Lenovo Storage E1012 and E1024 Disk Expansion Enclosures
Product Guide (withdrawn product)

The Lenovo Storage E1012 and E1024 Disk Expansion Enclosures offer universal storage expansion capabilities that are designed to provide simplicity, speed, scalability, security, and high availability for small to large businesses. The E1012 and E1024 deliver enterprise-class storage technology in a cost-effective solution with flexible drive configurations and RAID or JBOD (non-RAID) host connectivity or Lenovo storage area network (SAN) array expansion.

The E1012 and E1024 expansion units are designed for a wide range of workloads, including big data and analytics, video surveillance, media streaming, private clouds, file and print serving, e-mail and collaboration, and databases.

Figure 1. Lenovo Storage E1012 and E1024 Disk Expansion Enclosures

Did you know?

The E1012 and E1024 expansion enclosures offer flexible drive configurations with the choice of 2.5-inch and 3.5-inch drive form factors, 10K or 15K rpm SAS and 7.2K rpm NL SAS hard disk drives (HDDs) and self-encrypting drives (SEDs), and SAS solid-state drives (SSDs).

With support for daisy chaining, the E1012 can be scaled up to 960 TB for capacity-optimized configurations, and the E1024 can be scaled up to 192 drives for performance-optimized configurations.

The E1012 and E1024 expansion units are universal enclosures that can be used with Lenovo System x and ThinkServer systems as direct attach storage (DAS) or as expansion for the Lenovo Storage S2200 and S3200 storage area network (SAN) arrays.

Key features

Key features and benefits provided by the E1012 and E1024 storage expansion enclosures include:

- Versatile, scalable storage expansion with a single I/O module for entry-level solutions or dual I/O module configurations for high availability and performance
- Flexible host connectivity to match diverse client needs for direct attach storage with support for 6 Gb or 12 Gb SAS RAID adapters for advanced data protection or 6 Gb SAS Host Bus Adapter (HBA) for maximum JBOD performance
- Provide expansion capabilities and share common parts with the S2200 and S3200 SAN arrays
- 6 Gb SAS drive-side connectivity with support for 12x 3.5-inch large form factor (LFF) drives in the E1012 enclosure or 24x 2.5-inch small form factor (SFF) drives in the E1024 enclosure
- Scalability of up to 96 LFF or 192 SFF drives per RAID adapter with the attachment of up to eight E1012 or E1024 daisy-chained expansion enclosures 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 on a single RAID adapter to perfectly meet performance and capacity requirements for various workloads
- Self-encrypting drives with a supported RAID adapter allow clients to secure their sensitive data and to comply with various security regulations when required
- Designed to comply with NEBS and MIL-STD requirements
- Designed for 99.999% availability

The E1012 and E1024 are designed to support the complete range of data storage requirements, from highly utilized applications to high-capacity, low usage applications.

The following 3.5-inch SAS drives are supported by the E1012:

- High performance solid-state drives (10 drive writes per day [DWD]): 400 GB
- Performance-optimized, enterprise class disk drives: 600 GB and 900 GB 10K rpm
- High-capacity, archival-class nearline disk drives: 2 TB, 4 TB, 6 TB, 8 TB, and 10 TB 7.2K rpm

The following 2.5-inch SAS drives are supported by the E1024:

- 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): 400 GB and 800 GB
- Capacity-optimized solid-state drives (1 DWD): 3.84 TB
- Performance-optimized, enterprise class disk drives
    - 300 GB and 600 GB 15K rpm
    - 600 GB, 900 GB, 1.2 TB, and 1.8 TB 10K rpm
- High-capacity, archival-class nearline disk drives: 1 TB and 2 TB 7.2K rpm

Additional drives and expansion units are designed to be dynamically added with virtually no downtime (operating system dependent), helping to quickly and seamlessly respond to growing capacity demands.

The E1012 and E1024 expansion enclosures are designed to offer high levels of system and data availability with the following technologies:

- Dual I/O modules provide redundant paths from a supported RAID controller to the drives in the enclosures for I/O load balancing and failover
- Dual-port drives (both HDDs and SSDs) with automatic drive failure detection and RAID rebuild with global hot spares with a supported RAID adapter
- Redundant hardware, including host ports, I/O modules, and power supplies and fans
- Hot-swappable and customer replaceable components, including I/O modules, power supplies with fans, and drives

Components and connectors

The following figure shows the front of the E1012 drive expansion enclosure.
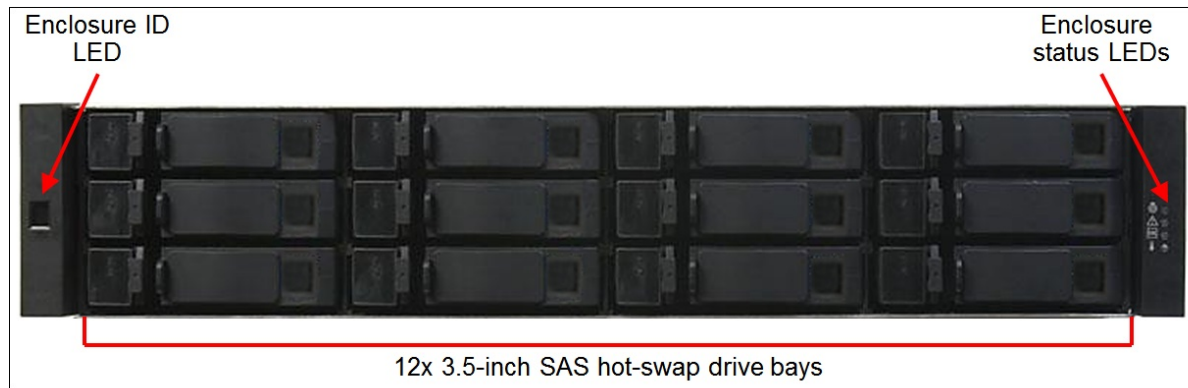

Figure 2. Front view of the E1012 drive enclosure

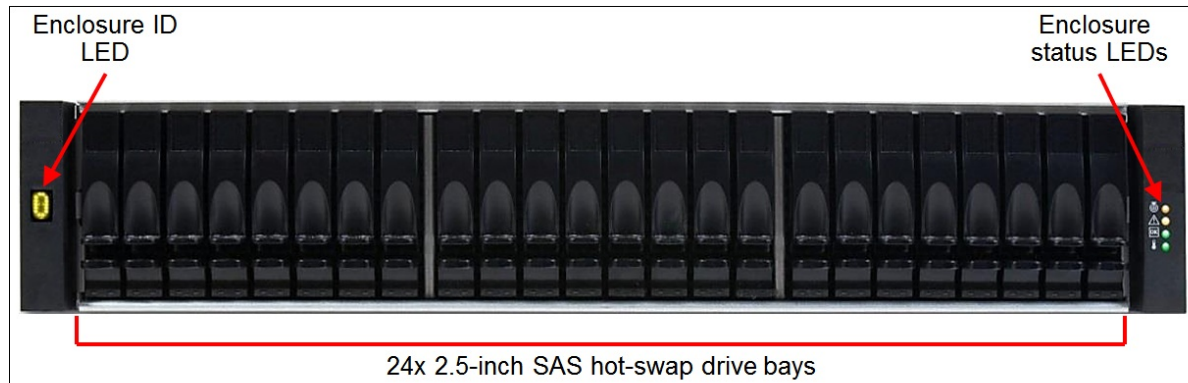The following figure shows the front of the E1024 drive expansion enclosure.

Figure 3. Front view of the E1024 drive enclosure

The following figure shows the rear of the E1012 and E1024 drive enclosures with dual I/O expansion modules. Single I/O module configurations are also supported.
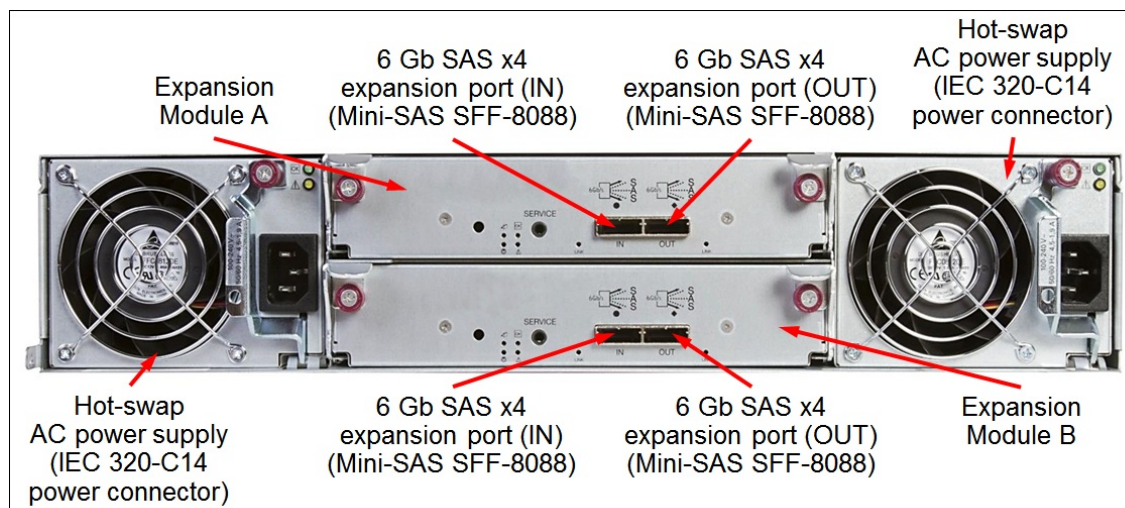

Figure 4. Rear view of the E1012 and E1024 drive enclosures

Note: The expansion modules (shown in Figure 4) have additional service ports with a specialized connector, and these ports are reserved for use by a Lenovo service technician.

System specifications

The following table lists the E1012 and E1024 system specifications.

Table 1. System specifications

Components	Specification
Form factor	2U rack mount
I/O expansion configuration	Single or dual I/O Expansion Module configurations supported. Single I/O Module enclosures can be upgraded to dual I/O Module enclosures non-disruptively.
Drive bays	• E1012: 12 LFF hot-swap drive bays; up to 8x E1012 enclosures can be daisy chained on a supported RAID adapter for a total of up to 96 LFF drives. • E1024: 24 SFF hot-swap drive bays; up to 8x E1024 enclosures can be daisy chained on a supported RAID adapter for a total of up to 192 SFF drives. Intermix of SFF and LFF enclosures is supported.
Drive technologies	SAS and NL SAS HDDs and SEDs; eMLC SAS SSDs. Intermix of HDDs, SEDs, and SSDs is supported within an enclosure, but not within a RAID array.
Drive connectivity	Dual-ported 6 Gb SAS drive attachment infrastructure: • E1012: 12x 6 Gb SAS internal drive ports per I/O Expansion Module • E1024: 24x 6 Gb SAS internal drive ports per I/O Expansion Module • 2x 6 Gb SAS x4 (Mini-SAS SFF-8088) expansion ports (IN and OUT) per I/O Expansion Module for the daisy chained attachment of the drive enclosures

Components	Specification
Drives	SFF drives: • 400 GB, 800 GB, and 1.6 TB SAS SSDs (3 DWD and 10 DWD) • 400 GB and 800 GB SAS SED SSDs (10 DWD) • 3.84 TB SAS SSDs (1 DWD) • 300 GB and 600 GB 15K rpm SAS HDDs • 600 GB, 900 GB, 1.2 TB, and 1.8 TB 10K rpm SAS HDDs • 1 TB and 2 TB 7.2K rpm NL SAS HDDs LFF drives: • 400 GB SAS SSDs (10 DWD) • 600 GB and 900 GB 10K rpm SAS HDDs • 2 TB, 4 TB, 6 TB, 8 TB, and 10 TB 7.2K rpm NL SAS HDDs
Storage capacity	• E1012: Up to 960 TB (96x 10 TB LFF NL SAS HDDs) • E1024: Up to 737 TB (192x 3.84 TB SFF SAS SSDs)
Host connectivity	1x 6/12 Gb SAS host port (IN) (Mini-SAS SFF-8088) per I/O Expansion Module
Host adapters	• 6Gb SAS HBA (2-port 6 Gb SAS; non-RAID) • ServeRAID M5120 (2-port 6 Gb SAS; RAID 0, 1, 10, 5, 50; optional RAID 6, 60) • ServeRAID M5225 (2-port 12 Gb SAS; RAID 0, 1, 10, 5, 50; optional RAID 6, 60) • ThinkServer 9280-8e (2-port 6 Gb SAS; RAID 0, 1, 10, 5, 50, 6, 60) • ThinkServer 9286CV-8e (2-port 6 Gb SAS; RAID 0, 1, 10, 5, 50, 6, 60)
Host operating systems	Microsoft Windows Server 2008 R2, 2012 and 2012 R2; Red Hat Enterprise Linux (RHEL) 5, 6, and 7; SUSE Linux Enterprise Server (SLES) 10, 11, and 12; VMware vSphere 5.1, 5.5, and 6.0.
Cooling	Redundant cooling with two fans that are built into power supplies.
Power supply	Two redundant hot-swap 595 W AC power supplies.
Hot-swap parts	I/O expansion modules, drives, power supplies/fans.
Management interfaces	SAS Enclosure Services
Security features	Self-encrypting drives (SEDs)
Warranty	Three-year customer-replaceable unit, parts only limited warranty with 9x5 next business day.
Service and support	Optional warranty service upgrades are available through Lenovo: on-site support, 24x7 coverage, 4-hour response time, 1-year or 2-year warranty extensions, Hard Drive Retention.
Dimensions	• E1012: Height: 87 mm (3.4 in), width: 447 mm (17.6 in), depth: 523 mm (20.6 in) • E1024: Height: 89 mm (3.5 in), width: 447 mm (17.6 in), depth: 519 mm (20.5 in)
Weight	• E1012: Minimum: 16.8 kg (37.0 lb); Maximum: 26.6 kg (58.6 lb) • E1024: Minimum: 16.9 kg (37.2 lb); Maximum: 23.4 kg (51.6 lb

Models

The following table lists the models of the E1012 and E1024 expansion enclosures.

Table 2. Part numbers for ordering E1012 and E1024 models

Description	Part number
LFF models	
Lenovo Storage E1012 LFF Disk Expansion Single SAS IO Module, Rail Kit, 9x5 NBD	64111B1
Lenovo Storage E1012 LFF Disk Expansion Dual SAS IO Module, Rail Kit, 9x5 NBD	64111B2
SFF models	
Lenovo Storage E1024 SFF Disk Expansion Single SAS IO Module, Rail Kit, 9x5 NBD	64111B3
Lenovo Storage E1024 SFF Disk Expansion Dual SAS IO Module, Rail Kit, 9x5 NBD	64111B4

The part number for the E1012 or E1024 includes the following items:

- One E1012 or E1024 chassis with two power supplies with fans and with one or two SAS I/O expansion modules installed
- Two 4.3m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cables
- Lenovo Storage SAN Rack Mount Kit - Rails 25"-36"
- Getting Started Guide
- Warranty Flyer
- Important Notices Flyer
- Documentation Flyer

Connectivity topology

The E1012 and E1024 support single and dual expansion module configurations. Standard models of the E1012 and E1024 ship with one or two expansion modules (see Table 2). Single module configurations can be upgraded to dual module configurations non-disruptively.

Each expansion module has two 6 Gb SAS x4 ports (Mini-SAS SFF-8088 connectors) labeled IN and OUT. These ports are used for connections to a supported RAID adapter installed in a server and for daisy chaining the E1012 and E1024 enclosures between each other. The external port on the RAID controller is connected to the IN port on the expansion module, and the OUT port on the expansion module is connected to the IN port on the expansion module in the adjacent enclosure and so on.

Single I/O module configurations can be used with a supported RAID adapter or HBA. In this topology, each port on the adapter is connected to a separate chain of single I/O expansion enclosures, as illustrated in the following figure.
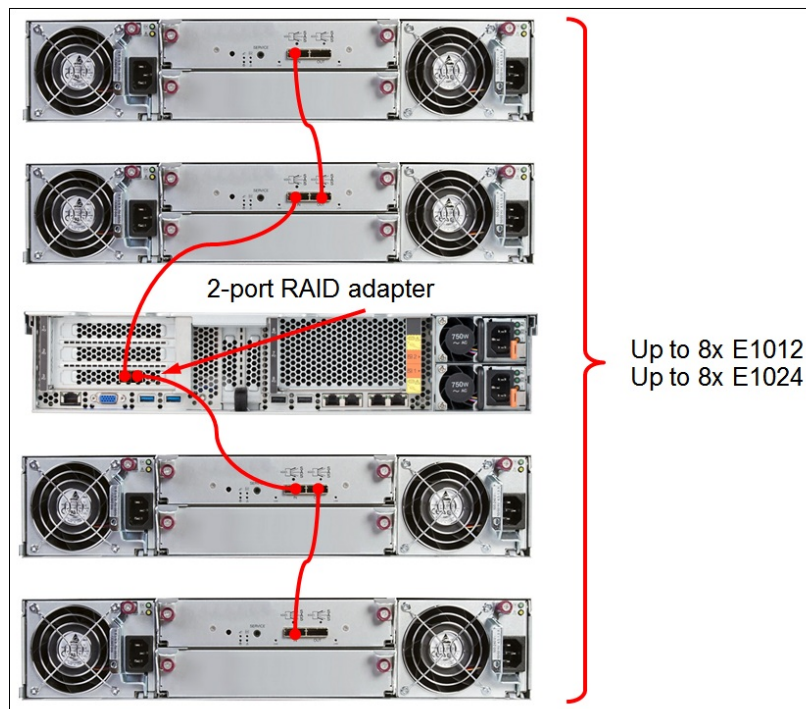
Figure 5. Single I/O module connectivity topology

Dual I/O module configurations can be used with 2-port RAID adapters for high availability and performance. In this topology, each port on the RAID adapter is connected to a different I/O module chain within the same chain of dual I/O enclosures.

Dual I/O connectivity topology without enclosure redundancy is shown in the following figure.
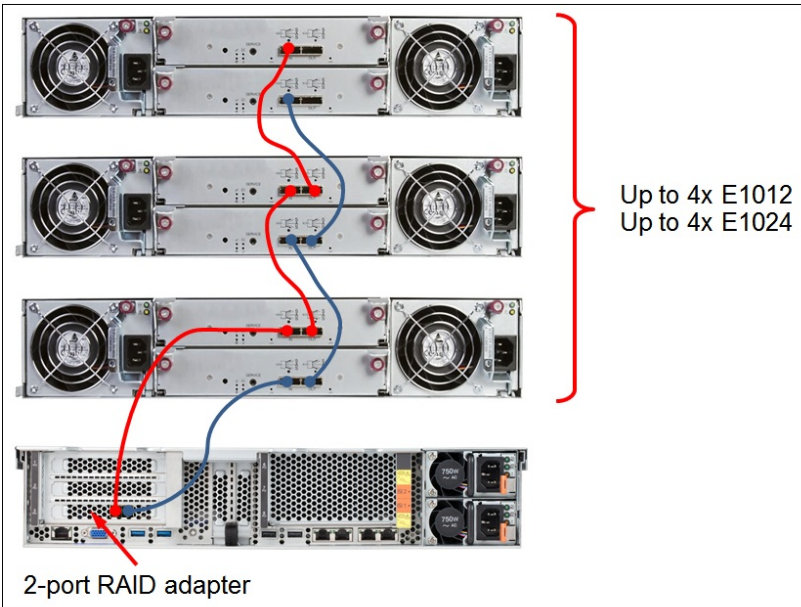
Figure 6. Dual I/O connectivity topology without enclosure redundancy

Dual I/O connectivity topology with enclosure redundancy is shown in the following figure.
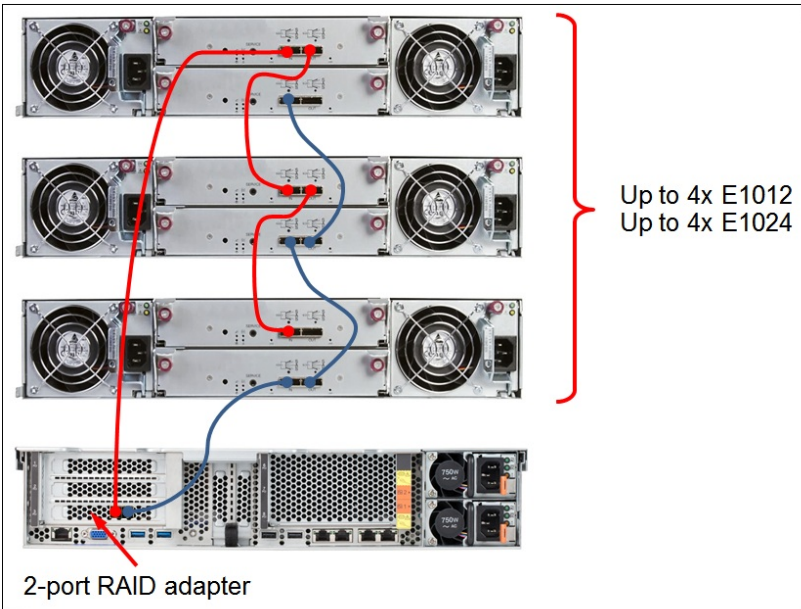
Figure 7. Dual I/O connectivity topology with enclosure redundancy

The following table lists the maximum number of the E1012 and E1024 in a chain on the same adapter.

Table 3. Maximum number of the E1012 and E1024 in a chain on the same adapter

Single I/O chain	E1012 qty	0	1	2	3	4	5	6	7	8
	E1024 qty	8	7	6	5	4	3	2	1	0
Dual I/O chain	E1012 qty	0	1	2	3	4				
	E1024 qty	4	3	2	1	0				

The following table lists ordering information for the expansion modules and related connectivity options.

Table 4. Expansion modules and connectivity options

Description	Part number	Feature code	Max qty per one enclosure
Expansion modules			
Lenovo Storage Expansion SAS IO Module	00WC085	AT27	2
Connectivity cables - Mini-SAS Host Adapter to Expansion and Expansion to Expansion			
External MiniSAS 8088/MiniSAS 8088 0.6m cable	00WE754	AT1A	2*
External MiniSAS 8088/MiniSAS 8088 1m cable	00WE755	AT1B	2*
External MiniSAS 8088/MiniSAS 8088 2m cable	00WE756	AT1C	2*
Connectivity cables - Mini-SAS HD Host Adapter to Expansion			
1.5m HD-miniSAS to miniSAS SAS Cable	00D5224	A3HX	2*
3m HD-miniSAS to miniSAS SAS Cable	00D5226	A3HY	2*

* One cable per SAS expansion module.

Drives

The E1012 enclosure supports up to 12 LFF hot-swap drives, and the E1024 enclosure supports up to 24 SFF hot-swap drives.

The following tables list drive options for the E1012 and E1024 drive enclosures.

Table 5. LFF drive options

Description	Part number	Feature code	Maximum qty per one E1012
3.5-inch SAS hot-swap HDDs			
Lenovo Storage 3.5" 600GB 10K SAS HDD (2.5" in 3.5")	00WC040	AT21	12
Lenovo Storage 3.5" 900GB 10K SAS HDD (2.5" in 3.5")	00WC035	AT1Z	12
3.5-inch NL SAS hot-swap HDDs			
Lenovo Storage 3.5" 2TB 7.2k NL-SAS HDD	00MM735	AT1V	12
Lenovo Storage 3.5" 4TB 7.2k NL-SAS HDD	00MM730	AT1W	12
Lenovo Storage 3.5" 6TB 7.2k NL-SAS HDD	00MM725	AT1Y	12
Lenovo Storage 3.5" 8TB 7.2k NL-SAS HDD	00WE790	AT47	12
Lenovo Storage 3.5" 10TB 7.2k NL-SAS HDD	01DC631	AU7W	12
3.5-inch NL SAS hot-swap SEDs			
Lenovo Storage 3.5" 4TB 7.2k NL-SAS HDD (SED)	00WC025	AT1X	12
3.5-inch SAS hot-swap SSDs (10 DWD)			
Lenovo Storage 3.5" 400GB SSD SAS (2.5" in 3.5" SSD1600MM)	00WC030	AT20	12
Lenovo Storage 3.5" 400GB 10DWD SAS SSD (2.5" in 3.5" 1200.2)	4XB7A09596	B16B	12

Table 6. SFF drive options

Description	Part number	Feature code	Maximum qty per one E1024
2.5-inch SAS hot-swap HDDs			
Lenovo Storage 2.5" 300GB 15k SAS HDD	00MM685	AT1H	24
Lenovo Storage 2.5" 600GB 10k SAS HDD	00MM700	AT1K	24
Lenovo Storage 2.5" 600GB 15k SAS HDD	00MM680	AT1J	24
Lenovo Storage 2.5" 900GB 10k SAS HDD	00MM695	AT1M	24
Lenovo Storage 2.5" 1.2TB 10k SAS HDD	00MM690	AT1P	24
Lenovo Storage 2.5" 1.8TB 10k SAS HDD	00YG718	ATSK	24
2.5-inch SAS hot-swap SEDs			
Lenovo Storage 2.5" 600GB 10k SAS HDD (SED)	00WC020	AT1L	24
Lenovo Storage 2.5" 900GB 10k SAS HDD (SED)	00MM745	AT1N	24
Lenovo Storage 2.5" 1.2TB 10k SAS HDD (SED)	00MM740	AT1Q	24
2.5-inch NL SAS hot-swap HDDs			
Lenovo Storage 2.5" 1TB 7.2k NL-SAS HDD	00MM705	AT1R	24
Lenovo Storage 2.5" 2TB 7.2k NL-SAS HDD	00YG698	ATSL	24
2.5-inch SAS hot-swap SSDs (1 DWD) (1200.2)			
Lenovo Storage 2.5" 3.84TB 1DWD SSD	01CX868	AUJN	24

Description	Part number	Feature code	Maximum qty per one E1024
2.5-inch SAS hot-swap SSDs (3 DWD) (PM1635)			
Lenovo Storage 2.5" 400GB 3DWD SSD	00YH988	AU22	24
Lenovo Storage 2.5" 800GB 3DWD SSD	00YH978	AU21	24
Lenovo Storage 2.5" 1.6TB 3DWD SSD	00YH968	AU20	24
2.5-inch SAS hot-swap SSDs (10 DWD) (SSD1600MM)			
Lenovo Storage 2.5" 400GB SSD (SAS)	00MM720	AT1S	24
Lenovo Storage 2.5" 800GB SSD (SAS)	00MM715	AT1T	24
Lenovo Storage 2.5" 1.6TB SSD (SAS)	00MM710	AT1U	24
2.5-inch SAS hot-swap SSDs (10 DWD) (1200.2)			
Lenovo Storage 2.5" 400GB 10DWDSAS SSD (1200.2)	01CX697	B16A	24
Lenovo Storage 2.5" 800GB 10DWD SAS SSD (1200.2)	01CX687	B168	24
Lenovo Storage 2.5" 1.6TB 10DWD SAS SSD (1200.2)	01CX682	B167	24
2.5-inch SAS hot-swap SED SSDs (10 DWD)			
Lenovo Storage 2.5" 400GB 10DWD SED SSD (SSD1600MM)	00YH983	AU24	24
Lenovo Storage 2.5" 800GB 10DWD SED SSD (SSD1600MM)	00YH973	AU23	24
Lenovo Storage 2.5" 800GB 10DWD SED (FIPS) SSD (1200.2)	01CX692	B169	24

Power cables

The E1012 and E1024 ship standard with two 4.3m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cables. Other power cable options are also available, and the part numbers and feature codes to order the power cables (two power cables are required per each E1012 and E1024) are listed in the following table.

Table 7. Part numbers and feature codes for ordering power cables

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
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	None*	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
Line cords		
10A/125V C13 to NEMA 5-15P 4.3m line cord	39Y7931	6207
10A/250V C13 to NEMA 6-15P 2.8m line cord	46M2592	A1RF
Argentina 10A/250V C13 to IRAM 2073 2.8m line cord	39Y7930	6222

Description	Part number	Feature code
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
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

Physical specifications

The E1012 and E1024 have the following dimensions and weight (approximate):

- E1012
    - Height: 87 mm (3.4 in.)
    - Width: 447 mm (17.6 in.)
    - Depth: 523 mm (20.6 in.)

- E1024
    - Height: 89 mm (3.5 in.)
    - Width: 447 mm (17.6 in.)
    - Depth: 519 mm (20.5 in.)
- Weight
    - E1012: Minimum: 16.8 kg (37.0 lb); Maximum: 26.6 kg (58.6 lb)
    - E1024: Minimum: 16.9 kg (37.2 lb); Maximum: 23.4 kg (51.6 lb)

Operating environment

The E1012 and E1024 are supported in the following environment:

- Air temperature:
    - Operating: 5 °C to 40 °C (41 °F to 104 °F); decrease the maximum ambient temperature by 3.3 °C for every 1,000 m (3,280 ft)
    - Storage: -10 °C to +60 °C (14 °F to 140 °F)
    - Maximum altitude: 3,000 m (9,842 ft)
- Humidity:
    - Operating: 8% to 85% (non-condensing)
    - Storage: 5% to 90% (non-condensing)
- Electrical:
    - 100 to 240 (nominal) V AC; 50 Hz to 60 Hz
- BTU output: 1488 Btu/hr (436 W)
- Noise level: 6.8 bels

Warranty

The E1012 and E1024 have a three-year parts only warranty with 9x5/next business day (NBD) terms. 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 region-specific. Not all warranty service upgrades are available in every region. For more information about Lenovo warranty service upgrade offerings that are available in your region, go to the Lenovo Data Center Solution Configurator (DCSC): http://dcsc.lenovo.com

The following table explains warranty service definitions for the E1012 and E1024 enclosures.

Table 8. Warranty service definitions

Term	Description
On-site service	A service technician will arrive at the client location for equipment service.
24x7x4 hour	A service technician is scheduled to arrive at the client location within four hours after remote problem determination is completed. Lenovo provides service around the clock, every day, including Lenovo holidays.
9x5x4 hour	A service technician is scheduled to arrive at the client location within four business hours after remote problem determination is completed. Lenovo provides service 8:00 am - 5:00 pm in the client's local time zone, Monday-Friday, excluding Lenovo holidays. For example, if a customer reports an incident at 3:00 pm on Friday, the technician will arrive by 10:00 am the following Monday.
9x5 next business day	A service technician is scheduled to arrive at the client location on the business day after remote problem determination is completed. Lenovo provides service 8:00 am - 5:00 pm in the client's local time zone, Monday - Friday, excluding Lenovo holidays. Calls received after 4:00 pm local time require an extra business day for service dispatch. Next business day service is not guaranteed.

In general, the types of Lenovo warranty service upgrades for the E1012 and E1024 are as follows:

- Warranty and maintenance service upgrades:
    - Onsite support for 9x5 NBD coverage
    - 4-hour target response time with onsite, 9x5 or 24x7 service coverage
    - Up to five years of warranty extension for all service levels in one or two year increments
- Hard Drive Retention
  Lenovo's Hard Drive Retention service is a multi-drive hard drive retention offering that ensures your data is always under your control, regardless of the number of hard drives that are installed in your Lenovo system. In the unlikely event of a hard drive failure, you retain possession of your hard drive while Lenovo replaces the failed drive part. Your data stays safely on your premises, in your hands. The Hard Drive Retention service can be purchased in convenient bundles with our warranty upgrades and extensions.

Regulatory compliance

The E1012 and E1024 conform to the following regulations:

- UL 60950-1, 2nd Edition, 2007-03-27 (USA)
- CAN/CSA-C22.2 No 60950-1-07, 2nd Edition, 2007-03 (Canada)
- IEC 60950-1:2005 (2nd Edition); Am 1:2009
- EN 60950-1:2005, 2nd Edition, AM1 2009 (EU)
- CFR 47 Part 15 Subpart B Class A (USA FCC)
- ICES-003:2012, Class A (Canada)
- EN 55022: 2010 Class A (EU)
- EN 55024: 2010 (EU)
- ASNZS CISPR 22-2009 Class A
- CNS 14338 (2006)
- KN22 Class A
- VCCI Technical Requirements 2012 Class A
- RoHS Directive 2011/65/EU
- EAC
- NOM
- UL, BMSI, CCC

RAID controllers and HBAs

The E1012 and E1024 expansion enclosures are supported with the RAID adapters and HBAs that are listed in the following table.

Table 9. RAID controllers and HBAs

Description	Part number	Max qty of enclosures per adapter	
		Single I/O module	Dual I/O module
System x HBAs (non-RAID)			
6Gb SAS HBA	46M0907	8	No support
System x RAID adapters			
ServeRAID M5225-2GB SAS/SATA Controller	00AE938	8	4
ServeRAID M5120 SAS/SATA Controller	81Y4478	8	4
ThinkServer RAID adapters			
ThinkServer 9286CV-8e 6Gb 8-port External SAS RAID Adapter by LSI	4XB0F28699	8	4
ThinkServer 9286CV-8e 6Gb SAS RAID Adapter by LSI	4XB0F28646	8	4
ThinkServer 9280-8e 6Gb 8-port RAID Adapter by LSI	4XB0F28645	8	4

The following table summarizes features of supported RAID adapters.

Table 10. RAID adapter features and specifications summary (PN = Part number)

Feature	M5225-2GB	M5120	9286CV-8e	9280-8e
Part number	00AE938	81Y4478	4XB0F28646 4XB0F28699	4XB0F28645
Form factor	Low profile	Low profile	Low profile	Low profile
Controller chip	LSI SAS3108	LSI SAS2208	LSI SAS2208	LSI SAS2108
Host interface	PCIe 3.0 x8	PCIe 3.0 x8	PCIe 3.0 x8	PCIe 2.0 x8
Port interface	12 Gbps SAS	6 Gbps SAS	6 Gbps SAS	6 Gbps SAS
Number of external ports	8	8	8	8
External port connectors	2x Mini-SAS HD (SFF-8644)	2x Mini-SAS (SFF-8088)	2x Mini-SAS (SFF-8088)	2x Mini-SAS (SFF-8088)
Drive interface	SAS	SAS	SAS	SAS
Drive type	HDD, SED, SSD	HDD, SED, SSD	HDD, SED, SSD	HDD, SED, SSD
Max number of devices	240	240	240	240
RAID levels	0/1/10/5/50; Optional 6/60 (PN 47C8706)	0/1/10/5/50; Optional 6/60 (PN 81Y4546)	0/1/10/5/50/6/60	0/1/10/5/50/6/60
JBOD mode	No	No	No	No
Cache	2 GB (included)	512 MB (PNs 81Y4484, 81Y4487) 1 GB (PN 81Y4559) 2 GB (PN 47C8670)	1 GB (included)	512 MB (included)
Cache protection	Flash (included)	Battery (optional for 81Y4484; PN 81Y4508) Flash (included with 81Y4487, 81Y4559, 47C8670)	Flash (included)	Battery (optional; PN 67Y2647)
SSD Caching	Optional (PN 47C8712)	Optional (PN 90Y4318)	Optional (PN 4XB0F28702)	No

The 6Gb SAS HBA (part number 46M0907) has the following features and specifications:

- Form factor: Low profile
- Controller chip: LSI SAS2008
- Host interface: PCIe 2.0 x8
- Port interface: 6 Gbps SAS/3 Gbps SATA
- Number of ports: 8 (four external, four internal)
- Port connectors: 1x Mini-SAS x4 (SFF-8088), 4x SATA (internal)
- Drive interface: SAS
- Drive type: HDD, SSD
- Maximum number of devices: 512
- RAID levels: None, JBOD mode only
- Cache: None

Servers

The E1012 and E1024 expansion enclosures are supported with the following Lenovo servers:

- System x3100 M5 Type 5457
- System x3250 M5 Type 5458
- System x3300 M4 Type 7382
- System x3500 M4 Type 7383 (E5-2600 and E5-2600 v2)
- System x3500 M5 Type 5464
- System x3530 M4 Type 7160 (E5-2400 and E5-2400 v2)
- System x3550 M4 Type 7914 (E5-2600 and E5-2600 v2)
- System x3550 M5 Type 5463
- System x3550 M5 Type 8869
- System x3630 M4 Type 7158 (E5-2400 and E5-2400 v2)
- System x3650 M4 Type 7915 (E5-2600 and E5-2600 v2)
- System x3650 M4 BD Type 5466
- System x3650 M4 HD Type 5460
- System x3650 M5 Type 5462
- System x3650 M5 Type 8871
- System x3750 M4 Type 8753
- System x3850 X6 Type 6241 (E7 v2 and E7 v3)
- System x3950 X6 Type 6241 (E7 v2 and E7 v3)
- ThinkServer RS140
- ThinkServer RD350 (E5-2600 v3 and E5-2600 v4)
- ThinkServer RD450 (E5-2600 v3 and E5-2600 v4)
- ThinkServer RD550 (E5-2600 v3 and E5-2600 v4)
- ThinkServer RD650 (E5-2600 v3 and E5-2600 v4)
- ThinkServer TS440
- ThinkServer TS450
- ThinkServer TD350 (E5-2600 v3 and E5-2600 v4)

For RAID adapters and HBAs support details for a particular server, refer to a Lenovo Press product guide for the server, found at: http://lenovopress.com

Operating systems

The E1012 and E1024 expansion enclosures support the following operating systems that are supported by RAID adapters and HBAs listed in RAID adapters and HBAs.

- Microsoft
    - Microsoft Windows Server 2012 R2
    - Microsoft Windows Server 2012
    - Microsoft Windows Server 2008 R2
- Red Hat
    - Red Hat Enterprise Linux 7
    - Red Hat Enterprise Linux 6 Server Edition
    - Red Hat Enterprise Linux 6 Server x64 Edition
    - Red Hat Enterprise Linux 5 Server Edition
    - Red Hat Enterprise Linux 5 Server x64 Edition
- SUSE
    - SUSE Linux Enterprise Server 12
    - SUSE Linux Enterprise Server 11 for AMD64/EM64T
    - SUSE Linux Enterprise Server 11 for x86
    - SUSE Linux Enterprise Server 10 for AMD64/EM64T
- VMware
    - VMware vSphere 6.0 (ESXi)
    - VMware vSphere 5.5 (ESXi)
    - VMware vSphere 5.1 (ESXi)

For information about operating compatibility with System x and ThinkServer systems, refer to the Operating System Interoperability Guide: http://lenovopress.com/osig

Rack cabinets

The following table lists the rack cabinets that are currently offered by Lenovo that can be used for mounting the E1012 and E1024 storage expansion enclosures and other IT infrastructure building blocks.

Table 13. 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 for distributing electrical power to the E1012 and E1024 storage expansion enclosures and other IT infrastructure building blocks mounted in a rack cabinet.

Table 14. Power distribution units

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

Description	Part number
DPI 32a Line Cord (IEC 309 P+N+G)	40K9612
DPI 32a Line Cord (IEC 309 3P+N+G)	40K9611
DPI 60a Cord (IEC 309 2P+G)	40K9615
DPI 63a Cord (IEC 309 P+N+G)	40K9613
DPI Australian/NZ 3112 Line Cord (32A)	40K9617
DPI Korean 8305 Line Cord (30A)	40K9618

For more information, see the list of Product Guides in the PDU category:
https://lenovopress.com/servers/options/pdu

Uninterruptible power supply units

The following table lists the uninterruptible power supply (UPS) units that are currently offered by Lenovo that can be used for providing electrical power protection to the E1012 and E1024 storage expansion enclosures and other IT infrastructure building blocks.

Table 15. Uninterruptible power supply units

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

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

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Related publications and links

For more information, see the following documents:

- Lenovo Storage product page
  http://www.lenovo.com/systems/storage
- Lenovo Data Center Solution Configurator (DCSC):
  http://dcsc.lenovo.com
- Lenovo Storage E1012 Support
  http://datacentersupport.lenovo.com/us/en/products/storage/lenovo-storage/e1012/6411
- Lenovo Storage E1024 Support
  http://datacentersupport.lenovo.com/us/en/products/storage/lenovo-storage/e1024/6411

Related product families

Product families related to this document are the following:

- Direct-Attached Storage

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