4XB7A74943	BHDQ	Lenovo ThinkSystem DE Series 18TB 7.2K 3.5" HDD 4U60	60
3.5-inch 12 Gbps NL SAS hot-swap FIPS HDDs (SED HDDs)			
4XB7A14127	B4GK	Lenovo ThinkSystem DE Series 10TB 7.2K 3.5" HDD FIPS 4U60	60
3.5-inch 12 Gbps SAS hot-swap SSDs (3 DWPD) (2.5" drive in a 3.5" tray)			
4XB7A14115	B4G9	Lenovo ThinkSystem DE Series 800GB 3DWD 2.5" SSD 4U60	60
4XB7A14116	B4GA	Lenovo ThinkSystem DE Series 1.6TB 3DWD 2.5" SSD 4U60	60
3.5-inch 12 Gbps SAS hot-swap FIPS SSDs (SED SSDs) (3 DWPD) (2.5" drive in a 3.5" tray)			
4XB7A14117	B4GB	Lenovo ThinkSystem DE Series 1.6TB 3DWD 2.5" SSD FIPS 4U60	60

Configuration notes:

- For DE6400F storage system no HDD drives, SSDs only. A single DE6400F storage system can support a maximum of 120 SSDs.
- For hybrid (NL-SAS and SSDs).
- A minimum of 20 drives is required for each 4U60 LFF enclosure (the front row of each drawer must be populated with four drives).
- Intermix of FIPS drives and non-FIPS drives is supported within the system.

Software

The following functions are included with every ThinkSystem DE6400F and DE6400H:

- **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.
- **All Flash Array (AFA) capability**: Meets the demand for higher speed storage and provide higher IOPS and bandwidth with lower power usage and total cost of ownership than hybrid or HDD-based solutions.
- **Snapshots**: Enables creation of copies of data for backup, parallel processing, testing, and development, and have the copies available almost immediately (up to 1024 snapshot targets per DE6400 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.

Software maintenance is included in the ThinkSystem DE6400F and DE6400H 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 DE6400F and DE6400H 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 913W (100-240V) Platinum AC power supplies, each with an IEC 320-C14 connector:

The ThinkSystem DE Series 4U60 LFF enclosures ship with two redundant hot-swap 2325 W (200 - 240 V) Platinum AC power supplies, each with an IEC 320-C20 connector.

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 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

Description	Part number	Feature code
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
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

Description	Part number	Feature code
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

The following table lists the rack power cable and line cord options that can be ordered for the DE Series 4U60 LFF enclosures (two power cords per enclosure).

Table 13. Power cables for DE Series 4U60 enclosures

Description	Part number	Feature code
Rack power cables		
2.0m, 16A/100-250V, C19 to IEC 320-C20 Rack Power Cable	None*	B4L2
2.5m, 16A/100-250V, C19 to IEC 320-C20 Rack Power Cable	39Y7916	6252
Line cords		
Argentina 4.3m, 16A/250V, C19 to IRAM 2073 Line Cord	40K9777	6276
Australia/New Zealand 4.3m, 15A/250V, C19 to AS/NZS 3112 Line Cord	40K9773	6284
Brazil 4.3m, 16A/250V, C19 to NBR 14136 Line Cord	40K9775	6277
China 4.3m, 16A/250V, C19 to GB2099.1 Line Cord	40K9774	6288
Denmark/Switzerland 4.3m, 16A/250V, C19 to IEC 309 P+N+G Line Cord	40K9769	6283
Europe 4.3m, 16A/250V, C19 to CEE7-VII Line Cord	40K9766	6279
India 4.3m, 16A/250V, C19 to IS6538 Line Cord	40K9776	6285
Israel 4.3m, 16A/250V, C19 to SI 32 Line Cord	40K9771	6282
Italy 4.3m, 16A/250V, C19 to CEI 23-16 Line Cord	40K9768	6281
Japan 4.3m, 15A/200V, C19 to JIS C-8303 Line Cord	41Y9233	6291
Korea 4.3m, 15A/250V, C19 to KSC 8305 Line Cord	41Y9231	6289
South Africa 4.3m, 16A/250V, C19 to SABS 164 Line Cord	40K9770	6280
Switzerland 4.3m, 16A/250V, C19 to SEV 1011 Line Cord	81Y2391	6549
Taiwan 4.3m, 16A/250V, C19 to CNS 10917-3 Line Cord	41Y9230	6287
United Kingdom 4.3m, 13A/250V, C19 to BS 1363/A Line Cord	40K9767	6278
United States 4.3m, 15A/250V, C19 to NEMA 6-15P Line Cord	00D7197	A1NV
United States 4.3m, 18A/250V, C19 to NEMA L6-20P Line Cord	40K9772	6275

* CTO only.

Rack installation

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

Table 14. 4-post rack mount kits

Description	Feature code	Quantity
Lenovo ThinkSystem Storage Rack Mount Kit 2U12	B38X	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 15. 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
DE 4U Adjustable Rail Kit (SIR)	B742	1

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

Table 16. Rack mount kit features and specifications summary

Attribute	Screw-in fixed rail with adjustable depth			
	2U12	2U24/4U60	2U24 SIR	4U SIR
Feature code	B38X	B38Y	B6TH	B742
Enclosure support	DE120S	DE6400F and DE6400H 2U DE240S DE600S‡	DE6400F and DE6400H 2U DE240S	DE600S‡
Rail type	Fixed (static) with adjustable depth	Fixed (static) with adjustable depth	Fixed (static) with adjustable depth	Fixed (static) with adjustable depth
Tool-less installation	No	No	No	No
In-rack maintenance	Yes*	Yes*	Yes*	Yes*
Ship-in-rack (SIR) support	Yes	No	Yes	Yes
1U PDU support	Yes	Yes	Yes	Yes
0U PDU support	Limited**	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	IBM or Lenovo 4-post, IEC standard-compliant
Mounting holes	Square or round	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.)	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.)	605 mm (23.8 in.) – 812.8 mm (32 in.)

‡ The rack cabinet must be at least 1100 mm (43.31 in.) deep for 4U60 enclosures.

* 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, or at least 1200 mm (47.24 in.) deep for 4U60 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 DE6400F and DE6400H 2U24 SFF enclosure:

- Height: 42 mm (1.7 in.)
- Width: 225 mm (8.9 in.)
- Depth: 200 mm (7.9 in.)

The ThinkSystem DE Series 2U24 SFF enclosures have the following dimensions:

- Height: 42 mm (1.7 in.)
- Width: 225 mm (8.9 in.)
- Depth: 200 mm (7.9 in.)

The ThinkSystem DE Series 2U12 LFF enclosures have the following dimensions:

- Height: 42 mm (1.7 in.)
- Width: 223 mm (8.9 in.)
- Depth: 200 mm (7.9 in.)

The ThinkSystem DE Series 4U60 LFF enclosures have the following dimensions:

- Height: 84 mm (3.3 in.)
- Width: 225 mm (8.9 in.)
- Depth: 450 mm (17.7 in.)

Weights of enclosures (fully configured):

- DE6400F and DE6400H 2U24 SFF controller enclosure (7DB6): 25.07 kg (55.3 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)
- DE600S 4U60 LFF expansion enclosure (7Y69): 112.2 kg (247.4 lb)

Operating environment

The ThinkSystem DE Series 2U24 SFF and 4U60 LFF enclosures are supported in the following environment:

- Air temperature:
 - Operating:
 - DE240S 2U24 SFF: 5 °C - 45 °C (41 °F - 113 °F)
 - 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:
 - 200 to 240 V AC (nominal); 50 Hz / 60 Hz
- Acoustical noise emission:
 - DE600S 4U60 SFF: 7.2 bels
 - DE240S 2U24 SFF and DE120S 2U12 LFF: 6.6 bels

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

Table 17. Enclosure power load, inlet current, and heat output

Enclosure	Source voltage (nominal)	Maximum power load	Current per inlet	Heat output
DE6400F and DE6400H 2U24 SFF	200 - 220 V AC	1150 W	5.48 A	4030 BTU/hour
DE240S 2U24 SFF	200 - 240 V AC	382 W	2.02 A	1304 BTU/hour
DE120S 2U12 LFF	200 - 240 V AC	300 W	1.58 A	1024 BTU/hour
DE600S 4U60 LFF	200 - 240 V AC	1446 W	7.62 A	4934 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; CECF
- 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 DE6400F and DE6400H Hybrid Storage Array supports attachment to Lenovo ThinkSystem, System x, and Flex System hosts by using SAS, iSCSI, Fibre Channel, NVMe over Fibre Channel (NVMe/FC), or NVMe over RoCE (RDMA over Converged Ethernet) (NVMe/RoCE) 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>

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:

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

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