



## Lenovo ThinkSystem DS2200 Storage Array Product Guide

The Lenovo ThinkSystem DS2200 provides simplicity, speed, scalability, security, and high availability for small to large businesses. The ThinkSystem DS2200 delivers enterprise-class storage management technology in an affordable solution with a wide choice of host connectivity options, flexible drive configurations, and enhanced data management features.

The ThinkSystem DS2200 is a perfect fit for small offices and remote and branch offices of large enterprises that need a primary storage solution that supports general purpose workloads, such as file and print serving, web serving, email and collaboration, and small databases. The DS2200 is also well-suited for secure archive storage or a low-cost backup solution.

The ThinkSystem DS2200 supports up to 96 drives with up to three external expansion enclosures. It also offers flexible drive configurations with the choice of 2.5-inch and 3.5-inch drive form factors, 10 K or 15 K rpm SAS and 7.2 K rpm NL SAS hard disk drives (HDDs) and self-encrypting drives (SEDs), and SAS solid-state drives (SSDs). The DS2200 can be scaled up to 737 TB of raw storage capacity.

The Lenovo ThinkSystem DS2200 enclosures are shown in the following figure.



Figure 1. Lenovo ThinkSystem DS2200 SFF (left) and LFF (right) enclosures

### Did you know?

The ThinkSystem DS2200 supports Intelligent Real-time Tiering capabilities that help optimize system performance, reduce costs, and simplify management. The base software includes the ability to move data dynamically between SAS HDDs that are optimized for cost per IOPS and NL SAS HDDs that are optimized for cost per GB. With the optional software license, the DS2200 supports hybrid tiering across HDDs and SSDs.

The ThinkSystem DS2200 offers the flexible choice of 12 Gb SAS, 1/10 Gb iSCSI, and 4/8/16 Gb Fibre Channel (FC) host connectivity protocols. The Converged Network Controller (CNC) design of the DS2200 makes the selection of iSCSI or FC host connectivity as simple as attaching corresponding transceivers or Direct-Attach Copper (DAC) cables to the SFP/SFP+ ports on the controller module.

The ThinkSystem DS2200 supports battery-free cache protection, which reduces maintenance costs and provides permanent backup of unwritten cache data if there is a power failure.

## Key features

The ThinkSystem DS2200 offers the following key features and benefits:

- Low-cost, entry-level storage with dual active/active controller configurations for high availability and performance.
- Flexible host connectivity to match diverse client needs with support for 12 Gb SAS (SAS controller module) or 1/10 Gb iSCSI or 4/8/16 Gb Fibre Channel connectivity (FC/iSCSI controller module).
- 12 Gb SAS drive-side connectivity with support for 12x 3.5-inch large form factor (LFF) or 24x 2.5-inch small form factor (SFF) drives in the controller enclosure; scalable up to 48 LFF drives per system with the attachment of ThinkSystem DS Series LFF expansion units (12x LFF drives each) or up to 96 SFF drives per system with the attachment of ThinkSystem DS Series SFF expansion units (24x SFF drives each) to satisfy growing needs for storage capacity and performance.
- Flexibility in storing data on high-performance SAS SSDs, performance-optimized enterprise SAS HDDs, or capacity-optimized enterprise NL SAS HDDs; mixing and matching drive types and form factors within a single system to perfectly meet performance and capacity requirements for various workloads.
- Support for self-encrypting drives (SEDs) to allow clients to secure their sensitive data and to comply with various security regulations, when required.
- Rich set of standard functions available at no extra cost, including virtualized storage pools, snapshots, thin provisioning, rapid RAID rebuild, real-time HDD tiering, SSD read cache, and All Flash Array (AFA).
- Optional licensed functions, including higher number of snapshots for more scalability, real-time SSD tiering for boosting IOPS performance, and asynchronous replication for 24x7 data protection and disaster recovery.
- Intuitive, web-based GUI for easy system set up and management, as well as Command Line Interface (CLI).
- Designed for 99.999% availability.

The ThinkSystem DS2200 supports the complete range of data storage requirements, from highly used applications to high-capacity, low usage applications.

The following 2.5-inch drives are supported:

- Capacity-optimized solid-state drives (1 drive write per day [DWD]): 3.84 TB and 7.68 TB
- High performance solid-state drives (3 DWD and 10 DWD): 400 GB, 800 GB, and 1.6 TB
- High performance self-encrypting solid-state drives (10 DWD): 800 GB
- Performance-optimized, enterprise class disk drives:
  - 300 GB, 600 GB, and 900 GB 15 K rpm
  - 600 GB, 900 GB, 1.2 TB, and 1.8 TB 10 K rpm
- Performance-optimized, enterprise class self-encrypting disk drives: 1.2 TB 10 K rpm
- High-capacity, archival-class nearline disk drives: 1 TB and 2 TB 7.2 K rpm

The following 3.5-inch drives are supported:

- High-performance solid-state drives (3 DWD and 10 DWD): 400 GB
- Performance-optimized, enterprise class disk drives: 900 GB 10 K rpm
- High-capacity, archival-class nearline disk drives: 2 TB, 4 TB, 6 TB, 8 TB, and 10 TB 7.2 K rpm
- High-capacity, archival-class nearline self-encrypting disk drives: 4 TB 7.2 K rpm

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

Up to three ThinkSystem DS Series expansion units are supported by a single ThinkSystem DS2200. Customers can intermix 3.5-inch and 2.5-inch expansion enclosures behind a 3.5-inch or 2.5-inch 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 DS2200 offers high levels of system and data availability with the following technologies:

- Dual-active controller modules with low latency cache mirroring
- Dual-port HDDs and SSDs with automatic drive failure detection and rapid RAID rebuild with global hot spares
- Redundant, hot-swappable and customer replaceable hardware components, including SFP/SFP+ transceivers, controller modules, expansion modules, power and cooling modules, and drives
- Automated path failover support for the data path between the host and the drives with multipathing software
- Non-disruptive controller firmware upgrades for dual controller configurations with multipathing

### Components and connectors

The following figure shows the front of the ThinkSystem DS2200 SFF chassis and the DS Series SFF expansion unit.

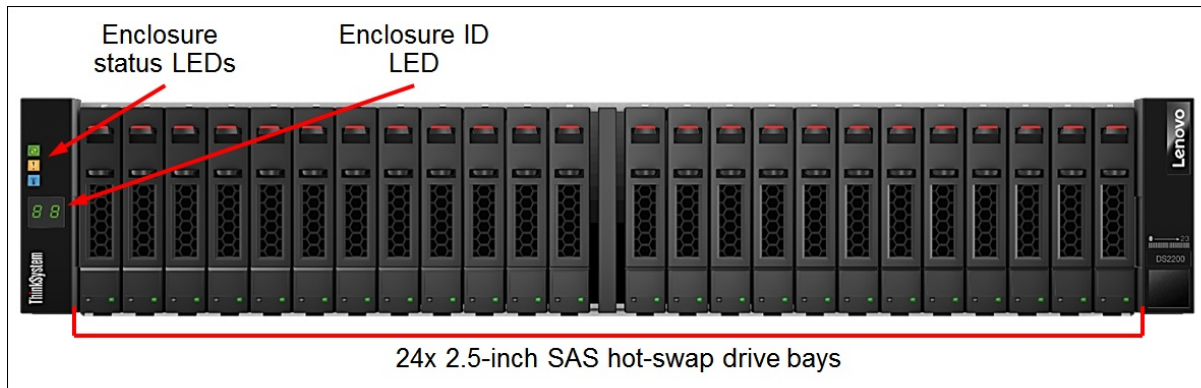


Figure 2. ThinkSystem DS2200 SFF chassis and DS Series SFF expansion unit: Front view

The following figure shows the front of the ThinkSystem DS2200 LFF chassis and the DS Series LFF expansion unit.

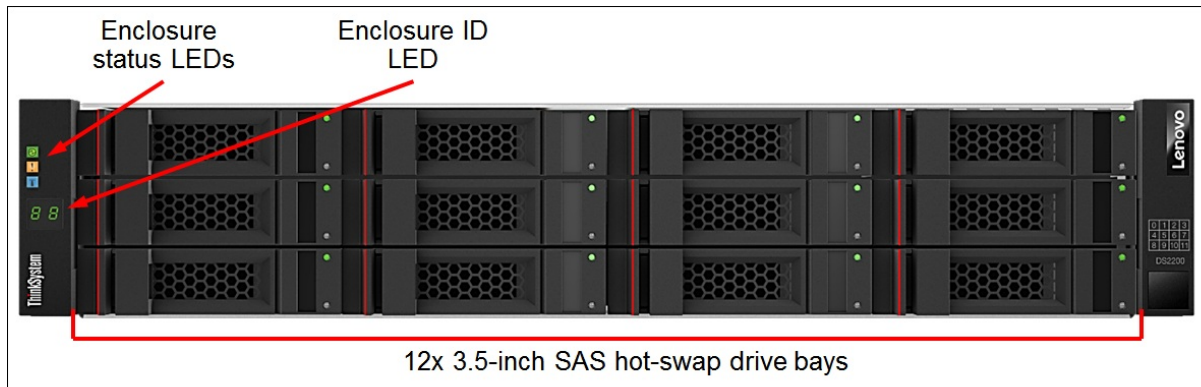


Figure 3. ThinkSystem DS2200 LFF chassis and DS Series LFF expansion unit: Front view

The following figure shows the rear of the ThinkSystem DS2200 with SAS controller modules.

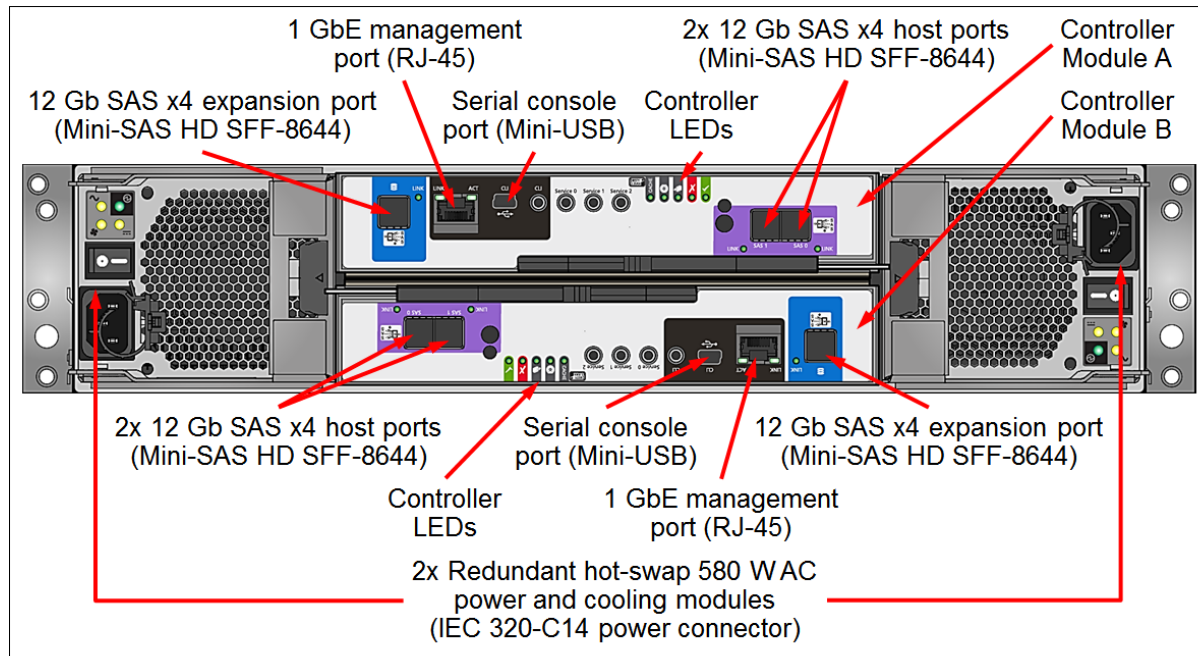


Figure 4. ThinkSystem DS2200 with SAS controller modules: Rear view

The following figure shows the rear view of the ThinkSystem DS2200 with FC/iSCSI controller modules.

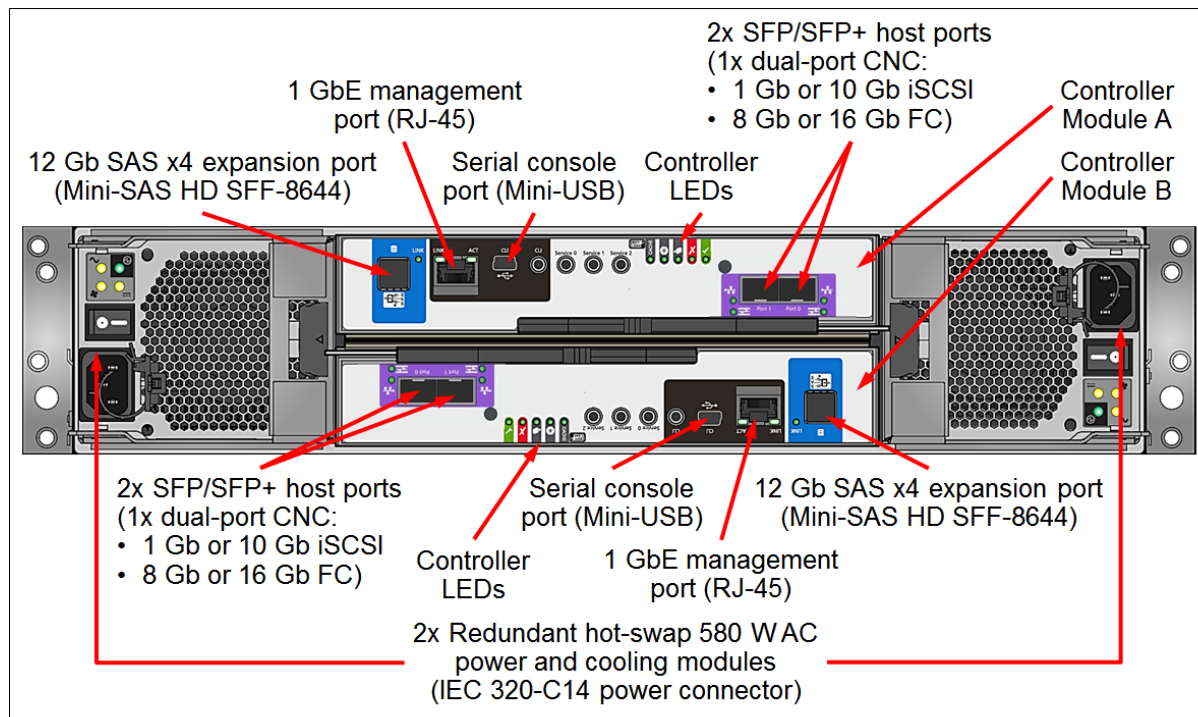


Figure 5. ThinkSystem DS2200 with FC/iSCSI controller modules: Rear view

The following figure shows the rear of the ThinkSystem DS Series expansion unit.

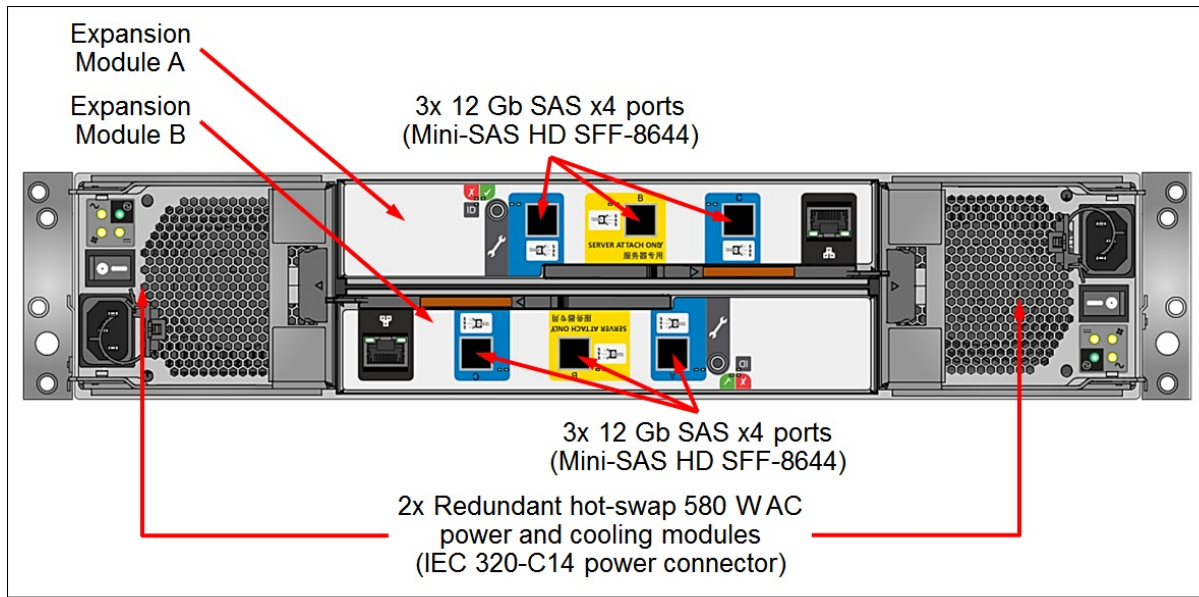


Figure 6. ThinkSystem DS Series expansion unit: Rear view

**Note:** Port B on the DS Series expansion unit is not used.

## System specifications

The following table lists the ThinkSystem DS2200 specifications.

Table 1. System specifications

Component	Specification
Form factor	<ul style="list-style-type: none"> <li>ThinkSystem DS2200: 2U rack mount (Machine Type 4599)</li> <li>ThinkSystem DS Series Expansion Unit: 2U rack mount (Machine Type 4588)</li> </ul>
Controller configuration	Two types of controller modules: <ul style="list-style-type: none"> <li>DS2200 SAS controller module</li> <li>DS2200 FC/iSCSI controller module</li> </ul> Dual controller configuration only. Both controllers in the system must be of the same type.
RAID levels	RAID 0, 1, 5, 6, and 10.
Controller memory	16 GB per system (8 GB per controller module). Battery-free cache protection with flash memory and supercapacitors. Low latency cache mirroring protection for dual controller configurations.
Drive bays	Up to 96 SFF drive bays per storage system: <ul style="list-style-type: none"> <li>24 SFF drive bays in the DS2200 SFF chassis</li> <li>24 SFF drive bays in the SFF expansion unit; up to 3 expansion units</li> </ul> Up to 48 LFF drive bays per storage system: <ul style="list-style-type: none"> <li>12 LFF drive bays in the DS2200 LFF chassis</li> <li>12 LFF drive bays in the LFF expansion unit; up to 3 expansion units</li> </ul> Intermix of SFF and LFF enclosures is supported.
Drive technology	SAS and NL SAS HDDs and SEDs, SAS SSDs. Intermix of HDDs and SSDs is supported. Intermix of SEDs with HDDs or SSDs is not supported.

Component	Specification
Drive connectivity	<p>Dual-ported 12 Gb SAS drive attachment infrastructure.</p> <p>Controller unit with two controller modules (ports per one controller module):</p> <ul style="list-style-type: none"> <li>● 24x 12 Gb SAS internal drive ports (SFF enclosure)</li> <li>● 12x 12 Gb SAS internal drive ports (LFF enclosure)</li> <li>● 1x 12 Gb SAS x4 (Mini-SAS HD SFF-8644) expansion port for the attachment of the expansion enclosures</li> </ul> <p>Expansion unit with two expansion modules (ports per one expansion module):</p> <ul style="list-style-type: none"> <li>● 24x 12 Gb SAS internal drive ports (SFF enclosure)</li> <li>● 12x 12 Gb SAS internal drive ports (LFF enclosure)</li> <li>● 3x 12 Gb SAS x4 (Mini-SAS HD SFF-8644) expansion ports; two of these ports (Ports A and C) are used for the daisy chained attachment of the expansion enclosures; Port B is not used.</li> </ul>
Drives	<p>SFF drives:</p> <ul style="list-style-type: none"> <li>● 300 GB, 600 GB, and 900 GB 15K rpm 12 Gb SAS HDDs</li> <li>● 600 GB, 900 GB, 1.2 TB, and 1.8 TB 10K rpm 12 Gb SAS HDDs</li> <li>● 1.2 TB 10K rpm 12 Gb SAS SED HDD</li> <li>● 1 TB and 2 TB 7.2K rpm 12 Gb NL SAS HDDs</li> <li>● 3.84 TB and 7.68 TB 12 Gb SAS SSDs (1 DWD)</li> <li>● 400 GB, 800 GB, and 1.6 TB 12 Gb SAS SSDs (3 DWD and 10 DWD)</li> <li>● 800 GB 12 Gb SAS SED SSD (10 DWD)</li> </ul> <p>LFF drives:</p> <ul style="list-style-type: none"> <li>● 900 GB 10K rpm 12 Gb SAS HDDs</li> <li>● 2 TB, 4 TB, 6 TB, 8 TB, and 10 TB 7.2K rpm 12 Gb NL SAS HDDs</li> <li>● 4 TB 7.2K rpm NL 12 Gb SAS SED HDD</li> <li>● 400 GB 12 Gb SAS SSDs (3 DWD and 10 DWD)</li> </ul>
Storage capacity	<ul style="list-style-type: none"> <li>● SFF drives: Up to 737 TB (96x 7.68 TB 2.5-inch SAS SSDs)</li> <li>● LFF drives: Up to 480 TB (48x 10 TB 3.5-inch NL SAS HDDs)</li> </ul>
Host connectivity	<p>DS2200 SAS controller module: 2x 12 Gb SAS host ports (Mini-SAS HD, SFF-8644)</p> <p>DS2200 FC/iSCSI controller module: 2x SFP/SFP+ CNC host ports</p> <p>CNC host port options (per controller module):</p> <ul style="list-style-type: none"> <li>● 2x 1 Gb iSCSI SFP (1 Gb speed, UTP, RJ-45)</li> <li>● 2x 10 Gb iSCSI SFP+ (1/10 Gb speeds, SW fiber optics, LC)</li> <li>● 2x 8 Gb FC SFP+ (4/8 Gb speeds, SW fiber optics, LC)</li> <li>● 2x 16 Gb FC SFP+ (4/8/16 Gb speeds, SW fiber optics, LC)</li> <li>● 2x 10 Gb iSCSI SFP+ DAC cables</li> </ul>
Host operating systems	<p>Microsoft Windows Server 2012, 2012 R2, and 2016; Red Hat Enterprise Linux (RHEL) 6 and 7; SUSE Linux Enterprise Server (SLES) 11 and 12; VMware vSphere 5.5 and 6.0; Citrix XenServer 6.5.</p>
Standard software features	<p>Intelligent Real-time Tiering for HDDs, Virtualized Storage Pools, Thin Provisioning, SSD Read Cache, Rapid RAID Rebuild, Snapshots (up to 128 targets), All Flash Array.</p>
Optional software features	<p>Intelligent Real-time Tiering for SSDs, Snapshots (up to 1024 targets), Asynchronous Replication.</p>
Performance	<p>Dual controller configuration</p> <ul style="list-style-type: none"> <li>● Up to 100000 random disk read IOPS</li> <li>● Up to 3.5 GBps sequential disk read throughput</li> <li>● Up to 3.0 GBps sequential disk write throughput</li> </ul>

Component	Specification
Configuration maximums	Per system: <ul style="list-style-type: none"> <li>• Maximum number of virtual storage pools: 2 (1 per controller module)</li> <li>• Maximum virtual pool size: 1.1 PB</li> <li>• Maximum number of logical volumes: 1024</li> <li>• Maximum logical volume size: 140 TB</li> <li>• Maximum number of drives in a drive group: 16</li> <li>• Maximum number of drive groups: 32</li> <li>• Maximum global spares: 16</li> <li>• Maximum number of initiators: 4096 (1024 per host port on the controller module)</li> <li>• Maximum number of initiators per host: 128</li> <li>• Maximum number of host groups: 32</li> <li>• Maximum number of hosts in a host group: 256</li> <li>• Maximum SSD read cache size: 4 TB</li> <li>• Maximum number of snapshots: 1024 (requires an optional license)</li> <li>• Maximum number of replication peers: 1 (requires an optional license)</li> <li>• Maximum number of replication volumes: 32 (requires an optional license)</li> </ul>
Cooling	Redundant cooling with two fans built into power and cooling modules (PCMs).
Power supply	Two redundant hot-swap 580 W AC power supplies built into PCMs.
Hot-swap parts	Controller modules, expansion modules, SFP/SFP+ transceivers, drives, PCMs.
Management interfaces	1 GbE port (UTP, RJ-45) and serial port (Mini-USB) on the controller modules. Web-based interface (WBI); Telnet, SSH, or Direct Connect USB CLI; SNMP and email notifications; optional Lenovo XClarity.
Security features	Secure Socket Layer (SSL), Secure Shell (SSH), Self-encrypting drives (SEDs).
Warranty	Three-year customer-replaceable unit and onsite limited warranty with 9x5 next business day response. Optional warranty service upgrades are available through Lenovo: Technician Installed Parts, 24x7 coverage, 2-hour or 4-hour response time, 6-hour or 24-hour committed repair, 1-year or 2-year warranty extensions, YourDrive YourData, installation services.
Dimensions	Height: 88 mm (3.5 in.); width: 443 mm (17.4 in.); depth: 630 mm (24.8 in.)
Weight	<ul style="list-style-type: none"> <li>• SFF controller enclosure (fully configured): 30 kg (66 lb)</li> <li>• SFF expansion enclosure (fully configured): 25 kg (55 lb)</li> <li>• LFF controller enclosure (fully configured): 32 kg (71 lb)</li> <li>• LFF expansion enclosure (fully configured): 28 kg (62 lb)</li> </ul>



## Controller enclosures

The following table lists the relationship models of the ThinkSystem DS2200.

Table 2. ThinkSystem DS2200 relationship models

Description	Part number
SFF models - FC/iSCSI	
Lenovo ThinkSystem DS2200 SFF FC/iSCSI Dual Controller Unit (US English documentation)	4599A11*
Lenovo ThinkSystem DS2200 SFF FC/iSCSI Dual Controller Unit (Simplified Chinese documentation)	4599A1C^
Lenovo ThinkSystem DS2200 SFF FC/iSCSI Dual Controller Unit (Japanese documentation)	4599A1J**
SFF models - SAS	
Lenovo ThinkSystem DS2200 SFF SAS Dual Controller Unit (US English documentation)	4599A21*
Lenovo ThinkSystem DS2200 SFF SAS Dual Controller Unit (Simplified Chinese documentation)	4599A2C^
Lenovo ThinkSystem DS2200 SFF SAS Dual Controller Unit (Japanese documentation)	4599A2J**
LFF models - FC/iSCSI	
Lenovo ThinkSystem DS2200 LFF FC/iSCSI Dual Controller Unit (US English documentation)	4599A31*
Lenovo ThinkSystem DS2200 LFF FC/iSCSI Dual Controller Unit (Simplified Chinese documentation)	4599A3C^
Lenovo ThinkSystem DS2200 LFF FC/iSCSI Dual Controller Unit (Japanese documentation)	4599A3J**
LFF models - SAS	
Lenovo ThinkSystem DS2200 LFF SAS Dual Controller Unit (US English documentation)	4599A41*
Lenovo ThinkSystem DS2200 LFF SAS Dual Controller Unit (Simplified Chinese documentation)	4599A4C^
Lenovo ThinkSystem DS2200 LFF SAS Dual Controller Unit (Japanese documentation)	4599A4J**

\* Available worldwide (except China and Japan).

^ Available only in China.

\*\* Available only in Japan.

The following table lists the CTO base models for the ThinkSystem DS2200.

Table 3. ThinkSystem DS2200 CTO base models

Description	Machine Type-Model	Feature code
Lenovo ThinkSystem DS2200 SFF Chassis (2x PCMs, no controller modules)	4599-HC2	AU2A
Lenovo ThinkSystem DS2200 LFF Chassis (2x PCMs, no controller modules)	4599-HC1	AU28

### Configuration notes:

- For Relationship models, two DS2200 FC/iSCSI or SAS Controller Modules are included in the model configuration.
- For CTO models, two DS2200 FC/iSCSI Controller Modules (feature code AU2G) or DS2200 SAS Controller Modules (feature code AU2F) must be selected during the configuration process, and both modules must be of the same type - either FC/iSCSI or SAS (mixing of FC/iSCSI and SAS controller modules is not supported).



The models of the ThinkSystem DS2200 include the following items:

- One LFF or SFF chassis with the following components:
  - Dual FC/iSCSI or SAS controller modules
  - Two 580 W AC power and cooling modules
- Lenovo Storage 12Gb SAN Rack Mount Kit - Rails 25"-36"
- Lenovo USB A Male-to-Mini-B 1.5m cable
- *Getting Started Guide*
- *Electronic Publications Flyer*
- Two power cables:
  - 1.5m, 10A/100-250V, C13 to IEC 320-C14 rack power cables (Relationship models)
  - Customer-configured power cables (CTO models)

## Controller modules

The ThinkSystem DS2200 supports dual controller configurations, and the ThinkSystem DS2200 models ship with two controller modules. The following types of controller modules are available:

- DS2200 SAS Controller Modules
- DS2200 FC/iSCSI Controller Modules

DS2200 SAS Controller Modules provide direct SAS attachment for up to two hosts with a supported SAS HBA installed. Each DS2200 SAS Controller Module has two 12 Gb SAS ports with Mini-SAS HD (SFF-8644) connectors.

DS2200 FC/iSCSI Controller Modules provide SAN based iSCSI or FC connectivity to the hosts with a supported software initiator or HBA installed. Each DS2200 FC/iSCSI Controller Module has a built-in Converged Network Controller (CNC) that has two SFP/SFP+ ports.

The CNC supports the following storage connectivity protocols, depending on the SFP/SFP+ transceiver installed or DAC cables attached:

- 1 Gb iSCSI with 1 GbE RJ-45 SFP optical modules
- 1/10 Gb iSCSI with 10 GbE SW SFP+ optical modules with LC connectors
- 10 Gb iSCSI with 10 GbE SFP+ DAC cables
- 4/8 Gb Fibre Channel with 8 Gb FC SW SFP+ optical modules with LC connectors
- 4/8/16 Gb Fibre Channel with 16 Gb FC SW SFP+ optical modules with LC connectors

### Notes:

- Both ports on the CNC on the DS2200 FC/iSCSI Controller Module must have the same connectivity type (the same type of SFP/SFP+ modules or DAC cables).
- Both controller modules in the system must be of the same type, and they must have matching port configurations (that is, the ports on both DS2200 FC/iSCSI controller modules must have SFP/SFP+ modules of the same type).

SAS controller modules and FC/iSCSI controller modules have one 12 Gb SAS x4 expansion port (Mini-SAS HD SFF-8644 connector) for the attachment of the ThinkSystem DS Series expansion units.

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

Table 4. Controller modules and connectivity options

Description	Part number	Feature code	Maximum quantity per DS2200
<b>Controller modules</b>			
DS2200 SAS Controller Module	None	AU2F	2^
DS2200 FC/iSCSI Controller Module	None	AU2G	2^
<b>FC and iSCSI controller host connectivity options</b>			
1G RJ-45 iSCSI SFP+ Module 1 pack	00WC086	AT2C	4*
10G SW Optical iSCSI SFP+ Module 1 pack	00WC087	AT2A	4*
8G Fibre Channel SFP+ Module 1 pack	00WC088	AT28	4*
16G Fibre Channel SFP+ Module 1 pack	00WC089	AT29	4*
<b>Cable options for FC and optical iSCSI host connectivity</b>			
Lenovo 1m LC-LC OM3 MMF Cable	00MN502	ASR6	4**
Lenovo 3m LC-LC OM3 MMF Cable	00MN505	ASR7	4**
Lenovo 5m LC-LC OM3 MMF Cable	00MN508	ASR8	4**
Lenovo 10m LC-LC OM3 MMF Cable	00MN511	ASR9	4**
Lenovo 25m LC-LC OM3 MMF Cable	00MN517	ASRB	4**
<b>DAC cable options for 10 Gb iSCSI host connectivity</b>			
Lenovo 1m Passive SFP+ DAC Cable	90Y9427	A1PH	4**
Lenovo 2m Passive SFP+ DAC Cable	00AY765	A51P	4**
Lenovo 3m Passive SFP+ DAC Cable	90Y9430	A1PJ	4**
<b>SAS host connectivity cables - Mini-SAS HD (controller) to Mini-SAS HD (host)</b>			
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**
<b>Cable options for 1 Gb iSCSI and Ethernet management ports</b>			
Lenovo Ethernet CAT5E shielded 6m cable	00WE747	AT1G	6***
<b>Spare cables for serial management ports</b>			
Lenovo USB A Male-to-Mini-B 1.5m cable	00WE746	AT1F	1

^ Factory-installed only, no field upgrade. Relationship models include two controller modules. CTO models require the selection of two controller modules.

\* Up to two SFP/SFP+ modules per controller; the modules must be of the same type.

\*\* Up to two cables per controller.

\*\*\* Up to three cables per controller: one cable for 1 GbE management port connection; up to two cables for CNC port connections with 1G RJ-45 modules attached.

## Expansion enclosures

The ThinkSystem DS2200 supports attachment of up to three ThinkSystem DS Series expansion enclosures. Intermix of LFF and SFF enclosures is supported. The enclosures can be added to the system non-disruptively.

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

Table 5. ThinkSystem DS Series Expansion Unit relationship models

Description	Part number
SFF models	
Lenovo ThinkSystem DS Series Dual IOM SFF Expansion Unit (US English documentation)	4588A21*
Lenovo ThinkSystem DS Series Dual IOM SFF Expansion Unit (Simplified Chinese documentation)	4588A2C^
Lenovo ThinkSystem DS Series Dual IOM SFF Expansion Unit (Japanese documentation)	4588A2J**
LFF models	
Lenovo ThinkSystem DS Series Dual IOM LFF Expansion Unit (US English documentation)	4588A11*
Lenovo ThinkSystem DS Series Dual IOM LFF Expansion Unit (Simplified Chinese documentation)	4588A1C^
Lenovo ThinkSystem DS Series Dual IOM LFF Expansion Unit (Japanese documentation)	4588A1J**

\* Available worldwide (except China and Japan).

^ Available only in China.

\*\* Available only in Japan.

The following table lists the CTO base models for the DS Series Expansion Units.

Table 6. ThinkSystem DS Series Expansion Unit CTO base models

Description	Machine Type-Model	Feature code
Lenovo ThinkSystem DS Series SFF Expansion Unit (2x PCMs, no IOMs)	4588-HC2	AU26
Lenovo ThinkSystem DS Series LFF Expansion Unit (2x PCMs, no IOMs)	4588-HC1	AU25

### Configuration notes:

- For Relationship models, two SAS I/O expansion modules are included in the model configuration.
- For CTO models, two SAS I/O expansion modules (feature code AU2K) must be selected during the configuration process.

The models of the ThinkSystem DS Series Expansion Units include the following items:

- One LFF or SFF chassis with the following components:
  - Dual SAS I/O expansion modules
  - Two 580 W AC power and cooling modules
- Lenovo Storage 12Gb SAN Rack Mount Kit - Rails 25"-36"
- Lenovo USB A Male-to-Mini-B 1.5m cable
- *Getting Started Guide*
- *Electronic Publications Flyer*
- Two power cables:
  - 1.5m, 10A/100-250V, C13 to IEC 320-C14 rack power cables (Relationship models)
  - Customer-configured power cables (CTO models)

Each ThinkSystem DS Series Expansion Unit ships with two SAS I/O expansion modules. Each *expansion module* provides 12 Gb SAS connectivity to the internal drives, and it has three external 12 Gb SAS x4 ports (Mini-SAS HD SFF-8644 connectors labelled Port A, Port B, and Port C) that are used for connections to the ThinkSystem DS2200 and for daisy chaining the expansion enclosures between each other.

The expansion port on the controller module is connected to the Port A on the expansion module, and the Port C on the expansion module is connected to the Port A on the expansion module in the adjacent enclosure, and so on.

**Note:** The Port B on the expansion module is not used.

The expansion enclosure connectivity topology is shown in the following figure.

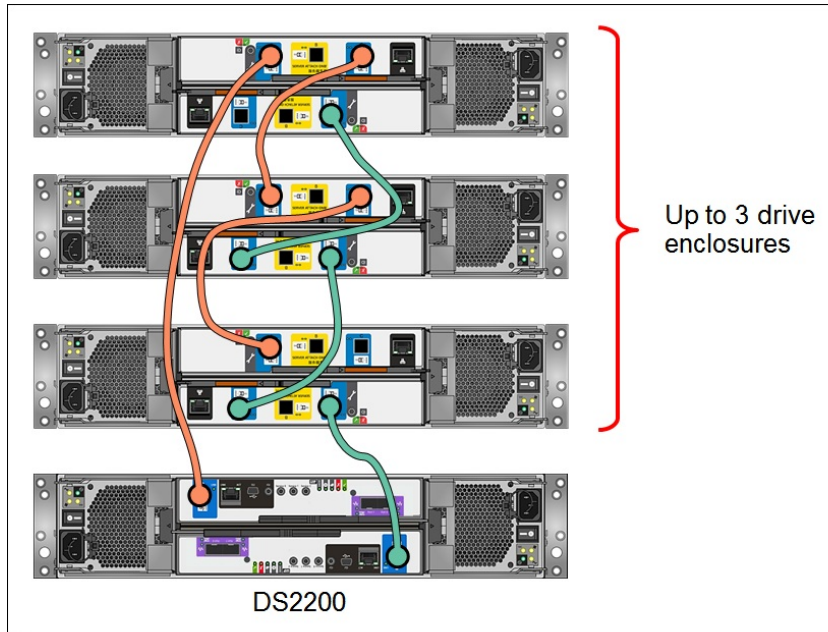


Figure 7. Expansion unit connectivity topology

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 unit
External MiniSAS HD 8644/MiniSAS HD 8644 0.5M Cable	00YL847	AU16	2*
External MiniSAS HD 8644/MiniSAS HD 8644 1M Cable	00YL848	AU17	2*
External MiniSAS HD 8644/MiniSAS HD 8644 2M Cable	00YL849	AU18	2*
External MiniSAS HD 8644/MiniSAS HD 8644 3M Cable	00YL850	AU19	2*

\* One cable per expansion module; two cables are required per each expansion enclosure.

## Drives

The ThinkSystem DS2200 SFF chassis and the DS Series SFF expansion enclosures support up to 24 SFF hot-swap drives, and the ThinkSystem DS2200 LFF chassis and the DS Series LFF expansion enclosures support up to 12 LFF hot-swap drives.

The following table lists supported drive options for the DS2200 SFF chassis and the DS Series SFF expansion enclosures.

Table 8. SFF drive options

Description	Part number	Feature code	Maximum quantity per SFF enclosure
<b>2.5-inch 12 Gbps SAS hot-swap HDDs</b>			
Lenovo Storage 300GB 15K 2.5" SAS HDD	01DC197	AU1J	24
Lenovo Storage 600GB 10K 2.5" SAS HDD	01DC427	AU1Q	24
Lenovo Storage 600GB 15K 2.5" SAS HDD	01DC192	AU1H	24
Lenovo Storage 900GB 10K 2.5" SAS HDD	01DC417	AU1N	24
Lenovo Storage 900GB 15K 2.5" SAS HDD	01KP040	AVP5	24
Lenovo Storage 1.2TB 10K 2.5" SAS HDD	01DC407	AU1L	24
Lenovo Storage 1.8TB 10K 2.5" SAS HDD	01DC402	AU1K	24
<b>2.5-inch 12 Gbps SAS hot-swap SEDs</b>			
Lenovo Storage 1.2TB 10K 2.5" SAS HDD (SED)	01DC412	AU1M	24
<b>2.5-inch 12 Gbps NL SAS hot-swap HDDs</b>			
Lenovo Storage 1TB 7.2K 2.5" NL-SAS HDD	01DC442	AU1S	24
Lenovo Storage 2TB 7.2K 2.5" NL-SAS HDD	01DC437	AU1R	24
<b>2.5-inch 12 Gbps SAS hot-swap SSDs (1 Drive Write per Day [DWD])</b>			
Lenovo Storage 3.84TB 1DWD 2.5" SAS SSD (1200.2)	01CX632	AV2F	24
Lenovo Storage 3.84TB 1DWD 2.5" SAS SSD (PM1633a)	01KP065	AVPA	24
Lenovo Storage 7.68TB 1DWD 2.5" SAS SSD (PM1633a)	01KP060	AVP9	24
<b>2.5-inch 12 Gbps SAS hot-swap SSDs (3 Drive Writes per Day)</b>			
Lenovo Storage 400GB 3DWD SSD 2.5" SAS SSD	01DC482	AU1V	24
Lenovo Storage 800GB 3DWD SSD 2.5" SAS SSD	01DC477	AU1U	24
Lenovo Storage 1.6TB 3DWD SSD 2.5" SAS SSD	01DC472	AU1T	24
<b>2.5-inch 12 Gbps SAS hot-swap SSDs (10 Drive Writes per Day)</b>			
Lenovo Storage 400GB 10DWD SSD 2.5" SAS SSD	01DC462	AUDK	24
Lenovo Storage 800GB 10DWD SSD 2.5" SAS SSD	01DC452	AUDH	24
Lenovo Storage 1.6TB 10DWD SSD 2.5" SAS SSD	01DC447	AUDG	24
<b>2.5-inch 12 Gbps SAS hot-swap SED SSDs (10 Drive Writes per Day)</b>			
Lenovo Storage 800GB 10DWD SSD 2.5" SAS SSD (SED)	01DC457	AUDJ	24

The following table lists supported drive options for the DS2200 LFF chassis and the DS Series LFF expansion enclosures.

Table 9. LFF drive options

Description	Part number	Feature code	Maximum quantity per LFF enclosure
3.5-inch 12 Gbps SAS hot-swap HDDs			
Lenovo Storage 900GB 10K SAS HDD - Hybrid Tray*	01DC182	AU1G	12
3.5-inch 12 Gbps NL SAS hot-swap HDDs			
Lenovo Storage 2TB 7.2K 3.5" NL-SAS HDD	00YH993	AU1F	12
Lenovo Storage 4TB 7.2K 3.5" NL-SAS HDD	01DC487	AU1D	12
Lenovo Storage 6TB 7.2K 3.5" NL-SAS HDD	00YG668	AU1C	12
Lenovo Storage 8TB 7.2K 3.5" NL-SAS HDD	00YG663	AU1B	12
Lenovo Storage 10TB 7.2K 3.5" NL-SAS HDD	01DC626	AU3S	12
3.5-inch 12 Gbps NL SAS hot-swap SEDs			
Lenovo Storage 4TB 7.2K 3.5" NL-SAS HDD (SED)	00YG673	AU1E	12
3.5-inch 12 Gbps SAS hot-swap SSDs (3 Drive Writes per Day)			
Lenovo Storage 400GB 3DWD SAS SSD - Hybrid Tray*	01GV682	AV2H	12
3.5-inch 12 Gbps SAS hot-swap SSDs (10 Drive Writes per Day)			
Lenovo Storage 400GB 10DWD SAS SSD - Hybrid Tray*	01CX642	AV2G	12

\* 2.5-inch drive in a 3.5-inch drive tray.

## Software

The following functions are included with every ThinkSystem DS2200:

- **Intelligent Real-time Tiering for HDDs:** Storage tiering helps optimize storage use with intelligent data placement to improve system performance, reduce costs, and simplify management. The DS2200 automatically and dynamically moves frequently accessed data to higher performing HDDs in the system without manually creating and managing storage tier policies.
- **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.
- **RAID levels 0, 1, 5, 6, and 10 :** Provide the flexibility to choose the level of data protection required.
- **Virtualized storage pools:** Enables rapid, flexible storage provisioning and simple configuration changes. Stored data is distributed across all drive groups in the pool (wide striping) which helps improve performance, lower latency, and achieve higher volume capacities. When a new drive group is added to the pool, the system performs automatic rebalancing to utilize all drives in the pool for better performance.
- **Thin provisioning:** Optimizes efficiency by allocating drive storage space in a flexible manner among multiple applications, based on the minimum space required by each application at any given time. With thin provisioning, applications consume only the space they are actually using, not the total space that has been allocated to them, which allows clients to purchase storage they need today and add more as application requirements grow.
- **SSD Read Cache:** An extension of the controller's cache to improve performance of read-centric workloads

- **Rapid RAID Rebuild:** Helps significantly decrease the time to recover lost data by only rebuilding the stripe where the corruption occurred, not the empty space or other stripes
- **Snapshots:** Enables creation of copies of data for backup, parallel processing, testing, and development, and have the copies available almost immediately. Base software supports up to 128 snapshot targets per system.

The ThinkSystem DS2200 capabilities can be expanded with optional licensed functions.

Optional licensed functions include:

- **Intelligent Real-time Tiering for SSDs:** The SSD tiering upgrade option allows the use of SSDs as read and write storage in the hybrid HDD and SSD storage configurations. Also, this option makes it easy and economical to deploy hybrid storage by dynamically moving frequently accessed data to SSDs in the system, resulting in flash drive performance without manually creating and managing storage tier policies.
- **Snapshots upgrade:** The snapshot upgrade options increase the supported number of snapshot targets to 512 or 1024 per system.
- **Asynchronous Replication:** The asynchronous replication feature provides storage system-based data replication between two peers by using asynchronous data transfers over IP (iSCSI) communication links.

The replication is done at predetermined intervals (Now, 1 hour, 12 hour, 24 hour) and does not require high-bandwidth network connection. For ultimate flexibility, DS2200 asynchronous replication interoperates with the ThinkSystem DS4200 and DS6200, as well as Lenovo Storage S2200 and S3200.

The asynchronous replication option must be acquired (or licensed) for both primary (local) and secondary (remote) systems.

The following table lists the Feature on Demand (FoD) upgrades for the ThinkSystem DS2200 to enable optional software features. Each optional DS2200 function is licensed on a per-system basis and covers both controller enclosure and all attached expansion units.

Table 10. Optional software features

Description	Part number	Feature code
512 Snapshot Upgrade License	01GV559	AWGM
1024 Snapshot Upgrade License	01GV560	AWGN
SSD Data Tiering License*	01GV561	AWGP
Asynchronous Replication License**	01GV562	AWGQ

\* The SSD Data Tiering Upgrade option is not required for all flash array configurations (a storage system with SSDs only; no HDDs installed); however, it is required for hybrid configurations (a storage system with SSDs and HDDs).

\*\* Asynchronous Replication requires an FC and iSCSI Controller-based DS2200 storage unit.

Software maintenance for standard software features is included in the ThinkSystem DS2200 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](#) for details).



Optional software features include 3-year software maintenance with the ability to extend it up to 5 years in 1-year or 2-year increments with the purchase of the software maintenance extension options that are listed in the following table.

**Note:** The ThinkSystem DS2200 must have active warranty coverage for the duration of an intended software maintenance extension period.

Table 11. Software maintenance extension options

Description	Part number	Feature code
512 Snapshot Upgrade Maintenance 1 Year	00WF825	ATT4
512 Snapshot Upgrade Maintenance 2 Years	00WF829	ATT5
1024 Snapshot Upgrade Maintenance 1 Year	00WF833	ATT6
1024 Snapshot Upgrade Maintenance 2 Years	00WF837	ATT7
SSD Data Tiering Maintenance 1 Year	00WF841	ATT8
SSD Data Tiering Maintenance 2 Years	00WF845	ATT9
Asynchronous Replication Maintenance 1 Year	00YG680	ATTA
Asynchronous Replication Maintenance 2 Years	00YG684	ATTB

## Management

The ThinkSystem DS2200 supports the following management interfaces:

- Lenovo Storage Management Console (SMC), a web-based interface (WBI) via HTTP, that 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 Telnet or SSH or through Direct Connect USB.  
**Note:** Direct Connect USB may require device drivers on the connected computer that uses older Windows operating systems. Drivers are provided on the Lenovo support site, if needed.
- SNMP and e-mail notifications.
- Optional Lenovo XClarity for discovery, inventory, monitoring, alerts, and firmware updates.

## Power supplies and cables

The ThinkSystem DS2200 and DS Series enclosures have two redundant hot-swap 580 W AC power supplies, each with an IEC 320-C14 connector.

The relationship models of the ThinkSystem DS2200 and DS Series enclosures ship standard with two 1.5m, 10A/100-250V, C13 to IEC 320-C14 rack power cables. The CTO models require the selection of two power cables.

The part numbers and feature codes to order the power cables are listed in the following table (two power cables should be ordered per each enclosure, if needed).

Table 12. Power cable options

Description	Part number	Feature code
Rack power cables		
1.2m, 10A/100-250V, 2 Short C13s to Short C14 Rack Power Cable	47C2487	A3SS
1.2m, 16A/100-250V, 2 Short C13s to Short C20 Rack Power Cable	47C2491	A3SW

Description	Part number	Feature code
1.5m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	39Y7937	6201
2.5m, 10A/100-250V, 2 Long C13s to Short C14 Rack Power Cable	47C2488	A3ST
2.5m, 16A/100-250V, 2 Long C13s to Short C20 Rack Power Cable	47C2492	A3SX
2.8m, 10A/100-250V, 2 Short C13s to Long C14 Rack Power Cable	47C2489	A3SU
2.8m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	4L67A08366	6311
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, 10A/100-250V, 2 Long C13s to Long C14 Rack Power Cable	47C2490	A3SV
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
<b>Country-specific line cords</b>		
Argentina 10A/250V C13 to IRAM 2073 2.8m line cord	39Y7930	6222
Australia/NZ 10A/250V C13 to AS/NZ 3112 2.8m line cord	39Y7924	6211
Brazil 10A/250V C13 to NBR 14136 2.8m line cord	69Y1988	6532
China 10A/250V C13 to GB 2099.1 2.8m line cord	39Y7928	6210
Denmark 10A/250V C13 to DK2-5a 2.8m line cord	39Y7918	6213
European 10A/230V C13 to CEE7-VII 2.8m line cord	39Y7917	6212
Denmark/Switzerland 10A/230V C13 to IEC 309 P+N+G 2.8m line cord	None*	6377
India 10A/250V C13 to IS 6538 2.8m line cord	39Y7927	6269
Israel 10A/250V C13 to SI 32 2.8m line cord	39Y7920	6218
Italy 10A/250V C13 to CEI 23-16 2.8m line cord	39Y7921	6217
Japan 12A/125V C13 to JIS C-8303 2.8m line cord	46M2593	A1RE
Korea 12A/250V C13 to KETI 2.8m line cord	39Y7925	6219
South Africa 10A/250V C13 to SABS 164 2.8m line cord	39Y7922	6214
Switzerland 10A/250V C13 to SEV 1011-S24507 2.8m line cord	39Y7919	6216
Taiwan 15A/125V C13/CNS 10917 2.8m line cord	00CG267	6402
United Kingdom 10A/250V C13 to BS 1363/A 2.8m line cord	39Y7923	6215
United States 10A/125V C13 to NEMA 5-15P 4.3m line cord	39Y7931	6207
United States 10A/250V C13 to NEMA 6-15P 2.8m line cord	46M2592	A1RF

\* CTO only.

## Physical specifications

The ThinkSystem DS2200 and DS Series enclosures have the following dimensions and weight (approximate):

- Height: 88 mm (3.5 in.)
- Width: 443 mm (17.4 in.)
- Depth: 630 mm (24.8 in.)
- Weight
  - SFF controller enclosure (fully configured): 30 kg (66 lb)
  - SFF expansion enclosure (fully configured): 25 kg (55 lb)
  - LFF controller enclosure (fully configured): 32 kg (71 lb)
  - LFF expansion enclosure (fully configured): 28 kg (62 lb)

## Operating environment

The ThinkSystem DS2200 and DS Series enclosures are supported in the following environment:

- Air temperature:
  - Operating:
    - Controller enclosure: 5 °C to 35 °C (41 °F to 95 °F)
    - Expansion enclosure: 5 °C to 40 °C (41 °F to 104 °F)
  - Storage: -40 °C to +60 °C (-40 °F to 140 °F)
  - Maximum altitude: 3045 m (10000 ft)
- Humidity:
  - Operating: 20% to 80% (non-condensing)
  - Storage: 5% to 100% (no precipitation)
- Electrical:
  - 100 to 127 (nominal) V AC; 50 Hz or 60 Hz; 6.11 A
  - 200 to 240 (nominal) V AC; 50 Hz or 60 Hz; 3.05 A
- BTU output: 1979 BTU/hr (580 W)
- Noise level: 6.6 bels

## Warranty

The ThinkSystem DS2200 and DS Series enclosures have a three-year customer-replaceable unit (CRU) and onsite (for field-replaceable units [FRUs] only) limited warranty with standard call center support during normal business hours and 9x5 Next Business Day Parts Delivered. Lenovo offers the service upgrades through warranty maintenance upgrades and post-warranty maintenance agreements with a well-defined scope of services, including service hours, response time, term of service, and service agreement terms and conditions.

Lenovo warranty service upgrade offerings are country-specific; that is, each country might have its own service types, service levels, response times, and terms and conditions. Not all covered types of warranty service upgrades might be available in a particular country or area. For more information about Lenovo warranty service upgrade offerings that are available in your country, refer to the Lenovo Enterprise Solutions Configurator (LESC):

<http://lesc.lenovo.com>

The following table explains warranty service definitions for the ThinkSystem DS2200.

Table 13. Warranty service definitions

Term	Description
Onsite Service	If a problem with your product cannot be resolved via telephone, a Service Technician will be dispatched to arrive at your location.
Parts Delivered	If a problem with your product cannot be resolved via telephone and a CRU part is required, Lenovo will send a replacement CRU to arrive at your location.
Technician Installed Parts	If a problem with your product cannot be resolved via telephone, a Service Technician will be dispatched to arrive at your location.
Hours of coverage	<ul style="list-style-type: none"> <li>• 9x5: 9 hours per day, 5 days per week, during normal business hours, excluding local public and national holidays</li> <li>• 24x7: 24 hours per day, 7 days per week, 365 days per year.</li> </ul>
Response time target	2 hours, 4 hours, or Next Business Day: The time period from when the telephone based troubleshooting is completed and logged, to the delivery of the CRU or arrival of a Service Technician and part at the Customer's location for repair.

Term	Description
Committed Repair	6 hours or 24 hours: The time period between the service request registration in Lenovo's call management system and the restoration of the product to conformance with its specification by a Service Technician.

The following Lenovo warranty service upgrades are available:

- Warranty and maintenance service upgrades:
  - Three, four, or five years of 9x5 or 24x7 service coverage
  - Parts delivered or technician installed parts from next business day to 4 or 2 hours
  - Committed service repair
  - Post-warranty extensions for 1 and 2 years
- Committed Service Repair  
 Committed Service Repair (CSR) enhances the level of Warranty Service Upgrade or Post Warranty/Maintenance Service offering associated with the selected systems. Offerings vary and are available in select countries.
  - Priority handling to meet defined time frames to restore the failing machine to good working condition
  - 24x7x6: Service performed 24 hours per day, 7 days per week, within 6 hours
  - 24x7x24: Service performed 24 hours per day, 7 days per week, within 24 hours
- YourDrive YourData  
 Lenovo's YourDrive YourData service is a multi-drive retention offering that ensures your data is always under your control, regardless of the number of drives that are installed in your Lenovo system. In the unlikely event of a drive failure, you retain possession of your drive while Lenovo replaces the failed drive part. Your data stays safely on your premises, in your hands. The YourDrive YourData service can be purchased in convenient bundles with Lenovo warranty upgrades and extensions.
- Hardware Installation Services  
 Lenovo experts can seamlessly manage the physical installation of your server, storage, or networking hardware. Working at a time convenient for you (business hours or off shift), the technician will unpack and inspect the systems on your site, install options, mount in a rack cabinet, connect to power and network, check and update firmware to the latest levels, verify operation, and dispose of the packaging, allowing your team to focus on other priorities.

## Regulatory compliance

The ThinkSystem DS2200 and DS Series enclosures conform to the following regulations:

- BSMI CNS 13438, Class A; CNS 14336-1 (Taiwan)
- CCC GB 4943.1, GB 17625.1, GB 9254 Class A (China)
- CE Mark (European Union)
- EAC (Russia)
- EN55032, Class A
- EN55024
- FCC Part 15, Class A (United States)
- ICES-003/NMB-03, Class A (Canada)
- IEC/EN60950-1
- MSIP (Korea)
- NOM-019 (Mexico)
- RCM (Australia)
- Reduction of Hazardous Substances (ROHS)
- UL/GSA IEC 60950-1
- VCCI, Class A (Japan)

## Interoperability

Lenovo provides end-to-end storage compatibility testing to deliver interoperability throughout the network. The ThinkSystem DS2200 supports attachment to Lenovo System x, ThinkServer, and Flex System hosts by using SAS, iSCSI, or Fibre Channel storage connectivity protocols.

For end-to-end storage configuration support, refer to the Lenovo ThinkSystem DS2200 Interoperability Matrix that can be found on the ThinkSystem DS2200 Documentation page:

<http://datacentersupport.lenovo.com/us/en/products/storage/lenovo-storage/thinksystem-ds2200/documentation>

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 DS2200 in storage solutions:

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

**Note:** Tables that are provided in these sections are for ordering reference purposes only. End-to-end storage configuration support *must* be verified through the Lenovo ThinkSystem DS2200 Interoperability Matrix.

## Adapters

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

- SAS connectivity
- iSCSI connectivity
- Fibre Channel connectivity

### SAS connectivity

The following table lists currently available SAS adapters for Lenovo servers that are compatible with the ThinkSystem DS2200 SAS storage (direct attach).

Table 14. SAS adapters

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

### iSCSI connectivity

The ThinkSystem DS2200 supports iSCSI attachments via standard 1 Gb or 10 Gb Ethernet network. Any compatible Ethernet switch, including Lenovo RackSwitch Ethernet switches and integrated Flex System Ethernet I/O modules, can be used to provide iSCSI connectivity for the ThinkSystem DS2200 iSCSI storage.

With software iSCSI initiators, any supported 1 Gb Ethernet or 10 Gb Ethernet adapter for Lenovo servers is compatible with the ThinkSystem DS2200 iSCSI storage.

Currently available converged iSCSI adapters for Lenovo servers that are compatible with the ThinkSystem DS2200 are listed in the following table. Other converged iSCSI HBAs also might be supported (see the Interoperability Matrix for details).

Table 15. Converged iSCSI adapters

Description	Part number
<b>System x converged adapters (iSCSI only)</b>	
Emulex VFA5 ML2 Dual Port 10GbE SFP+ Adapter (Requires 00D8544)	00D1996
QLogic 8200 Dual Port 10GbE SFP+ VFA (Requires 00Y5624)	90Y4600
<b>System x FoD upgrades required for iSCSI support</b>	
Emulex VFA5 ML2 FCoE/iSCSI License (FoD) (For 00D1996)	00D8544
Qlogic 8200 VFA FCoE/iSCSI License (FoD) (For 90Y4600)	00Y5624
<b>ThinkServer converged adapters (iSCSI only)</b>	
ThinkServer OCe14102-UX-L PCIe 10Gb 2 Port SFP+ CNA by Emulex	4XC0F28736
ThinkServer OCm14102-UX-L AnyFabric 10Gb 2 Port SFP+ CNA by Emulex	4XC0F28743
ThinkServer OCm14104-UX-L AnyFabric 10Gb 4 Port SFP+ CNA by Emulex	4XC0F28744
<b>Flex System converged adapters (iSCSI only)</b>	
Flex System CN4022 2-port 10Gb Converged Adapter	88Y5920
Flex System CN4052 2-port 10Gb Virtual Fabric Adapter (Requires 00JY804)	00JY800
Flex System CN4054R 10Gb Virtual Fabric Adapter (Requires 90Y3558)	00Y3306
Flex System CN4058S 8-port 10Gb Virtual Fabric Adapter (Requires 94Y5164)	94Y5160
<b>Flex System FoD upgrades required for iSCSI support</b>	
Flex System CN4052 Virtual Fabric Adapter SW Upgrade (FoD) (For 00JY800)	00JY804
Flex System CN4054 Virtual Fabric Adapter Upgrade (FoD) (For 00Y3306)	90Y3558
Flex System CN4058S Virtual Fabric Adapter SW Upgrade (FoD) (For 94Y5160)	94Y5164

## Fibre Channel connectivity

The ThinkSystem DS2200 supports direct FC attachments and FC switch-based attachments. Lenovo B Series and ThinkSystem DB Series FC SAN switches and Directors can be used to provide FC connectivity for the ThinkSystem DS2200 FC storage.

Currently available FC adapters for Lenovo servers that are compatible with the ThinkSystem DS2200 FC storage are listed in the following table. Other FC HBAs also might be supported (see the Interoperability Matrix for details).

Table 16. Fibre Channel adapters

Description	Part number
<b>System x HBAs: 16 Gb FC</b>	
Emulex 16Gb FC Single-port HBA	81Y1655
Emulex 16Gb FC Dual-port HBA	81Y1662
Emulex 16Gb Gen6 FC Single-port HBA	01CV830
Emulex 16Gb Gen6 FC Dual-port HBA	01CV840
QLogic 16Gb FC Single-port HBA	00Y3337

<b>Description</b>	<b>Part number</b>
QLogic 16Gb FC Dual-port HBA	00Y3341
QLogic 16Gb Enhanced Gen5 FC Single-port HBA	01CV750
QLogic 16Gb Enhanced Gen5 FC Dual-port HBA	01CV760
<b>System x HBAs: 8 Gb FC</b>	
Emulex 8Gb FC Single-port HBA	42D0485
Emulex 8Gb FC Dual-port HBA	42D0494
QLogic 8Gb FC Single-port HBA	42D0501
QLogic 8Gb FC Dual-port HBA	42D0510
<b>ThinkServer HBAs: 16 Gb FC</b>	
ThinkServer LPe16000B Single Port 16Gb FC HBA by Emulex	4XB0F28653
ThinkServer LPe16002B Dual Port 16Gb Fiber Channel HBA by Emulex	4XB0F28650
ThinkServer LPe16002B-M6-L PCIe 16Gb 2 Port FC HBA by Emulex	4XB0F28705
ThinkServer LPe16004B-M6-L PCIe 16Gb 4 port FC HBA by Emulex	4XB0F28681
ThinkServer LPm16002-M6-L AnyFabric 16Gb 2 Port FC HBA by Emulex	4XB0F28706
<b>ThinkServer HBAs: 8 Gb FC</b>	
ThinkServer LPe12002 PCIe 8Gb 2 Port FC HBA by Emulex	0C19478
ThinkServer LPm15004-M8-L AnyFabric 8Gb 4 Port FC HBA by Emulex	4XB0F28707
<b>Flex System HBAs: 16 Gb FC</b>	
Flex System FC5052 2-port 16Gb FC Adapter	95Y2386
Flex System FC5054 4-port 16Gb FC Adapter	95Y2391
Flex System FC5172 2-port 16Gb FC Adapter	69Y1942
<b>Flex System HBAs: 8 Gb FC</b>	
Flex System FC3052 2-port 8Gb FC Adapter	95Y2375
Flex System FC3172 2-port 8Gb FC Adapter	69Y1938



## Ethernet LAN switches

The following table lists currently available Ethernet rack-mount switches that are currently offered by Lenovo that can be used with the ThinkSystem DS2200 in storage solutions.

Table 17. Ethernet rack-mount switches

Description	Part number
1 Gb Ethernet (iSCSI connectivity)	
Lenovo RackSwitch G7028 (Rear to Front)	7159BAX
Lenovo RackSwitch G7052 (Rear to Front)	7159CAX
Lenovo RackSwitch G8052 (Rear to Front)	7159G52
10 Gb Ethernet (iSCSI connectivity)	
Lenovo RackSwitch G8124E (Rear to Front)	7159BR6
Lenovo RackSwitch G8264 (Rear to Front)	7159G64
Lenovo RackSwitch G8272 (Rear to Front)	7159CRW
Lenovo RackSwitch G8296 (Rear to Front)	7159GR6

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

The following table lists currently available Ethernet embedded switches and pass-thru modules for Flex System that can be used with the ThinkSystem DS2200 in storage solutions.

Table 18. Ethernet embedded switches for Flex System

Description	Part number
1 Gb Ethernet (iSCSI connectivity)	
Lenovo Flex System EN2092 1Gb Ethernet Scalable Switch	49Y4294
10 Gb Ethernet (iSCSI connectivity)	
Lenovo Flex System SI4091 10Gb System Interconnect Module	00FE327
Lenovo Flex System Fabric SI4093 System Interconnect Module	00FM518
Lenovo Flex System Fabric EN4093R 10Gb Scalable Switch	00FM514
Lenovo Flex System Fabric CN4093 10Gb Converged Scalable Switch	00FM510
Lenovo Flex System EN4023 10Gb Scalable Switch	94Y5212
Cisco Nexus B22 Fabric Extender for Flex System*	94Y5350
Cisco Nexus B22 Fabric Extender with FET bundle for Flex System*	94Y5355
Pass-thru modules (iSCSI connectivity; require a compatible external switch)	
Lenovo Flex System EN4091 10Gb Ethernet Pass-thru	88Y6043

\* Requires a supported Cisco Nexus top of rack switch.

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

## Fibre Channel SAN switches

The following table lists currently available Fibre Channel rack-mount switches that are currently offered by Lenovo that can be used with the ThinkSystem DS2200 in storage solutions.

Table 19. Fibre Channel rack-mount switches

Description	Part number
<b>8 Gb FC</b>	
Lenovo B300, 8 ports activated, 8x 8Gb SWL SFPs, 1 PS, Rail Kit	3873AR3
Lenovo B6505, 12 ports activated, 12x 8Gb SWL SFPs, 1 PS, Rail Kit	3873AR4
Lenovo B6510, 24 ports activated, 24x 8Gb SWL SFPs, 2 PS, Rail Kit	3873BR2
<b>16 Gb FC</b>	
Lenovo ThinkSystem DB610S, 8 ports activated, 8x 16Gb SWL SFPs, 1 PS, Rail Kit	6559D2Y
Lenovo ThinkSystem DB610S, 24 ports activated, 24x 16Gb SWL SFP, Enterprise SW, 1 PS, Rail Kit	6559D1Y
Lenovo B6505, 12 ports activated w/ 16Gb SWL SFPs, 1 PS, Rail Kit	3873AR5
Lenovo B6510, 24 ports activated w/ 16Gb SWL SFPs, 2 PS, Rail Kit	3873BR3
<b>32 Gb FC</b>	
Lenovo ThinkSystem DB610S, 8 ports activated, 1 PS, Rail Kit	6559D3Y
Lenovo ThinkSystem DB620S, 24 Ports Activated, 24x 32Gb SWL SFPs, 2 PS, Rail Kit	6415G11
Lenovo ThinkSystem DB620S, 48 Ports Activated, 48x 32Gb SWL SFPs, 2 PS, Rail Kit	6415G2A
Lenovo ThinkSystem DB400D 32Gb FC Director, up to 192 ports, 8U, Enterprise SW	6684B2A
Lenovo ThinkSystem DB800D 32Gb FC Director, up to 384 ports, 14U, Enterprise SW	6682B1A

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

The following table lists currently available Fibre Channel embedded switches and pass-thru modules for Flex System that can be used with the ThinkSystem DS2200 in storage solutions.

Table 20. Fibre Channel embedded switches for Flex System

Description	Part number
<b>8 Gb FC</b>	
Lenovo Flex System FC3171 8Gb SAN Switch	69Y1930
<b>16 Gb FC</b>	
Lenovo Flex System FC5022 16Gb SAN Scalable Switch	88Y6374
Lenovo Flex System FC5022 24-port 16Gb SAN Scalable Switch (includes two 16 Gb SFPs)	00Y3324
Lenovo Flex System FC5022 24-port 16Gb ESB SAN Scalable Switch	90Y9356
<b>Pass-thru modules (require a compatible external switch)</b>	
Lenovo Flex System FC3171 8Gb SAN Pass-thru	69Y1934

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

## Operating systems

The ThinkSystem DS2200 supports host attachments to the System x servers, ThinkServer systems, and Flex System compute nodes running the following operating systems:

- Citrix:
  - Citrix XenServer 6.5 SP1
- Microsoft:
  - Microsoft Windows Server 2016
  - Microsoft Windows Server 2012 R2
  - Microsoft Windows Server 2012
- Red Hat:
  - Red Hat Enterprise Linux 7 Update 2
  - Red Hat Enterprise Linux 7 Update 1
  - Red Hat Enterprise Linux 6 Update 8
  - Red Hat Enterprise Linux 6 Update 7
- SUSE:
  - SUSE Linux Enterprise Server 12 SP1
  - SUSE Linux Enterprise Server 12
  - SUSE Linux Enterprise Server 11 SP4
- VMware:
  - VMware vSphere 6.0 Update 1
  - VMware vSphere 6.0
  - VMware vSphere 5.5 Update 4
  - VMware vSphere 5.5 Update 3

## Rack cabinets

The following table lists the rack cabinets that are currently offered by Lenovo that can be used with the DS2200 in storage solutions.

Table 21. Rack cabinets

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

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

## Power distribution units

The following table lists the power distribution units (PDUs) that are currently offered by Lenovo that can be used with the DS2200 in storage solutions.

Table 22. Power distribution units

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

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

For more information, see the list of Product Guides in the Power Distribution Units category:  
<http://lenovopress.com/servers/options/pdu?rt=product-guide>

## Uninterruptible power supply units

The following table list the uninterruptible power supply (UPS) units that are currently offered by Lenovo that can be used with the DS2200 in storage solutions.

Table 23. Uninterruptible power supply units

Description	Part number
RT1.5kVA 2U Rack or Tower UPS (100-125VAC) (8x NEMA5-15R 12A outlets)	55941AX
RT1.5kVA 2U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A outlets)	55941KX
RT2.2kVA 2U Rack or Tower UPS (100-125VAC) (8x NEMA 5-20R 16A outlets)	55942AX
RT2.2kVA 2U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A, 1x IEC 320 C19 16A outlets)	55942KX
RT3kVA 2U Rack or Tower UPS (100-125VAC) (6x NEMA5-20R 16A, 1x NEMA L5-30R 24A outlets)	55943AX
RT3kVA 2U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A, 1x IEC 320 C19 16A outlets)	55943KX
RT5kVA 3U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A, 2x IEC 320 C19 16A outlets)	55945KX
RT6kVA 3U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A, 2x IEC 320 C19 16A outlets)	55946KX
RT8kVA 6U Rack or Tower UPS (200-240VAC) (4x IEC 320-C19 16A outlets)	55948KX
RT11kVA 6U Rack or Tower UPS (200-240VAC) (4x IEC 320-C19 16A outlets)	55949KX
RT8kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC) (4x IEC 320-C19 16A outlets)	55948PX
RT11kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC) (4x IEC 320-C19 16A outlets)	55949PX

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

## 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: <http://www.lenovofs.com>

## Related publications and links

For more information, see the following resources:

- Lenovo Storage product page:  
<http://www.lenovo.com/systems/storage>
- Lenovo Enterprise Solutions Configurator (LESC):  
<http://lesc.lenovo.com>
- Lenovo Data Center Support for the ThinkSystem DS2200:  
<http://datacentersupport.lenovo.com/us/en/products/storage/lenovo-storage/thinksystem-ds2200>

## Related product families

Product families related to this document are the following:

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

## Notices

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

Lenovo (United States), Inc.  
1009 Think Place - Building One  
Morrisville, NC 27560  
U.S.A.  
Attention: Lenovo Director of Licensing

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

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

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

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

**© Copyright Lenovo 2017. All rights reserved.**

This document, LP0509, was created or updated on July 25, 2017.

Send us your comments in one of the following ways:

- Use the online Contact us review form found at:  
<http://lenovopress.com/LP0509>
- Send your comments in an e-mail to:  
[comments@lenovopress.com](mailto:comments@lenovopress.com)

This document is available online at <http://lenovopress.com/LP0509>.



## Trademarks

Lenovo, the Lenovo logo, and For Those Who Do are trademarks or registered trademarks of Lenovo in the United States, other countries, or both. A current list of Lenovo trademarks is available on the Web at <http://www3.lenovo.com/us/en/legal/copytrade/>.

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

AnyFabric™  
Flex System™  
Lenovo XClarity™  
Lenovo®  
RackSwitch™  
System x®  
ThinkServer®  
ThinkSystem™

The following terms are trademarks of other companies:

Linux® is a trademark of Linus Torvalds in the United States, other countries, or both.

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

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