

Lenovo ThinkSystem DM5000H Unified Hybrid Storage Array

Product Guide

Lenovo ThinkSystem DM5000H is a unified, hybrid storage system that is designed to provide performance, simplicity, capacity, security, and high availability for medium enterprises. Powered by the ONTAP software, ThinkSystem DM5000H delivers enterprise-class storage management capabilities with a wide choice of host connectivity options, flexible drive configurations, and enhanced data management features. The ThinkSystem DM5000H is a perfect fit for a wide range of enterprise workloads, including data analytics, artificial intelligence, engineering and design, enterprise applications, and other storage I/O-intensive applications.

ThinkSystem DM5000H models are 2U rack-mount controller enclosures that include two controllers, 64 GB RAM and 8 GB battery-backed NVRAM (32 GB RAM and 4 GB NVRAM per controller), and 24 SFF hot-swap drive bays (2U24 form factor). Controllers provide universal 1/10 GbE NAS/iSCSI or 4/8/16 Gb Fibre Channel (FC) ports, or 1/10 GbE RJ-45 ports for host connectivity.

A single ThinkSystem DM5000H Storage Array scales up to 144 drives with the attachment of Lenovo ThinkSystem DM240S 2U24 SFF, DM120S 2U12, and DM600S 4U60 LFF Expansion Enclosures. It also offers flexible drive configurations with the choice of 2.5-inch (SFF) and 3.5-inch (LFF) form factors, 7.2 K rpm NL SAS hard disk drives (HDDs), and SAS solid-state drives (SSDs).



Figure 1. Lenovo ThinkSystem DM5000H

Up to 12 DM5000H Storage Arrays can be combined into a clustered system in a NAS environment, or up to 6 DM5000H Storage Arrays can be combined into a clustered system in a SAN environment.

Did you know?

A single ThinkSystem DM5000H can scale up to 1.96 PB of raw storage capacity. A cluster of the DM5000H storage systems can scale up to 23.5 PB for NAS or up to 11.7 PB for SAN environments.

The ThinkSystem DM5000H offers unified file and block storage connectivity with support for 1 GbE or 10 GbE NAS and iSCSI, and 8 Gb or 16 Gb Fibre Channel protocols at the same time.

Key features

The ThinkSystem DM5000H offers the following key features and benefits:

- Unified, hybrid storage with dual active/active controller configurations for high availability and performance.
- Improved performance and data protection with RAID-DP and RAID-TEC, as well as support for traditional RAID 4.
- Flexible host connectivity to match diverse client needs with support for unified NAS and SAN storage protocols, including 1/10 GbE NAS and iSCSI, and 8/16 Gb Fibre Channel connectivity.
- 12 Gb SAS drive-side connectivity with multipathing with up to 24x 2.5-inch small form factor (SFF) drives in the 2U24 SFF controller and expansion enclosures, up to 12x 3.5-inch large form factor (LFF) drives in the 2U12 LFF expansion enclosures, or up to 60x 3.5-inch LFF drives in the 4U60 LFF expansion enclosures.
- Scalability to up to 144 SFF or 120 LFF and 24 SFF drives with the attachment of the ThinkSystem DM240S 2U24 SFF, DM120S 2U12 LFF, or DM600S 4U60 LFF expansion enclosures to satisfy growing needs for storage capacity and performance.
- Flexibility in storing data on capacity-optimized SAS SSDs, performance-optimized enterprise SAS HDDs, or capacity-optimized enterprise NL SAS HDDs; mixing and matching drive types within a single system to perfectly meet performance and capacity requirements for various workloads.
- Acceleration of read-centric workloads with the high-speed, low-latency onboard NVMe SSD caching.
- A comprehensive set of advanced storage management features with the ONTAP software, including SSD read cache, hybrid storage pools, snapshots, volume copy, quality of service, thin provisioning, compression, deduplication, encryption, disk-based backup, application- and virtual machine-aware backup, quick data recovery, clustering, synchronous replication, asynchronous replication, and up to 84 drives.
- A core set of storage management features with the ONTAP Fundamentals software, including SSD read cache, hybrid storage pools, snapshots, quality of service, thin provisioning, compression, deduplication, encryption, quick data recovery, and asynchronous replication.
- Optional licensed functions, including WORM (write once, read many) data protection (SnapLock) and object storage tiering (FabricPool).
- Scale-out clustering of up to 12 ThinkSystem DM Series storage systems for NAS connectivity or up to 6 DM Series storage systems for SAN connectivity.
- Intuitive, web-based GUI for easy system setup and management.
- Lenovo XClarity support for centralized systems management of Lenovo x86 servers, switches, and storage, which provides automated agent-less discovery, inventory, monitoring, and additional platform-specific functions across multiple systems.
- Designed for 99.9999% availability with redundant hot-swap components, including controllers and I/O modules, power supplies, and non-disruptive firmware upgrades.
- Certified storage for Oracle VM.
- Certified storage for Citrix XenServer: http://hcl.xenserver.org/storage/910/Lenovo_DM_Series.

The ThinkSystem DM5000H supports the following drives:

- 2U24 SFF capacity-optimized SSDs: 960 GB, 3.84 TB, 7.68 TB, and 15.36 TB
- 2U24 SFF enterprise SAS HDDs: 900 GB, 1.2 TB, and 1.8 TB 10K rpm
- 2U12 LFF and 4U60 LFF high-capacity nearline HDDs: 4 TB, 8 TB, 10 TB, and 16 TB 7.2K rpm

All drives are dual-port and hot-swappable.

The ThinkSystem DM5000H supports attachment of the following ThinkSystem DM Series expansion enclosures:

- Up to 5 ThinkSystem DM240S 2U24 SFF enclosures.
- Up to 9 ThinkSystem DM120S 2U12 LFF enclosures.
- Up to 2 ThinkSystem DM600S 4U60 LFF enclosures.
- A combination of the DM240S, DM120S, and DM600S enclosures for a maximum of 144 drives.

Customers can intermix 2U24 SFF, 2U12 LFF, and 4U60 LFF expansion enclosures behind a 2U24 controller enclosure. This configuration delivers the added flexibility to mix 3.5-inch and 2.5-inch drives within a single system (but not within the enclosure).

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 DM5000H offers high levels of system and data availability with the following technologies:

- Dual-active controllers (high availability pair) with automatic load balancing and failover
- Mirrored, battery-backed controller NVRAM
- Dual-port SAS HDDs and SSDs with automatic drive failure detection and rebuild
- Redundant, hot-swappable and customer replaceable hardware components, including SFP+ transceivers, controllers, I/O modules, power supplies, cooling modules (4U60 LFF only), and drives
- Automated failover for the data path between the host and the drives with multipathing
- Non-disruptive controller and drive firmware upgrades
- Scale-out clustering

Components and connectors

The following figure shows the front of the ThinkSystem DM5000H or DM240S 2U SFF enclosure.

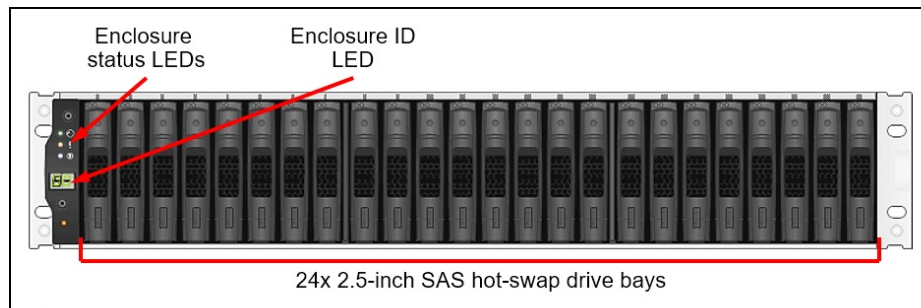


Figure 2. ThinkSystem DM5000H or DM240S enclosure front view

The front of the ThinkSystem DM5000H or DM240S 2U SFF enclosure includes the following components:

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

The following figure shows the rear of the ThinkSystem DM5000H 2U controller enclosure with universal SFP+ host ports.

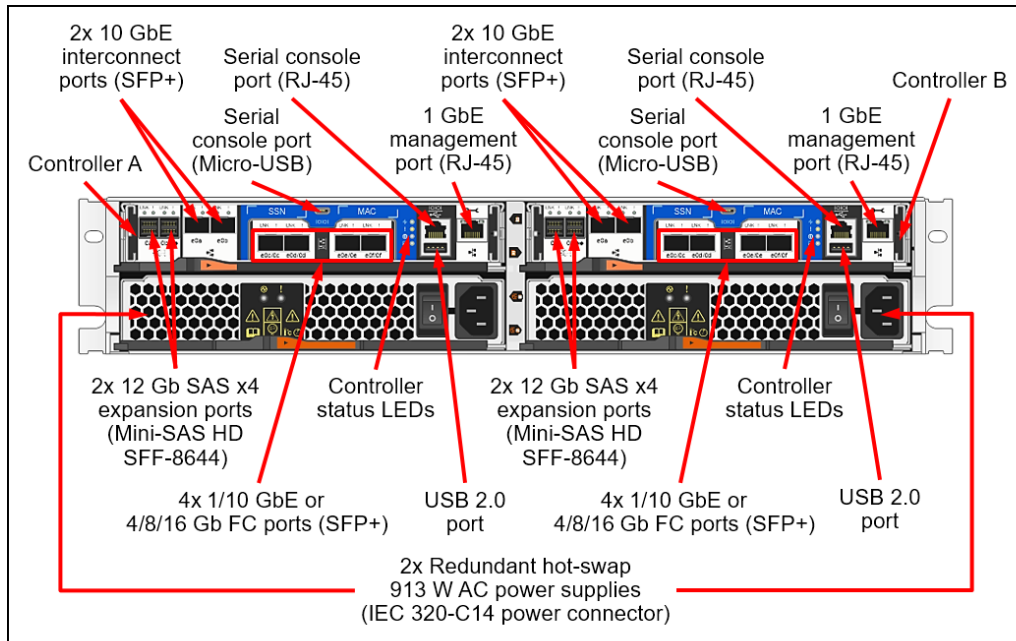


Figure 3. ThinkSystem DM5000H 2U controller enclosure rear view: Universal SFP+ host ports

The following figure shows the rear of the ThinkSystem DM5000H 2U controller enclosure with 10GBASE-T host ports.

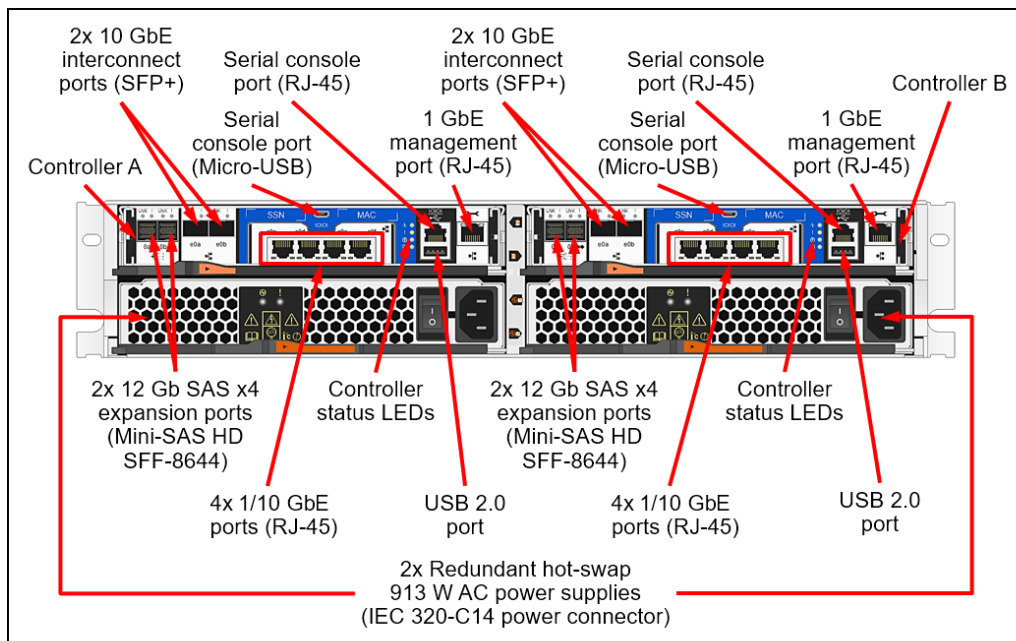


Figure 4. ThinkSystem DM5000H 2U controller enclosure rear view: 10GBASE-T host ports

The rear of the ThinkSystem DM5000H 2U controller enclosure includes the following components:

- Two redundant hot-swap controllers, each with the following ports:
 - Two SFP+ interconnect ports for direct-attach HA pair or switched cluster connections.
 - Four SFP+ host ports for 1/10 Gb GbE or 4/8/16 Gb FC connectivity or four 1/10 GbE RJ-45 ports.
 - Two 12 Gb SAS x4 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.
 - Two serial console ports (RJ-45 and Micro-USB) for another means to configure the system.
 - One USB Type A port (for ONTAP software installation or booting)
- Two redundant hot-swap 913 W (100 - 240 V) AC power supplies (IEC 320-C14 power connector) with integrated cooling fans.
- Controller status LEDs.

The following figure shows the front of the ThinkSystem DM120S 2U LFF expansion enclosure.

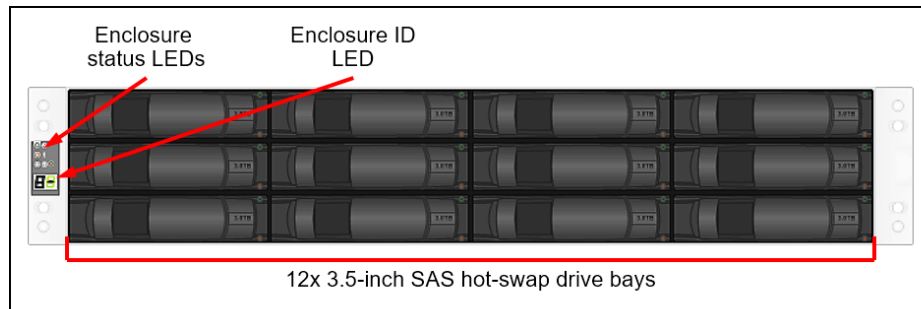


Figure 5. ThinkSystem DM120S 2U LFF expansion enclosure front view

The front of the ThinkSystem DM120S 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 DM240S or DM120S 2U expansion enclosure.

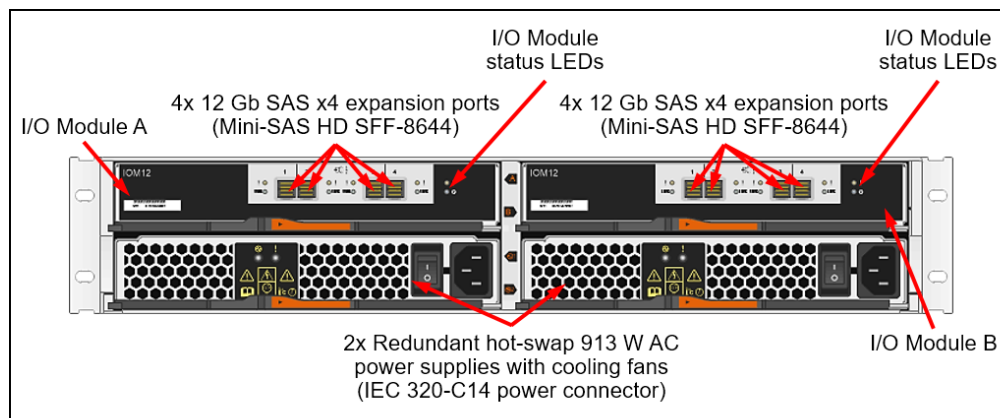


Figure 6. ThinkSystem DM240S or DM120S 2U expansion enclosure rear view

The rear of the ThinkSystem DM240S or DM120S 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.
- I/O Module status LEDs.

The following figure shows the front of the ThinkSystem DM600S 4U LFF expansion enclosure.

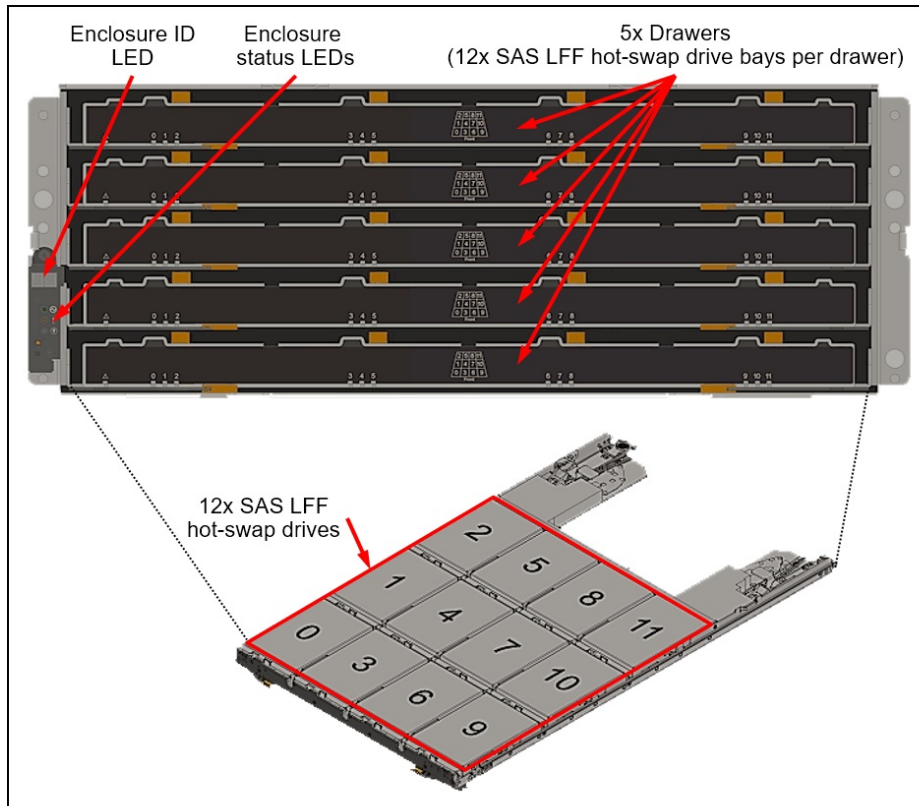


Figure 7. ThinkSystem DM600S 4U LFF expansion enclosure front view

The front of the ThinkSystem DM600S 4U LFF expansion enclosure includes the following components:

- Five drawers, each with 12 LFF hot-swap drive bays.
- Enclosure status LEDs.
- Enclosure ID LED.

The following figure shows the rear of the ThinkSystem DM600S 4U LFF expansion enclosure.

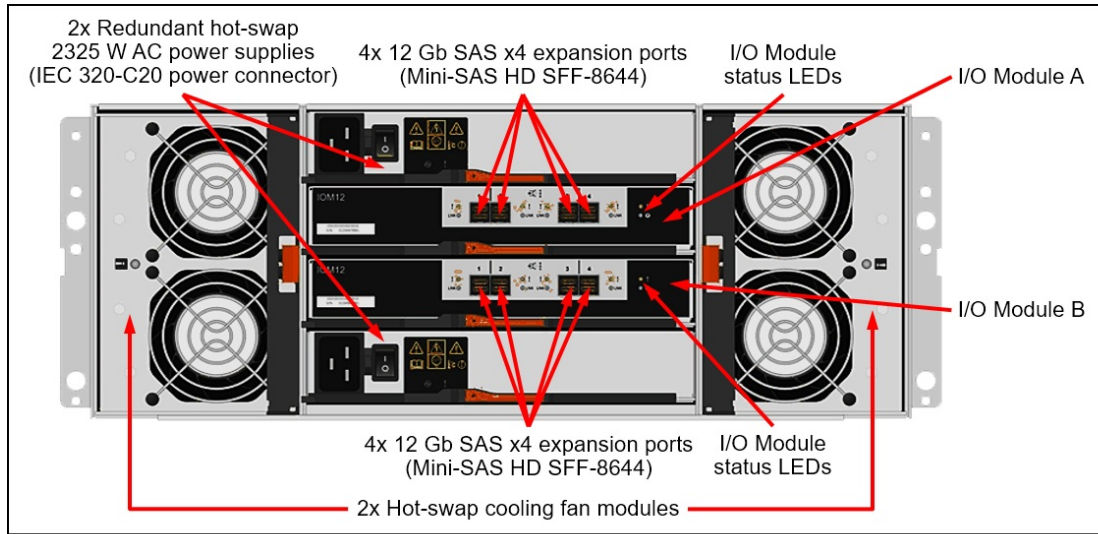


Figure 8. ThinkSystem DM600S 4U LFF expansion enclosure rear view

The rear of the ThinkSystem DM600S 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 (200 - 240 V) AC 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.
- I/O Module status LEDs.

System specifications

The following table lists the ThinkSystem DM5000H storage system specifications.

Note: The supported hardware options, software features, and interoperability listed in this product guide are based on the ONTAP software version 9.7. 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 DM5000H that can be found at:

<http://datacentersupport.lenovo.com>

Table 1. ThinkSystem DM5000H system specifications

Attribute	Specification
Form factor	<ul style="list-style-type: none"> DM5000H controller enclosure (Machine Type 7Y57): 2U rack mount. DM240S 2U24 SFF expansion enclosure (Machine Type 7Y58): 2U rack mount. DM120S 2U12 LFF expansion enclosure (Machine Type 7Y59): 2U rack mount. DM600S 4U60 LFF expansion enclosure (Machine Type 7Y43): 4U rack mount.
Controller configuration	Dual active-active controller configuration (HA pair). Up to 6 HA pairs can be combined into a single SAN cluster, or up to 12 HA pairs can be combined into a single NAS cluster. Note: The ONTAP Fundamentals software does not support clustering.
HA pair/cluster interconnect ports	4x 10 GbE SFP+ ports (DAC cables or SW fiber optics [LC]) (2 ports per controller).
RAID levels	RAID-4, RAID-DP, RAID-TEC.
Controller memory	64 GB RAM per system (32 GB per controller). 8 GB battery-backed NVRAM per system (4 GB per controller) mirrored between the controllers.
Controller cache	2 TB NVMe-based Flash Cache (1 TB per controller).
Drive bays	<ul style="list-style-type: none"> Up to 144 SFF hot-swap drive bays (1x 2U24 controller enclosure + up to 5x 2U24 SFF expansion enclosures). Up to 120 LFF and 24 SFF hot-swap drive bays (1x 2U24 controller enclosure + up to 2x 4U60 LFF or up to 9x 2U12 LFF expansion enclosures). Intermix of 2U24 SFF, 2U12 LFF, and 4U60 LFF enclosures is supported. Note: The ONTAP Fundamentals software supports up to 84 drives.
Drive technology	12 Gb SAS HDDs, 12 Gb NL SAS HDDs, 12 Gb SAS SSDs.
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	<ul style="list-style-type: none"> 2U24 SFF drives: <ul style="list-style-type: none"> 960 GB, 3.84 TB, 7.68 TB, and 15.36 TB SAS SSDs (1 DWD). 900 GB, 1.2 TB, and 1.8 TB 10K rpm SAS HDDs. 2U12 and 4U60 LFF drives: 4 TB, 8 TB, 10 TB, and 16 TB 7.2K rpm NL SAS HDDs.
Storage capacity	Up to 1.96 PB (120x 16 TB LFF HDDs + 24x 1.8 TB SFF HDDs).
Storage protocols	<ul style="list-style-type: none"> NAS (File access): NFS and CIFS/SMB. SAN (Block access): iSCSI and FC.
Host connectivity	Base ports (per controller enclosure): <ul style="list-style-type: none"> 8x 1 GbE (RJ-45 UTP)/10 GbE (DAC cable or SW fiber optic cable, LC) or 4/8/16 Gb FC (SW fiber optic cable, LC) SFP+ host ports (4 ports per controller); or 8x 1/10 GbE RJ-45 UTP host ports (4 ports per controller).
Host operating systems	Microsoft Windows Server 2012 R2, 2016, and 2019; Red Hat Enterprise Linux (RHEL) 6, 7, and 8; SUSE Linux Enterprise Server (SLES) 11, 12, and 15; VMware vSphere 6.0, 6.5, 6.7, and 7.0.

Attribute	Specification
Standard software features	<ul style="list-style-type: none"> ● ONTAP: RAID data protection, NVMe SSD read cache (Flash Cache), hybrid storage pools (Flash Pool), snapshots, volume copy (FlexClone), storage quality of service (QoS), thin provisioning, compression, deduplication, encryption, disk-based backup (SnapVault), application-aware backup (SnapCenter), quick data recovery (SnapRestore), clustering, clustering with data mirroring (MetroCluster IP), and synchronous and asynchronous replication (SnapMirror). ● ONTAP Fundamentals: RAID data protection, Flash Cache, Flash Pool, snapshots, storage QoS, thin provisioning, compression, deduplication, encryption, SnapRestore, and SnapMirror asynchronous replication.
Optional software features	ONTAP: WORM data protection (SnapLock) and object storage tiering (FabricPool).
Performance*	Up to 148 000 random read IOPS (8 KB blocks).
Configuration maximums**	<ul style="list-style-type: none"> ● Maximum raw storage capacity: 1.24 PB ● Maximum flash pool cache size: 24 TB ● Maximum aggregate size: 400 TB ● Maximum number of FlexVol volumes per controller: 1000 ● Maximum volume size: 100 TB ● Maximum number of LUNs per controller: 8192 ● Maximum number of LUNs per FlexVol volume: 512 ● Maximum LUN size: 16 TB ● Maximum number of drives in a RAID group (data + parity drives): <ul style="list-style-type: none"> ○ RAID 4: 14 (13 + 1 SAS SSDs) or 7 (6 + 1 NL SAS HDDs) ○ RAID-DP: 28 (26 + 2 SAS SSDs) or 20 (18 + 2 NL SAS HDDs) ○ RAID-TEC: 29 (26 + 3 SAS SSDs or NL SAS HDDs) ● Maximum number of initiators per controller: 2048 ● Maximum number of snapshots per FlexVol volume: 1023
Cooling	Redundant cooling with two cooling modules (DM600S 4U60 LFF) or with the fans that are built into power supplies (DM5000H, DM240S 2U24 SFF, and DM120S 2U12 LFF).
Power supply	Two redundant hot-swap 913 W (100 - 240 V) (DM5000H, DM240S 2U24 SFF, and DM120S SFF enclosures) or 2325 W (200 - 240 V) (DM600S 4U60 LFF enclosures) Platinum AC power supplies.
Hot-swap parts	Controllers, I/O modules, drives, power supplies, cooling modules (DM600S 4U60 LFF only), and SFP+ transceivers and DAC cables.
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	ThinkSystem Storage Manager web-based 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-, four-, or five-year customer-replaceable unit and onsite limited warranty with selectable service levels: 9x5 service coverage next business day (NBD) onsite response (Foundation) or 24x7 service coverage with 4-hour onsite response (Essential). Premier Support is also available. Software support is included in the Foundation or Essential Service for the duration of the warranty period.

Attribute	Specification
Dimensions	Controller 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.) 2U24 SFF expansion enclosure: <ul style="list-style-type: none"> ● Height: 85 mm (3.4 in.) ● Width: 449 mm (17.7 in.) ● Depth: 484 mm (19.1 in.) 2U12 LFF expansion 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.) 4U60 LFF expansion enclosure: <ul style="list-style-type: none"> ● Height: 174 mm (6.9 in.) ● Width: 449 mm (17.7 in.) ● Depth: 922 mm (36.3 in.)
Weight	<ul style="list-style-type: none"> ● Controller enclosure (fully configured): 27.6 kg (60.8 lb) ● 2U24 SFF expansion enclosure (fully configured): 24.4 kg (53.8 lb) ● 2U12 LFF expansion enclosure (fully configured): 28.7 kg (63.3 lb) ● 4U60 LFF expansion enclosure (fully configured): 111.5 kg (245.8 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

Preconfigured and factory-integrated models of the ThinkSystem DM5000H Unified Hybrid Storage Array are configured by using the Lenovo Data Center Solution Configurator (DCSC):

<http://dcsc.lenovo.com>

The following table lists the preconfigured models of the ThinkSystem DM5000H.

Table 2. ThinkSystem DM5000H preconfigured models for North America

Description	Part number
Relationship models - North America (NA)	
ThinkSystem DM5000H, 43.2TB (24x 1.8TB HDDs), 16Gb FC / 10GbE SFP+, 8x 10Gb iSCSI SFP+ optical modules, 2x 0.5m Passive DAC SFP+ cables, ONTAP 9.7 SW Fundamentals, Encryption (No support included*)	7Y571030NA
ThinkSystem DM5000H, 11.5TB (12x 960GB SSDs), 16Gb FC / 10GbE SFP+, 8x 10Gb iSCSI SFP+ optical modules, 2x 0.5m Passive DAC SFP+ cables, ONTAP 9.7 SW Fundamentals, Encryption (No support included*)	7Y571031NA

* Support must be purchased with the storage system (See [Warranty and support](#) for details).

Table 3. ThinkSystem DM5000H preconfigured models for EMEA

Description	Model for EU countries	Model for non-EU countries
Relationship models - Europe, Middle East, and Africa (EMEA) (sorted by bundle and drive capacity)		
ThinkSystem DM5000H, 12x960GB SSD, Fundamentals Bundle 9.7, Non-NVE, 10G BaseT	7Y571040EA	7Y571016EA

Description	Model for EU countries	Model for non-EU countries
ThinkSystem DM5000H, 12x960GB SSD, Fundamentals Bundle 9.7, Non-NVE, CNA	7Y571035EA	7Y571015EA
ThinkSystem DM5000H, 12x960GB SSD, Fundamentals Bundle 9.7, NVE, 10G BaseT	7Y57103PEA	7Y571017EA
ThinkSystem DM5000H, 12x960GB SSD, Fundamentals Bundle 9.7, NVE, CNA	7Y571032EA	7Y571014EA
ThinkSystem DM5000H, 24x960GB SSD, Fundamentals Bundle 9.7, Non-NVE, CNA	7Y57103SEA	7Y57101AEA
ThinkSystem DM5000H, 24x960GB SSD, Fundamentals Bundle 9.7, NVE, 10G BaseT	7Y57103QEA	7Y571019EA
ThinkSystem DM5000H, 24x960GB SSD, Fundamentals Bundle 9.7, NVE, 10G BaseT	7Y571041EA	7Y571018EA
ThinkSystem DM5000H, 24x960GB SSD, Fundamentals Bundle 9.7, NVE, CNA	7Y571033EA	7Y57101BEA
ThinkSystem DM5000H, 12x1.2TB HDD, Fundamentals Bundle 9.7, Non-NVE, 10G BaseT	7Y571037EA	7Y57101LEA
ThinkSystem DM5000H, 12x1.2TB HDD, Fundamentals Bundle 9.7, NVE, 10G BaseT	7Y57103EEA	7Y57101TEA
ThinkSystem DM5000H, 12x1.2TB SSD, Fundamentals Bundle 9.7, Non-NVE, CNA	7Y571043EA	7Y571021EA
ThinkSystem DM5000H, 12x1.2TB SSD, Fundamentals Bundle 9.7, NVE, CNA	7Y57103FEA	7Y57101UEA
ThinkSystem DM5000H, 24x1.2TB HDD, Fundamentals Bundle 9.7, NVE, CNA	7Y57103TEA	7Y57101VEA
ThinkSystem DM5000H, 24x1.2TB SSD, Fundamentals Bundle 9.7, Non-NVE, 10G BaseT	7Y57103JEA	7Y57101MEA
ThinkSystem DM5000H, 24x1.2TB SSD, Fundamentals Bundle 9.7, Non-NVE, CNA	7Y57104UEA	7Y571020EA
ThinkSystem DM5000H, 24x1.2TB SSD, Fundamentals Bundle 9.7, NVE, 10G BaseT	7Y57103GEA	7Y57101SEA
ThinkSystem DM5000H, 12x1.8TB HDD, Fundamentals Bundle 9.7, Non-NVE, 10G BaseT	7Y57103CEA	7Y57101NEA
ThinkSystem DM5000H, 12x1.8TB HDD, Fundamentals Bundle 9.7, Non-NVE, CNA	7Y57103NEA	7Y57101ZEA
ThinkSystem DM5000H, 12x1.8TB HDD, Fundamentals Bundle 9.7, NVE, 10G BaseT	7Y57103WEA	7Y57101REA
ThinkSystem DM5000H, 12x1.8TB SSD, Fundamentals Bundle 9.7, NVE, CNA	7Y57103YEA	7Y57101WEA
ThinkSystem DM5000H, 24x1.8TB HDD, Fundamentals Bundle 9.7, Non-NVE, 10G BaseT	7Y57103VEA	7Y57101PEA
ThinkSystem DM5000H, 24x1.8TB HDD, Fundamentals Bundle 9.7, NVE, CNA	7Y57103UEA	7Y57101XEA
ThinkSystem DM5000H, 24x1.8TB SSD, Fundamentals Bundle 9.7, Non-NVE, CAN	7Y571042EA	7Y57101YEA
ThinkSystem DM5000H, 24x1.8TB SSD, Fundamentals Bundle 9.7, NVE, 10G BaseT	7Y57103HEA	7Y57101QEA
ThinkSystem DM5000H, 12x3.84TB SSD, Fundamentals Bundle 9.7, Non-NVE, 10G BaseT	7Y57103LEA	7Y57101EEA
ThinkSystem DM5000H, 12x3.84TB SSD, Fundamentals Bundle 9.7, Non-NVE, CNA	7Y571034EA	7Y57101DEA
ThinkSystem DM5000H, 12x3.84TB SSD, Fundamentals Bundle 9.7, NVE, 10G BaseT	7Y57103AEA	7Y57101FEA
ThinkSystem DM5000H, 12x3.84TB SSD, Fundamentals Bundle 9.7, NVE, CNA	7Y57103REA	7Y57101CEA
ThinkSystem DM5000H, 24x3.84TB SSD, Fundamentals Bundle 9.7, Non-NVE, 10G BaseT	7Y57103KEA	7Y57101KEA
ThinkSystem DM5000H, 24x3.84TB SSD, Fundamentals Bundle 9.7, Non-NVE, CNA	7Y571039EA	7Y57101HEA
ThinkSystem DM5000H, 24x3.84TB SSD, Fundamentals Bundle 9.7, NVE, 10G BaseT	7Y571038EA	7Y57101JEA
ThinkSystem DM5000H, 24x3.84TB SSD, Fundamentals Bundle 9.7, NVE, CNA	7Y57103MEA	7Y57101GEA
ThinkSystem DM5000H, 12x960GB SSD, Premium Bundle 9.7, Non-NVE, 10G BaseT	7Y57104AEA	7Y57102JEA
ThinkSystem DM5000H, 12x960GB SSD, Premium Bundle 9.7, Non-NVE, CNA	7Y57104CEA	7Y57102HEA
ThinkSystem DM5000H, 12x960GB SSD, Premium Bundle 9.7, NVE, 10G BaseT	7Y57103ZEA	7Y57102ZEA
ThinkSystem DM5000H, 12x960GB SSD, Premium Bundle 9.7, NVE, CNA	7Y57104SEA	7Y571022EA
ThinkSystem DM5000H, 24x960GB SSD, Premium Bundle 9.7, Non-NVE, 10G BaseT	7Y57104NEA	7Y57102KEA
ThinkSystem DM5000H, 24x960GB SSD, Premium Bundle 9.7, Non-NVE, CNA	7Y57104PEA	7Y57102GEA

Description	Model for EU countries	Model for non-EU countries
ThinkSystem DM5000H, 24x960GB SSD, Premium Bundle 9.7, NVE, 10G BaseT	7Y57103DEA	7Y57102YEA
ThinkSystem DM5000H, 24x960GB SSD, Premium Bundle 9.7, NVE, CAN	7Y571045EA	7Y571023EA
ThinkSystem DM5000H, 12x1.2TB SSD, Premium Bundle 9.7, Non-NVE, 10G BaseT	7Y57104JEA	7Y57102NEA
ThinkSystem DM5000H, 12x1.2TB SSD, Premium Bundle 9.7, Non-NVE, CNA	7Y57104FEA	7Y57102DEA
ThinkSystem DM5000H, 12x1.2TB SSD, Premium Bundle 9.7, NVE, 10G BaseT	7Y57104MEA	7Y57102VEA
ThinkSystem DM5000H, 12x1.2TB SSD, Premium Bundle 9.7, NVE, CAN	7Y57104WEA	7Y571026EA
ThinkSystem DM5000H, 24x1.2TB SSD, Premium Bundle 9.7, Non-NVE, 10G BaseT	7Y57104KEA	7Y57102PEA
ThinkSystem DM5000H, 24x1.2TB SSD, Premium Bundle 9.7, Non-NVE, CNA	7Y571049EA	7Y57102CEA
ThinkSystem DM5000H, 24x1.2TB SSD, Premium Bundle 9.7, NVE, 10G BaseT	7Y57103BEA	7Y57102UEA
ThinkSystem DM5000H, 24x1.2TB SSD, Premium Bundle 9.7, NVE, CAN	7Y571046EA	7Y571027EA
ThinkSystem DM5000H, 12x1.8TB SSD, Premium Bundle 9.7, Non-NVE, 10G BaseT	7Y57104REA	7Y57102QEA
ThinkSystem DM5000H, 12x1.8TB SSD, Premium Bundle 9.7, Non-NVE, CNA	7Y57104EEA	7Y57102BEA
ThinkSystem DM5000H, 12x1.8TB SSD, Premium Bundle 9.7, NVE, 10G BaseT	7Y57104HEA	7Y57102TEA
ThinkSystem DM5000H, 12x1.8TB SSD, Premium Bundle 9.7, NVE, CNA	7Y57104XEA	7Y571028EA
ThinkSystem DM5000H, 24x1.8TB SSD, Premium Bundle 9.7, Non-NVE, 10G BaseT	7Y57104GEA	7Y57102REA
ThinkSystem DM5000H, 24x1.8TB SSD, Premium Bundle 9.7, Non-NVE, CAN	7Y571047EA	7Y57102AEA
ThinkSystem DM5000H, 24x1.8TB SSD, Premium Bundle 9.7, NVE, 10G BaseT	7Y571036EA	7Y57102SEA
ThinkSystem DM5000H, 24x1.8TB SSD, Premium Bundle 9.7, NVE, CNA	7Y571048EA	7Y571029EA
ThinkSystem DM5000H, 12x3.84TB SSD, Premium Bundle 9.7, Non-NVE, 10G BaseT	7Y57104DEA	7Y57102LEA
ThinkSystem DM5000H, 12x3.84TB SSD, Premium Bundle 9.7, Non-NVE, CNA	7Y57104BEA	7Y57102FEA
ThinkSystem DM5000H, 12x3.84TB SSD, Premium Bundle 9.7, NVE, 10G BaseT	7Y57104LEA	7Y57102XEA
ThinkSystem DM5000H, 12x3.84TB SSD, Premium Bundle 9.7, NVE, CNA	7Y57104TEA	7Y571024EA
ThinkSystem DM5000H, 24x3.84TB SSD, Premium Bundle 9.7, Non-NVE, 10G BaseT	7Y57104VEA	7Y57102MEA
ThinkSystem DM5000H, 24x3.84TB SSD, Premium Bundle 9.7, Non-NVE, CNA	7Y57104QEA	7Y57102EEA
ThinkSystem DM5000H, 24x3.84TB SSD, Premium Bundle 9.7, NVE, 10G BaseT	7Y57103XEA	7Y57102WEA
ThinkSystem DM5000H, 24x3.84TB SSD, Premium Bundle 9.7, NVE, CNA	7Y571044EA	7Y571025EA

The following table lists the CTO base models of the ThinkSystem DM5000H.

Table 4. ThinkSystem DM5000H CTO base models

Description	Machine Type/Model	Feature code
Lenovo ThinkSystem Storage 2U24 Chassis (2x PSUs, No controller modules)	7Y57CTO1WW	B38L

Configuration note: Two DM3000/DM5000 10GBASE-T controllers (feature code B39G) or two DM3000/DM5000 SFP+ controllers (feature code B39F) must be selected during the CTO configuration process, and both controllers must be of the same type (either 10GBASE-T or SFP+).

The models of the ThinkSystem DM5000H ship with the following items:

- One chassis with the following components:
 - Two controllers with the configured software version (No Encryption or Encryption Capable)
 - Two power supplies
- Rack Mount Kit
- 2 m USB Cable (USB Type A to Micro-USB)
- *Electronic Publications Flyer*
- Two power cables:
 - CTO models: Two customer-configured power cables
 - Preconfigured models in Table 2: Two 2.8m 10A/100-250V, C13 to C14 Rack Power Cables
- Additional configured components (model-specific)

Controllers

The ThinkSystem DM5000H controller enclosures ship with two DM3000/DM5000 10GBASE-T or SFP+ controllers. A *controller* provides interfaces for host connectivity, management, and internal drives, and it runs ONTAP storage management software. Each DM5000H controller enclosure provides 64 GB RAM, 8 GB battery-backed NVRAM, and 2 TB NVMe SSD flash cache (32 GB RAM, 4 GB NVRAM, and 1 TB NVMe SSD flash cache per controller).

The ThinkSystem DM5000H controller enclosures ship with four interconnect 10 GbE SFP+ ports (two ports per controller) to cable a directly-connected dual-controller HA pair or for switched cluster interconnect with multiple dual-controller HA pairs. Up to six HA pairs can be combined into a single SAN cluster or up to 12 HA pairs can be combined into a single NAS cluster.

The ThinkSystem DM5000H controller enclosures ship with one of the following interface types:

- 8x Universal SFP+ ports (four ports per controller) for 1/10 GbE NAS / iSCSI or 4/8/16 Gb FC host connectivity.
- 8x 1/10 GbE RJ-45 ports (four ports per controller) for 1/10 GbE NAS / iSCSI host connectivity.

Each DM5000H controller enclosure also provides four integrated 12 Gb SAS x4 expansion ports (Mini-SAS HD SFF-8644 connectors) (two ports per controller) for the attachment of the ThinkSystem DM Series expansion enclosures.

Configuration notes:

- Two controllers are required for selection. Both controllers must be of the same type (either 16 Gb FC / 10 GbE or 10GBASE-T, but not both types), and they must have matching configurations of the base ports (type and physical connections).
- A pair of the universal SFP+ base ports (e0c/0c and e0d/0d or e0e/0e and e0f/0f) in the system must have the same connectivity type (either Ethernet or Fibre Channel, but not both types) and the same type of physical connections; different pairs might have different types of connectivity.

The following table lists the controllers for the DM5000H Storage Array and supported connectivity options.

Table 5. DM5000H storage array controllers and connectivity options

Description	Part number	Feature code	Maximum quantity per controller enclosure
Controllers			
Lenovo ThinkSystem DM3000/DM5000 Controller, 10GBASE-T	None*	B39G	2
Lenovo ThinkSystem DM3000/DM5000 Controller, 16Gb FC / 10GbE	None*	B39F	2
SFP+ options for base ports			
1Gb RJ-45 iSCSI SFP+ Module 1 pack	4XF7A14917	B4K7	8
8Gb Fibre Channel SFP+ Module 1 pack	4XF7A14918	B4K8	8
16Gb Fibre Channel SFP+ Module 1 pack	4XF7A14920	B4KA	8
SFP+ options for base ports and interconnect ports			
10Gb SW Optical iSCSI SFP+ Module 1 pack	4XF7A14919	B4K9	12
OM4 cable options for 8 Gb FC, 16 Gb FC, and 10 GbE SW SFP+ optical transceivers			
Lenovo 0.5m LC-LC OM4 MMF Cable	4Z57A10845	B2P9	12
Lenovo 1m LC-LC OM4 MMF Cable	4Z57A10846	B2PA	12
Lenovo 3m LC-LC OM4 MMF Cable	4Z57A10847	B2PB	12
Lenovo 5m LC-LC OM4 MMF Cable	4Z57A10848	B2PC	12
Lenovo 10m LC-LC OM4 MMF Cable	4Z57A10849	B2PD	12
Lenovo 15m LC-LC OM4 MMF Cable	4Z57A10850	B2PE	12
Lenovo 25m LC-LC OM4 MMF Cable	4Z57A10851	B2PF	12
Lenovo 30m LC-LC OM4 MMF Cable	4Z57A10852	B2PG	12
OM3 cable options for 8 Gb FC, 16 Gb FC, and 10 GbE SW SFP+ optical transceivers			
Lenovo 0.5m LC-LC OM3 MMF Cable	00MN499	ASR5	12
Lenovo 1m LC-LC OM3 MMF Cable	00MN502	ASR6	12
Lenovo 3m LC-LC OM3 MMF Cable	00MN505	ASR7	12
Lenovo 5m LC-LC OM3 MMF Cable	00MN508	ASR8	12
Lenovo 10m LC-LC OM3 MMF Cable	00MN511	ASR9	12
Lenovo 15m LC-LC OM3 MMF Cable	00MN514	ASRA	12
Lenovo 25m LC-LC OM3 MMF Cable	00MN517	ASRB	12
Lenovo 30m LC-LC OM3 MMF Cable	00MN520	ASRC	12
DAC cable options for 10 GbE SFP+ connectivity (SFP+ base ports and interconnect ports)			
0.5m Passive DAC SFP+ Cable	00D6288	A3RG	12
1m Passive DAC SFP+ Cable	90Y9427	A1PH	12
1.5m Passive DAC SFP+ Cable	00AY764	A51N	12
2m Passive DAC SFP+ Cable	00AY765	A51P	12
3m Passive DAC SFP+ Cable	90Y9430	A1PJ	12
5m Passive DAC SFP+ Cable	90Y9433	A1PK	12
7m Passive DAC SFP+ Cable	00D6151	A3RH	12
UTP Category 6 cables options for 1/10 GbE RJ-45 host connectivity and 1 GbE RJ-45 management ports			
0.75m Green Cat6 Cable	00WE123	AVFW	10
1.0m Green Cat6 Cable	00WE127	AVFX	10

Description	Part number	Feature code	Maximum quantity per controller enclosure
1.25m Green Cat6 Cable	00WE131	AVFY	10
1.5m Green Cat6 Cable	00WE135	AVFZ	10
3m Green Cat6 Cable	00WE139	AVG0	10
10m Green Cat6 Cable	90Y3718	A1MT	10
25m Green Cat6 Cable	90Y3727	A1MW	10

* Factory-installed only.

Expansion enclosures

The ThinkSystem DM5000H supports attachment of the following DM Series expansion enclosures:

- Up to 5 ThinkSystem DM240S 2U24 SFF enclosures.
- Up to 9 ThinkSystem DM120S 2U12 LFF enclosures.
- Up to 2 ThinkSystem DM600S 4U60 LFF enclosures.
- A combination of the DM240S, DM120S, and DM600S enclosures for a maximum of 144 drives.

Note: The ONTAP Fundamentals software supports up to 84 drives.

DM240S 2U24 SFF, DM120S 2U12 LFF, and DM600S 4U60 LFF expansion enclosures can be intermixed behind a 2U24 controller enclosure. The expansion enclosures can be added to the system non-disruptively.

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

Table 6. CTO base models for the ThinkSystem DM Series expansion enclosures

Description	Machine Type/Model	Feature code
Lenovo ThinkSystem Storage 2U24 Chassis (with 2x PSUs)	7Y58CTO1WW	B38L
Lenovo ThinkSystem Storage 2U12 Chassis (with 2x PSUs)	7Y59CTO1WW	B38M
Lenovo ThinkSystem Storage 4U60 Chassis (with 2x PSUs)	7Y43CTO1WW	B38N

Configuration note: Two I/O expansion modules (feature code B39J) are selected by default in the configurator, and the selection cannot be changed.

The models of the ThinkSystem DM240S, DM120S, and DM600S ship with the following items:

- One chassis with the following components:
 - Two I/O modules
 - Two power supplies
 - Two cooling modules (4U60 LFF only)
- Rack Mount Kit
- *Electronic Publications Flyer*
- Two customer-configured power cables
- Additional configured components (model-specific)

Each ThinkSystem DM Series expansion enclosure ships with two SAS I/O expansion modules. Each *I/O expansion module* provides two external 12 Gb SAS x4 ports (Mini-SAS HD SFF-8644 connectors labelled Port 1-4) that are used for connections to the ThinkSystem DM5000H and for daisy chaining the expansion enclosures between each other.

The dual-path HA (high availability) connectivity topology for the enclosures is shown in the following figure.

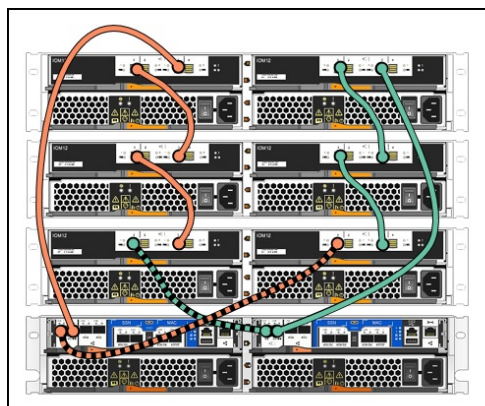


Figure 9. DM5000H expansion enclosure connectivity topology

Expansion cabling rules:

- Port 0b on the Controller 1 is the primary path that is connected to the Port 3 on the I/O Module A in the last expansion enclosure in a stack.
- Port 1 on the I/O Module A in the last expansion enclosure is connected to Port 3 on the I/O Module A in the adjacent expansion enclosure, and so on (until the first expansion enclosure in a stack is cabled).
- Port 0a on the Controller 1 is the secondary path that is connected to the Port 1 on the I/O Module B in the first expansion enclosure in a stack.
- Port 0b on the Controller 2 is the primary path that is connected to the Port 3 on the I/O Module B in the last expansion enclosure in a stack.
- Port 1 on the I/O Module B in the last expansion enclosure is connected to Port 3 on the I/O Module B in the adjacent expansion enclosure, and so on (until the first expansion enclosure in a stack is cabled).
- Port 0a on the Controller 2 is the secondary path that is connected to the Port 1 on the I/O Module A in the first expansion enclosure in a stack.

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

Table 7. Expansion enclosure connectivity options

Description	Part number	Feature code	Maximum 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 following quantities of SAS cables are needed for the stack of the expansion enclosures:
 - Two SAS cables per expansion enclosure in the stack for connecting the first expansion enclosure in the stack to the controller enclosure and for connections to the adjacent expansion enclosures.
 - Two additional SAS cables for connecting the last expansion enclosure in the stack to the controller enclosure.
- The length of the SAS cables that connect a 2U12 or 2U24 enclosure to an adjacent 4U60 enclosure should be at least 1 meter.

Drives

The ThinkSystem DM5000H and DM240S 2U24 SFF enclosures support up to 24 SFF hot-swap drives, the DM120S 2U12 LFF expansion enclosures support up to 12 LFF hot-swap drives, and the DM600S 4U60 LFF expansion enclosures support up to 60 LFF hot-swap drives.

The following table lists supported drive packs for the DM5000H and DM240S 2U24 SFF enclosures.

Table 8. DM5000H and DM240S 2U24 SFF drive packs for ONTAP

Description	Part number	Feature code	Maximum quantity per 2U24 enclosure
2.5-inch 12 Gbps SAS hot-swap SSDs (1 Drive Write per Day)			
ThinkSystem 5.76TB (6x 960GB SAS SSDs) 2U24 Drive Pack for DM5000H	4XB7A16946	B65X	4
ThinkSystem 23.04TB (6x 3.84TB SAS SSDs) 2U24 Drive Pack for DM5000H	4XB7A16948	B65Z	4
ThinkSystem 46.08TB (6x 7.68TB SAS SSDs) 2U24 Drive Pack for DM5000H	4XB7A16950	B661	4
ThinkSystem 92.16TB (6x 15.36TB SAS SSDs) 2U24 Drive Pack for DM5000H	4XB7A16952	B663	4
2.5-inch 12 Gbps SAS 10K rpm hot-swap HDDs			
ThinkSystem 5.4TB (6x 900GB SAS 10K HDDs) 2U24 Drive Pack for DM5000H	4XB7A16954	B665	4
ThinkSystem 7.2TB (6x 1.2TB SAS 10K HDDs) 2U24 Drive Pack for DM5000H	4XB7A16956	B667	4
ThinkSystem 10.8TB (6x 1.8TB SAS 10K HDDs) 2U24 Drive Pack for DM5000H	4XB7A16958	B669	4

Table 9. DM5000H and DM240S 2U24 SFF drive packs for ONTAP Fundamentals

Description	Part number	Feature code	Maximum quantity per 2U24 enclosure
2.5-inch 12 Gbps SAS hot-swap SSDs (1 Drive Write per Day)			
5.76TB (6x 960GB SAS SSDs) 2U24 Drive Pack for DM5000H - Fundamentals	4XB7A39366	B72J	4
23.04TB (6x 3.84TB SAS SSDs) 2U24 Drive Pack for DM5000H - Fundamentals	4XB7A39367	B72K	4
46.08TB (6x 7.68TB SAS SSDs) 2U24 Drive Pack for DM5000H - Fundamentals	4XB7A39368	B72L	4
92.16TB (6x 15.36TB SAS SSDs) 2U24 Drive Pack for DM5000H - Fundamentals	4XB7A39369	B72M	4
2.5-inch 12 Gbps SAS 10K rpm hot-swap HDDs			
5.4TB (6x 900GB SAS 10K HDDs) 2U24 Drive Pack for DM5000H - Fundamentals	4XB7A39370	B72N	4
7.2TB (6x 1.2TB SAS 10K HDDs) 2U24 Drive Pack for DM5000H - Fundamentals	4XB7A39371	B72P	4
10.8TB (6x 1.8TB SAS 10K HDDs) 2U24 Drive Pack for DM5000H - Fundamentals	4XB7A39372	B72Q	4

The following table lists supported drive packs for the DM120S 2U12 LFF expansion enclosures.

Table 10. DM120S 2U12 LFF drive packs for ONTAP

Description	Part number	Feature code	Maximum quantity per 2U12 enclosure
3.5-inch 12 Gbps NL SAS hot-swap HDDs			
ThinkSystem 24TB (6x 4TB NL SAS HDDs) 2U12 Drive Pack for DM5000H	4XB7A17022	B67W	2
ThinkSystem 48TB (6x 8TB NL SAS HDDs) 2U12 Drive Pack for DM5000H	4XB7A17024	B67Y	2
ThinkSystem 60TB (6x 10TB NL SAS HDDs) 2U12 Drive Pack for DM5000H	4XB7A17026	B680	2
ThinkSystem 96TB (6x 16TB NL SAS HDDs) 2U12 Drive Pack for DM5000H	4XB7A65094	BCV7	2

Table 11. DM120S 2U12 LFF drive packs for ONTAP Fundamentals

Description	Part number	Feature code	Maximum quantity per 2U12 enclosure
3.5-inch 12 Gbps NL SAS hot-swap HDDs			
24TB (6x 4TB NL SAS HDDs) 2U12 Drive Pack for DM5000H - Fundamentals	4XB7A39383	B73J	2
48TB (6x 8TB NL SAS HDDs) 2U12 Drive Pack for DM5000H - Fundamentals	4XB7A39384	B73K	2
60TB (6x 10TB NL SAS HDDs) 2U12 Drive Pack for DM5000H - Fundamentals	4XB7A39385	B73L	2
96TB (6x 16TB NL SAS HDDs) 2U12 Drive Pack for DM5000H - Fundamentals	4XB7A65096	BCV9	2

The following table lists supported drive packs for the DM600S 4U60 LFF expansion enclosures.

Table 12. DM600S 4U60 LFF drive packs for ONTAP

Description	Part number	Feature code	Maximum quantity per 4U60 enclosure
3.5-inch 12 Gbps NL SAS hot-swap HDDs			
ThinkSystem 120TB (30x 4TB NL SAS HDDs) 4U60 Drive Pack for DM5000H	4XB7A14687	B3XB	2
ThinkSystem 240TB (30x 8TB NL SAS HDDs) 4U60 Drive Pack for DM5000H	4XB7A14688	B3XD	2
ThinkSystem 300TB (30x 10TB NL SAS HDDs) 4U60 Drive Pack for DM5000H	4XB7A14689	B3XF	2
ThinkSystem 480TB (30x 16TB NL SAS HDDs) 4U60 Drive Pack for DM5000H	4XB7A65408	BCVH	2

Table 13. DM600S 4U60 LFF drive packs for ONTAP Fundamentals

Description	Part number	Feature code	Maximum quantity per 4U60 enclosure
3.5-inch 12 Gbps NL SAS hot-swap HDDs			
120TB (30x 4TB NL SAS HDDs) 4U60 Drive Pack for DM5000H - Fundamentals	4XB7A39386	B73M	2
240TB (30x 8TB NL SAS HDDs) 4U60 Drive Pack for DM5000H - Fundamentals	4XB7A39387	B73N	2
300TB (30x 10TB NL SAS HDDs) 4U60 Drive Pack for DM5000H - Fundamentals	4XB7A39388	B73P	2

Description	Part number	Feature code	Maximum quantity per 4U60 enclosure
480TB (30x 16TB NL SAS HDDs) 4U60 Drive Pack for DM5000H - Fundamentals	4XB7A65407	BCVG	2

Configuration notes:

- The DM5000H 2U24 SFF controller enclosures support from 12 to 24 drives in increments of 6 drives. For factory-installed drive packs, all drives in the enclosure must be of the same type and capacity.
- The DM240S 2U24 SFF expansion enclosures support from 6 to 24 drives in increments of 6 drives. For factory-installed drive packs, all drives in the enclosure must be of the same type and capacity.
- The DM120S 2U12 LFF expansion enclosures support from 6 to 12 drives in increments of 6 drives. For factory-installed drive packs, all drives in the enclosure must be of the same type and capacity.
- The DM600S 4U60 LFF expansion enclosures support from 30 to 60 drives in increments of 30 drives. For factory-installed drive packs, all drives in the enclosure must be of the same type and capacity.
- Drive packs for ONTAP are supported only with the DM5000H storage systems that run the ONTAP software. Drive packs for ONTAP Fundamentals are supported only with the DM5000H storage systems that run the ONTAP Fundamentals software.

Software

The ThinkSystem DM5000H can be configured with one of the following software bundles:

- **ONTAP:** Provides a comprehensive set of advanced storage management features for enterprises of various sizes.
- **ONTAP Fundamentals:** Provides a core set of storage management features for small and medium enterprises and remote locations of large enterprises.

The following features are included with the ThinkSystem DM5000H ONTAP software:

- **RAID-4, RAID-DP, and RAID-TEC data protection :** Provides the flexibility to choose the level of data protection required and helps improve performance and availability with built-in spare capacity and by distributing data across all physical drives in the aggregate, sustaining to up to one (RAID-4), two (RAID-DP), or three (RAID-TEC) concurrent drive failures.
- **SyncMirror data protection:** Adds extra level of data protection and availability by mirroring a pair of RAID aggregates.
- **Flash Cache:** Helps accelerate performance of read-centric workloads with read caching on the onboard NVMe flash module.
- **Flash Pool:** Helps accelerate performance of read- and write-centric workloads with read and write caching on aggregates with HDDs and SSDs.
- **FlexVol:** Provides abstraction layer between the logical volume and its physical location in the storage array.
- **FlexGroup:** Enables a single volume to span across multiple clustered storage arrays to maximize storage capacity and automate load distribution.
- **FlexCache:** Speeds up access to data and offloads traffic from heavily accessed volumes for read-intensive workloads by placing frequently used data in cache locally or remotely (closer to the point of client access) and serving the data to the clients directly from cache without accessing the data source.
- **Thin provisioning:** Optimizes efficiency 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.
- **Compression:** Provides transparent inline and post-process data compression to reduce the amount of storage that customers need to purchase and manage.

- **Compaction:** Works with compression to pack more data into each storage block to further reduce the amount of storage that customers need to purchase and manage.
- **Deduplication:** Performs general-purpose deduplication for removal of redundant data to reduce the amount of storage that customers need to purchase and manage.
- **Snapshots:** Enables creation of read-only copies of data for backup, parallel processing, testing, and development, and have the copies available almost immediately.
- **FlexClone:** References snapshot metadata to create writable point-in-time copies of a volume.
- **Encryption:** Provides software-based encryption for data at rest for enhanced data security with the traditional drives and embedded key management (requires the encryption-capable version of the ONTAP software).
- **Balanced placement:** Provides automated workload distribution across the cluster to help increase utilization and performance.
- **Dynamic capacity expansion:** Allows the capacity of a volume or aggregate to be expanded by adding new physical drives.
- **Adaptive Quality of Service:** Simplifies operations and maintains consistent workload performance by defining QoS policies and automatically adjusting storage resources to respond to workload changes.
- **SnapVault disk-based storage backup:** Enables data stored on multiple systems to be backed up to a central, secondary system quickly and efficiently as read-only snapshot copies.
- **SnapRestore:** Enables quick recovery of data by reverting a local volume or file to its previous state from a particular snapshot copy stored on the file system.
- **SnapCenter:** Provides application- and virtual machine-aware backup and restoration of data by using the Snapshots technology and leverages the SnapMirror capabilities of storage systems to provide onsite or offsite backup set mirroring for disaster recovery.
- **MetroCluster IP:** Provides storage system-based clustering with online, real-time data mirroring between the local and remote sites by using synchronous data transfers over IP communication links to deliver continuous availability with zero RPO and near-zero RTO.
Note: All storage systems in a MetroCluster IP configuration must be of the same model.
- **SnapMirror synchronous and asynchronous replication:** Provides storage system-based data replication between the storage systems containing source (local) and destination (remote) volumes by using synchronous (as soon as the data is written to the source volume) or asynchronous (at specified regular intervals) data transfers over IP communication links.
Note: The SnapMirror feature of the ThinkSystem DM5000H interoperate with other ThinkSystem DM Series storage arrays.

The following features are included with the ThinkSystem DM5000H ONTAP Fundamentals software:

- RAID-4, RAID-DP, and RAID-TEC
- SyncMirror
- Flash Cache
- Flash Pool
- FlexVol
- Thin provisioning
- Compression
- Compaction
- Deduplication
- Snapshots
- Encryption (requires the encryption-capable version of the ONTAP Fundamentals software)
- Dynamic capacity expansion
- Adaptive Quality of Service
- SnapRestore
- SnapMirror asynchronous replication
- Scalability to up to 84 drives
- No clustering support

The following table lists the software selection options for the ThinkSystem DM5000H.

Table 14. Software selection

Description	Feature code
ONTAP software	
Lenovo ThinkSystem DM Series ONTAP 9.6 Software, Encryption	B79W
Lenovo ThinkSystem DM Series ONTAP 9.6 Software, No Encryption	B79X
Lenovo ThinkSystem DM Series ONTAP 9.7 Software, Encryption	BAYL
Lenovo ThinkSystem DM Series ONTAP 9.7 Software, No Encryption	BAYK
ONTAP Fundamentals software	
Lenovo ThinkSystem DM Series ONTAP 9.5 Software, Fundamentals, Encryption	B72V
Lenovo ThinkSystem DM Series ONTAP 9.5 Software, Fundamentals, No Encryption	B72W
Lenovo ThinkSystem DM Series ONTAP 9.6 Software, Fundamentals, Encryption	B7F8
Lenovo ThinkSystem DM Series ONTAP 9.6 Software, Fundamentals, No Encryption	B7F9
Lenovo ThinkSystem DM Series ONTAP 9.7 Software, Fundamentals, Encryption	BAYG
Lenovo ThinkSystem DM Series ONTAP 9.7 Software, Fundamentals, No Encryption	BAYH

Configuration note: The encryption-capable version of the ONTAP Software is not available in the following countries:

- Belarus
- Kazakhstan
- People's Republic of China
- Russia

Software maintenance is included in the ThinkSystem DM5000H warranty and support (see [Warranty and support](#) for details).

It is possible to upgrade ONTAP Fundamentals to ONTAP after the initial deployment by purchasing the software upgrade license option listed in the following table.

Table 15. Software upgrade license

Description	Part number	Feature code
DM Series ONTAP Fundamentals to Premium Bundle Upgrade	None*	BCVJ

* The software license for field upgrades can be ordered via the CTO base 7D4FCTO2WW (refer to the [configuration note](#)).

Configuration note: The software license for ONTAP field upgrades of the existing ThinkSystem DM5000H storage arrays that run ONTAP Fundamentals can be ordered via the CTO base 7D4FCTO2WW, DM Series ONTAP Fundamentals to Premium Bundle Upgrade.

The ThinkSystem DM5000H ONTAP capabilities can be expanded with the following optional licensed functions:

- **SnapLock WORM data protection:** Creates non-rewritable, non-erasable data on hard disk drives to prevent files from being altered or deleted until a predetermined or default retention date.
- **FabricPool object storage tiering:** Enables automated tiering of data from high-performance SSDs (active data) to lower-cost object storage in public or private clouds (inactive data).
Note: FabricPool is supported for SSD-only storage pools; Hybrid (SSD and HDD) or HDD-only storage pools are not supported.

The following table lists the Feature on Demand (FoD) upgrades for the ThinkSystem DM5000H to enable optional software features.

Table 16. Optional software features

Description	Part number	Feature code	Quantity
DM Series SnapLock License	4P47A16547	None*	1**
DM Series FabricPool – 1TB Increment – 3 years	4P47A37057	None*	1^
DM Series FabricPool – 1TB Increment – 5 years	4P47A37288	None*	1^
10TB Free FabricPool License – 3yr Svcs	4P47A64860	None*	1^^
10TB Free FabricPool License – 5yr Svcs	4P47A64861	None*	1^^

* Field upgrade only; no factory installation.

** Quantity per system; contains two licenses.

^ Quantity per TB of storage capacity.

^^ Includes the capacity-based FabricPool license for 10 TB free-of-charge and software support services for the additional cost.

Configuration notes:

- The SnapLock feature is licensed on a per-controller basis; that is, two licenses are needed per system, and these two licenses are contained in a single orderable part number. These licenses also include 5-year software support entitlement.
- The FabricPool feature is a cluster-wide, capacity-based license that is available for 3- or 5-year subscription terms.

Management

The ThinkSystem DM5000H supports the following management interfaces:

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

Power supplies and cables

The ThinkSystem DM5000H, DM240S 2U24 SFF, and DM120S 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 ThinkSystem DM600S 4U60 LFF expansion enclosures ship with two redundant hot-swap 2325 W (200 - 240 V) Platinum AC power supplies, each with an IEC 320-C20 connector.

Each ThinkSystem DM Series enclosure requires the selection of two power cables.

The following table lists the rack power cable and line cord options that can be ordered for the DM5000H, DM240S 2U24 SFF, and DM120S 2U12 LFF enclosures (two power cords per enclosure).

Table 17. Power cables for DM5000H, DM240S 2U24 SFF, and DM120S 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
1.2m, 16A/100-250V, 2 Short C13s to Short C20 Rack Power Cable	47C2491	A3SW
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
2.5m, 16A/100-250V, 2 Long C13s to Short C20 Rack Power Cable	47C2492	A3SX
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
2.8m, 16A/100-250V, 2 Short C13s to Long C20 Rack Power Cable	47C2493	A3SY
4.1m, 16A/100-250V, 2 Long C13s to Long C20 Rack Power Cable	47C2494	A3SZ
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

Description	Part number	Feature code
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/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/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

The following table lists the rack power cable and line cord options that can be ordered for the DM600S 4U60 LFF expansion enclosures (two power cords per enclosure).

Table 18. Power cables for DM600S 4U60 enclosures

Description	Part number	Feature code
Rack power cables		
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

Rack installation

The individually shipped ThinkSystem DM5000H, DM240S, and DM600S enclosures come with the ThinkSystem Storage Rack Mount Kit 2U24/4U60, and the individually shipped ThinkSystem DM120S enclosures come with the ThinkSystem Storage Rack Mount Kit 2U12. The rack mount kits are listed in the following table.

Table 19. 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 DM 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 20. 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
DM/DE 4U Adjustable Rail Kit (SIR)	B742	1

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

Table 21. 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	DM120S	DM5000H DM240S DM600S‡	DM5000H DM240S	DM600S‡
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 ThinkSystem DM5000H controller enclosure has the following dimensions and weight (approximate):

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

The ThinkSystem DM240S 2U24 SFF enclosures have the following dimensions and weight (approximate):

- Height: 85 mm (3.4 in.)
- Width: 449 mm (17.7 in.)
- Depth: 484 mm (19.1 in.)
- Weight (fully configured): 24.4 kg (53.8 lb)

The ThinkSystem DM120S 2U12 LFF enclosures have the following dimensions and weight (approximate):

- Height: 85 mm (3.4 in.)
- Width: 447 mm (17.6 in.)
- Depth: 483 mm (19.0 in.)
- Weight (fully configured): 28.7 kg (63.3 lb)

The ThinkSystem DM600S 4U60 LFF enclosures have the following dimensions and weight (approximate):

- Height: 174 mm (6.9 in.)
- Width: 449 mm (17.7 in.)
- Depth: 922 mm (36.3 in.)
- Weight (fully configured): 111.5 kg (245.8 lb)

Operating environment

The ThinkSystem DM5000H and DM240S 2U24 SFF enclosures are supported in the following environment:

- Air temperature:
 - Operating:
 - DM5000H and DM240S 2U24 SFF: 5 °C - 45 °C (41 °F - 113 °F)
 - DM120S 2U12 LFF and DM600S 4U60 LFF: 10 °C - 40 °C (50 °F - 104 °F)
 - Non-operating: -40 °C - +70 °C (-40 °F - 158 °F)
 - Maximum altitude: 3050 m (10,000 ft)
- Relative humidity:
 - Operating: 8% - 90% (non-condensing)
 - Non-operating: 10% - 95% (non-condensing)
- Electrical power:
 - DM5000H
 - 100 to 127 (nominal) V AC; 50 Hz or 60 Hz; 5.35 A
 - 200 to 240 (nominal) V AC; 50 Hz or 60 Hz; 2.67 A
 - Maximum system power load: 508 W
 - DM240S 2U24 SFF
 - 100 to 127 (nominal) V AC; 50 Hz or 60 Hz; 4.11 A
 - 200 to 240 (nominal) V AC; 50 Hz or 60 Hz; 2.05 A
 - Maximum system power load: 390 W
 - DM120S 2U12 LFF
 - 100 to 127 (nominal) V AC; 50 Hz or 60 Hz; 3.56 A
 - 200 to 240 (nominal) V AC; 50 Hz or 60 Hz; 1.78 A
 - Maximum system power load: 338 W
 - DM600S 4U60 LFF
 - 200 to 240 (nominal) V AC; 50 Hz or 60 Hz; 8.11 A
 - Maximum system power load: 1541 W
- Heat dissipation:
 - DM5000H: 1733 BTU/hour
 - DM240S 2U24 SFF: 1331 BTU/hour
 - DM120S 2U12 LFF: 1153 BTU/hour
 - DM600S 4U60 LFF: 5258 BTU/hour
- Acoustical noise emission:
 - DM5000H: 6.9 bels
 - DM240S 2U24 SFF: 6.9 bels
 - DM120S 2U12 LFF: 6.3 bels
 - DM600S 4U60 SFF: 7.2 bels

Warranty and support

The ThinkSystem DM Series enclosures can be configured with a three-, four, or five-year Customer Replaceable Unit (CRU) and onsite limited warranty with various levels of coverage with a well-defined scope of services, including service hours, response time, term of service, and service agreement terms and conditions.

Lenovo's 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 Service Levels (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.
 - **Foundation Service:** 9x5 service coverage with next business day onsite response.
 - **Essential Service:** 24x7 service coverage with 4-hour onsite response.

Note: Either Foundation or Essential Service *must* be purchased with the storage system (for controller enclosures, expansion enclosures, and drive packs).
- **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.
- **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://lenovolocator.com/>

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

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

Services

Lenovo Services is a dedicated partner to customer success. Lenovo's goal for customers is to reduce capital outlays, mitigate IT risks, and accelerate time to productivity.

Here is a more in-depth look at what Lenovo can do for their customers:

- **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 customers.
- **Assessment Services**
An assessment helps solve customer IT challenges through an onsite, multi-day session with a Lenovo technology expert. Lenovo performs 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, no matter how large or small, get a better return on their IT investment and overcome challenges in the ever-changing technology landscape.
- **Design Services**
Professional Services consultants perform infrastructure design and implementation planning to support customer's 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 customer's server, storage, or networking hardware. Working at a time convenient for the customer (business hours or off shift), the technician will unpack and inspect the systems on customer 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 customers to focus on other priorities.

- **Deployment Services**

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

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

Integration, Migration, and Expansion Services allow to move existing physical and virtual workloads easily, or to determine technical requirements to support increased workloads while maximizing performance. These services include tuning, validation, and documenting ongoing run processes, and they leverage migration assessment planning documents to perform necessary migrations.

Some service options may not be available in every country. For more information about Lenovo service offerings that are available in a specific country or area, contact a local Lenovo sales representative or business partner.

Regulatory compliance

The ThinkSystem DM Series enclosures conform to the following regulations:

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

Interoperability

Lenovo provides end-to-end storage compatibility testing to deliver interoperability throughout the network. The ThinkSystem DM5000H Unified Hybrid Storage Array supports attachment to Lenovo servers by using NAS (NFS and CIFS/SMB), iSCSI, and Fibre Channel storage connectivity protocols.

The following sections list adapters and Ethernet LAN and FC SAN switches that are currently offered by Lenovo that can be used with the ThinkSystem DM5000H Hybrid Storage Array in IT solutions:

- [Adapters](#)
- [Cluster interconnect](#)
- [Ethernet LAN switches](#)
- [Fibre Channel SAN switches](#)

Note: Tables that are provided in these sections are for ordering reference purposes only.

For end-to-end storage configuration support, refer to the Lenovo Storage Interoperation Center (LSIC): <https://datacentersupport.lenovo.com/us/en/lpic>

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.

Adapters

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

- NAS and iSCSI connectivity
- Fibre Channel connectivity

NAS and iSCSI connectivity

The ThinkSystem DM5000H supports NAS and iSCSI attachments via standard 1 Gb and 10 Gb Ethernet connections (direct attach or switch-based). Any compatible Ethernet switch, including Lenovo ThinkSystem and RackSwitch Ethernet switches and embedded Flex System Ethernet I/O modules, can be used to provide NAS and iSCSI connectivity for the ThinkSystem DM5000H storage.

With software iSCSI initiators, any supported 1 Gb or 10 Gb Ethernet adapter for Lenovo servers is compatible with the ThinkSystem DM5000H NAS and iSCSI storage.

Fibre Channel connectivity

The ThinkSystem DM5000H supports FC switch-based attachments. Lenovo B Series and DB Series FC SAN switches and directors can be used to provide FC connectivity.

Currently available FC adapters for Lenovo servers that are compatible with the ThinkSystem DM5000H FC storage are listed in the following table. Other FC HBAs also might be supported (see the Interoperability Matrix for details).

Table 22. Fibre Channel adapters

Description	Part number
ThinkSystem HBAs: 32 Gb FC (8/6/32 Gb FC connectivity)	
ThinkSystem Emulex LPe35000 32Gb 1-port PCIe Fibre Channel Adapter	4XC7A08250
ThinkSystem Emulex LPe35002 32Gb 2-port PCIe Fibre Channel Adapter	4XC7A08251
ThinkSystem Emulex LPe32000-M6-LP PCIe 32Gb 1-Port SFP+ Fibre Channel Adapter	7ZT7A00517
ThinkSystem Emulex LPe32002-M6-LP PCIe 32Gb 2-Port SFP+ Fibre Channel Adapter	7ZT7A00519
ThinkSystem QLogic QLE2740 PCIe 32Gb 1-Port SFP+ Fibre Channel Adapter	7ZT7A00516
ThinkSystem QLogic QLE2742 PCIe 32Gb 2-Port SFP+ Fibre Channel Adapter	7ZT7A00518
System x HBAs: 16 Gb FC	
Emulex 16Gb Gen6 FC Single-port HBA (LPe31000)	01CV830
Emulex 16Gb Gen6 FC Dual-port HBA (LPe31002)	01CV840
Emulex 16Gb FC Single-port HBA (LPe16000)	81Y1655
Emulex 16Gb FC Dual-port HBA (LPe16002)	81Y1662
QLogic 16Gb Enhanced Gen5 FC Single-port HBA (QLE2690)	01CV750
QLogic 16Gb Enhanced Gen5 FC Dual-port HBA (QLE2692)	01CV760
QLogic 16Gb FC Single-port HBA (QLE2660)	00Y3337
QLogic 16Gb FC Dual-port HBA (QLE2662)	00Y3341
Flex System HBAs: 16 Gb FC	
ThinkSystem Emulex LPm16002B-L Mezz 16Gb 2-Port Fibre Channel Adapter	7ZT7A00521
ThinkSystem Emulex LPm16004B-L Mezz 16Gb 4-Port Fibre Channel Adapter	7ZT7A00522
ThinkSystem QLogic QML2692 Mezz 16Gb 2-Port Fibre Channel Adapter	7ZT7A00520

Cluster interconnect

The following table lists the Ethernet storage switch that can be used with the ThinkSystem DM5000H Unified Hybrid Storage Array for cluster interconnect and MetroCluster IP configurations.

Table 23. Ethernet storage switch

Description	Part number
BES-53248 Ethernet Storage Switch: 16x SFP ports and 2x QSFP ports active, 2 PS (CTO only)	7D2SCTO1WW

For more information, see the BES-53248 Ethernet Storage Switch for Lenovo Product Guide:
<http://lenovopress.com/lp1226>

Ethernet LAN switches

The following table lists currently available embedded Ethernet switches and pass-thru modules for Flex System that can be used with the ThinkSystem DM5000H Unified Hybrid Storage Array in IT solutions.

Table 25. Embedded Ethernet switches for Flex System

Description	Part number
10 Gb Ethernet (10 GbE connectivity; NAS and iSCSI)	
Lenovo Flex System Fabric EN4093R 10Gb Scalable Switch	00FM514
Lenovo Flex System SI4091 10Gb System Interconnect Module	00FE327
Lenovo Flex System Fabric SI4093 System Interconnect Module	00FM518
25 Gb Ethernet (10 GbE connectivity out of an SFP28 port; NAS and iSCSI)	
Lenovo ThinkSystem NE2552E Flex Switch	4SG7A08868
Pass-thru modules (10 GbE connectivity [require a compatible external switch]; NAS and iSCSI)	
Lenovo Flex System EN4091 10Gb Ethernet Pass-thru	88Y6043

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

Fibre Channel SAN switches

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

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

Rack cabinets

The following table lists the supported rack cabinets.

Table 26. Rack cabinets

Part number	Description
93072RX	25U Standard Rack
93072PX	25U Static S2 Standard Rack
93634PX	42U 1100mm Dynamic Rack
93634EX	42U 1100mm Dynamic Expansion Rack
93604PX	42U 1200mm Deep Dynamic Rack
93614PX	42U 1200mm Deep Static Rack
93084EX	42U Enterprise Expansion Rack
93084PX	42U Enterprise Rack
93074RX	42U Standard Rack

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 27. Power distribution units

Part number	Description
0U Basic PDUs	
00YJ776	0U 36 C13/6 C19 24A/200-240V 1 Phase PDU with NEMA L6-30P line cord
00YJ777	0U 36 C13/6 C19 32A/200-240V 1 Phase PDU with IEC60309 332P6 line cord
00YJ778	0U 21 C13/12 C19 32A/200-240V/346-415V 3 Phase PDU with IEC60309 532P6 line cord
00YJ779	0U 21 C13/12 C19 48A/200-240V 3 Phase PDU with IEC60309 460P9 line cord
Switched and Monitored PDUs	
00YJ780	0U 20 C13/4 C19 Switched and Monitored 32A/200-240V/1Ph PDU w/ IEC60309 332P6 line cord
00YJ781	0U 20 C13/4 C19 Switched and Monitored 24A/200-240V/1Ph PDU w/ NEMA L6-30P line cord
00YJ782	0U 18 C13/6 C19 Switched / Monitored 32A/200-240V/346-415V/3Ph PDU w/ IEC60309 532P6 cord
00YJ783	0U 12 C13/12 C19 Switched and Monitored 48A/200-240V/3Ph PDU w/ IEC60309 460P9 line cord
46M4003	1U 9 C19/3 C13 Switched and Monitored 60A 3 Phase PDU with IEC 309 3P+Gnd line cord
46M4004	1U 12 C13 Switched and Monitored DPI PDU (without line cord)
46M4005	1U 12 C13 Switched and Monitored 60A 3 Phase PDU with IEC 309 3P+Gnd line cord
Ultra Density Enterprise PDUs (9x IEC 320 C13 + 3x IEC 320 C19 outlets)	
71762NX	Ultra Density Enterprise C19/C13 PDU Module (without line cord)
71763NU	Ultra Density Enterprise C19/C13 PDU 60A/208V/3ph with IEC 309 3P+Gnd line cord
C13 Enterprise PDUs (12x IEC 320 C13 outlets)	
39M2816	DPI C13 Enterprise PDU+ (without line cord)
39Y8941	DPI Single Phase C13 Enterprise PDU (without line cord)

Part number	Description
C19 Enterprise PDUs (6x IEC 320 C19 outlets)	
39Y8948	DPI Single Phase C19 Enterprise PDU (without line cord)
39Y8923	DPI 60A 3 Phase C19 Enterprise PDU with IEC 309 3P+G (208 V) fixed line cord
Front-end PDUs (3x IEC 320 C19 outlets)	
39Y8938	DPI 30amp/125V Front-end PDU with NEMA L5-30P line cord
39Y8939	DPI 30amp/250V Front-end PDU with NEMA L6-30P line cord
39Y8934	DPI 32amp/250V Front-end PDU with IEC 309 2P+Gnd line cord
39Y8940	DPI 60amp/250V Front-end PDU with IEC 309 2P+Gnd line cord
39Y8935	DPI 63amp/250V Front-end PDU with IEC 309 2P+Gnd line cord
NEMA PDUs (6x NEMA 5-15R outlets)	
39Y8905	DPI 100-127V PDU with Fixed NEMA L5-15P line cord
Line cords for PDUs that ship without a line cord	
40K9611	DPI 32a Line Cord (IEC 309 3P+N+G)
40K9612	DPI 32a Line Cord (IEC 309 P+N+G)
40K9613	DPI 63a Cord (IEC 309 P+N+G)
40K9614	DPI 30a Line Cord (NEMA L6-30P)
40K9615	DPI 60a Cord (IEC 309 2P+G)
40K9617	DPI Australian/NZ 3112 Line Cord
40K9618	DPI Korean 8305 Line Cord

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 28. 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 countries in the Asia Pacific region.

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

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

Lenovo Financial Services

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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 Data Center SAN Storage product page
<http://www.lenovo.com/us/en/c/storage-area-network>
- Lenovo Data Center Solution Configurator
<http://dcsc.lenovo.com>
- ThinkSystem DM Series documentation
http://thinksystem.lenovofiles.com/storage/help/topic/ontap_software/overview.html
- Lenovo Data Center Support - ThinkSystem DM5000H
<http://datacentersupport.lenovo.com/us/en/products/storage/lenovo-storage/thinksystem-dm5000h>

Related product families

Product families related to this document are the following:

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

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