Lenovo

ThinkSystem ST250 V3
System Configuration Guide



Machine Types: 7DCE, 7DCF

Note

Before using this information and the product it supports, be sure to read and understand the safety information and the safety instructions, which are available at:
https://pubs.lenovo.com/safety_documentation/

In addition, be sure that you are familiar with the terms and conditions of the Lenovo warranty for your server, which can be found at:
http://datacentersupport.lenovo.com/warrantylookup

Twenty-first Edition (October 2025)

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information （安全信息）。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

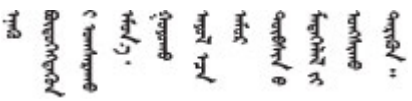
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.



Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

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Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་རྫས་འདི་བདེ་སྤྱོད་མ་བྱས་གོང་། ·སྐྱོན་ཉི་ཡིད་གཟབ·
བྱ་འདྲ་མིན་ཡོད་པའི་འོད་སྣེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

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Youq mwngz yungh canjbinj neix gaxgonq, itdingh aeu doeg aen canjbinj soengq cungj vahgangj ancien siusik.

Safety inspection checklist

Use the information in this section to identify potentially unsafe conditions with your server. As each machine was designed and built, required safety items were installed to protect users and service technicians from injury.

Note: The product is not suitable for use at visual display workplaces according to §2 of the Workplace Regulations.

Attention: This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

CAUTION:
This equipment must be installed or serviced by trained personnel, as defined by the NEC, IEC 62368-1 & IEC 60950-1, the standard for Safety of Electronic Equipment within the Field of Audio/Video, Information Technology and Communication Technology. Lenovo assumes you are qualified in the servicing of equipment and trained in recognizing hazards energy levels in products. Access to the equipment is by the use of a tool, lock and key, or other means of security.

Important: Electrical grounding of the server is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Use the following checklist to verify that there are no potentially unsafe conditions:

1. Make sure that the power is off and the power cord is disconnected.
2. Check the power cord.
   - Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
   - Make sure that the power cord is the correct type.

     To view the power cords that are available for the server:

     a. Go to:

http://dcsc.lenovo.com/#/

b. Click **Preconfigured Model** or **Configure to order**.

c. Enter the machine type and model for your server to display the configurator page.

d. Click **Power → Power Cables** to see all line cords.

- Make sure that the insulation is not frayed or worn.

3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
4. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
5. Check for worn, frayed, or pinched cables.
6. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

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Chapter 1. Introduction

The ThinkSystem ST250 V3 server (Types 7DCE and 7DCF) is a 4U tower server designed for performance and expansion for various IT workloads. With the modular design, the server is flexible to be customized for maximum storage capacity or high storage density with selectable input/output options and tiered system management.

Figure 1. ThinkSystem ST250 V3



Features

Performance, ease of use, reliability, and expansion capabilities were key considerations in the design of your server. These design features make it possible for you to customize the system hardware to meet your needs today and provide flexible expansion capabilities for the future.

Your server implements the following features and technologies:

- **Features on Demand**

  If a Features on Demand feature is integrated in the server or in an optional device that is installed in the server, you can purchase an activation key to activate the feature. For information about Features on Demand, see:

  https://fod.lenovo.com/lkms

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- **Lenovo XClarity Controller (XCC)**

  The Lenovo XClarity Controller is the common management controller for Lenovo ThinkSystem server hardware. The Lenovo XClarity Controller consolidates multiple management functions in a single chip on the server system board (system board assembly). Some of the features that are unique to the Lenovo XClarity Controller are enhanced performance, higher-resolution remote video, and expanded security options.

  The server supports Lenovo XClarity Controller 2 (XCC2). For additional information about Lenovo XClarity Controller 2 (XCC2), refer to https://pubs.lenovo.com/lxcc-overview/.

- **UEFI-compliant server firmware**

  Lenovo ThinkSystem firmware is Unified Extensible Firmware Interface (UEFI) compliant. UEFI replaces BIOS and defines a standard interface between the operating system, platform firmware, and external devices.

  Lenovo ThinkSystem servers are capable of booting UEFI-compliant operating systems, BIOS-based operating systems, and BIOS-based adapters as well as UEFI-compliant adapters.

  Note: The server does not support Disk Operating System (DOS).

- **Large system-memory capacity**

  The server supports up to 4 TruDDR5 DIMMs operating at up to 4800 MHz. For more information about the specific types and maximum amount of memory, see “Technical specifications” on page 4.

- **Integrated network support**

  The server comes with an integrated 2-port Gigabit Ethernet controller, which supports connection to a 10 Mbps, 100 Mbps, or 1000 Mbps network. In the initial server configuration, Ethernet 1 and Ethernet 2 are activated.

- **Large data-storage capacity and hot-swap capability**

  With the hot-swap feature, you can add, remove, or replace hard disk drives without turning off the server.

  The hot-swap server models support a maximum of sixteen 2.5-inch hot-swap or eight 3.5-inch hot-swap Serial Attached SCSI (SAS) hard disk drives or hot-swap Serial ATA (SATA) hard disk drives. For some models, you can install up to eight 2.5-inch hot-swap drives and four 3.5-inch hot-swap drives into the same server.

  The simple-swap server models support a maximum of eight 3.5-inch simple-swap SATA drives or six 3.5-inch simple-swap SATA with optical drives.

  See “Technical specifications” on page 4 for more information.

- **Lightpath Diagnostics**

  Lightpath Diagnostics provides LEDs to help you diagnose problems. For more information about the Lightpath Diagnostics, see “Troubleshooting by system LEDs and diagnostics display” on page 30.

- **Mobile access to Lenovo Service Information website**

  The server provides a QR code on the system service label, which is on the cover of the server, that you can scan using a QR code reader and scanner with a mobile device to get quick access to the Lenovo Service Information website. The Lenovo Service Information website provides additional information for parts installation, replacement videos, and error codes for server support.

- **Active Energy Manager**

  Lenovo XClarity Energy Manager is a power and temperature management solution for data centers. You can monitor and manage the power consumption and temperature of Converged, NeXtScale, System x, and ThinkServer servers, and improve energy efficiency using Lenovo XClarity Energy Manager.

- **Optional power capabilities**

  The server supports a maximum of two 800-watt hot-swap power supplies, which provide redundancy for a typical configuration.

- **ThinkSystem RAID support**

  The ThinkSystem RAID adapter provides hardware redundant array of independent disks (RAID) support to create configurations, supporting RAID levels 0, 1, 5, and 10. An optional RAID adapter is available for purchase.

Tech Tips

Lenovo continually updates the support website with the latest tips and techniques that you can use to solve issues that your server might encounter. These Tech Tips (also called retain tips or service bulletins) provide procedures to work around issues or solve problems related to the operation of your server.

To find the Tech Tips available for your server:

1. Go to http://datacentersupport.lenovo.com and navigate to the support page for your server.
2. Click on **How To's** from the navigation pane.
3. Click **Article Type → Solution** from the drop-down menu.

   Follow the on-screen instructions to choose the category for the problem that you are having.

Security advisories

Lenovo is committed to developing products and services that adhere to the highest security standards in order to protect our customers and their data. When potential vulnerabilities are reported, it is the responsibility of the Lenovo Product Security Incident Response Team (PSIRT) to investigate and provide information to our customers so they may put mitigation plans in place as we work toward providing solutions.

The list of current advisories is available at the following site:

https://datacentersupport.lenovo.com/product_security/home

Specifications

Summary of the features and specifications of the server. Depending on the model, some features might not be available, or some specifications might not apply.

Refer to the below table for specifications categories and the content of each category.

Specification category	Technical specifications	Mechanical specifications	Environmental specifications
Content	• Processor • Memory • M.2 Drive • Storage expansion • Expansion slots • Integrated functions and I/O connectors • Network • Rear button • RAID adapter • Host bus adapter • System fan • Electrical input • Minimal configuration for debugging • Operating systems	• Dimension • Weight	• Heat output • Acoustical noise emissions • Ambient temperature management • Environmental

Technical specifications

Summary of the technical specifications of server. Depending on the model, some features might not be available, or some specifications might not apply.

Processor

- This server supports one of the following Intel® processors:
  - Xeon® 6300 / E-2400 series
  - Pentium®

  Note: Only the Xeon® E processor supports Intel® Trusted Execution Technology (Intel® TXT) feature.
- Designed for LGA 1700 socket
- Scalable up to 8 cores per socket
- Supports TDP up to 95W

For a list of supported processors, see: http://datacentersupport.lenovo.com.

Memory

See “Memory module installation rules and order” in *User Guide* or *Hardware Maintenance Guide* for detailed information about memory configuration and setup.

- Minimum: 16 GB
- Maximum: 128 GB
- Slots: four DIMM slots (two channels, two DIMMs per channel)
- Memory module type:
  - TruDDR5 4800MHz UDIMM: 16 GB (1Rx8), 32 GB (2Rx8)
  - TruDDR5 5600MHz UDIMM: 16 GB (1Rx8), 32 GB (2Rx8)

Notes:

- Memory operates at up to 4400 MHz, depending on “Memory module installation rules and order” in *User Guide* or *Hardware Maintenance Guide*.
- 4800MHz memory is only supported with Intel Xeon® E-2400 series and Pentium® processors.

For a list of supported memory modules, see: https://serverproven.lenovo.com.

M.2 Drive

Supports up to two SATA M.2 drives of the following drive form factors:

- 42 mm (2242)
- 60 mm (2260)
- 80 mm (2280)
- 110 mm (22110)

Supports the following M.2 drive capacity:
- 240 GB
- 480 GB
- 960 GB (supported only when the ambient temperature is below 30°C)

Notes:

- Follow the rules below when a ThinkSystem M.2 SATA/x4 NVMe 2-Bay Enablement Kit is installed.
  - Up to six 3.5-inch simple-swap SATA drives configured with software RAID is supported.
  - Up to four 3.5-inch hot-swap SATA drives configured with software RAID is supported.
  - 2.5-inch hot-swap SATA drives configured with software RAID and optical/tape drives are not supported.

For a list of supported M.2 drives, see: https://serverproven.lenovo.com.

Storage expansion

Available drive bays might vary by model.

- Storage drive bays:
  - 3.5-inch simple-swap drive configurations
    - Eight 3.5-inch drives
      - Bay 0 to 5 support SATA drives
      - Bay 6 to 7 supports one of the following:
        - SATA drive
        - NVMe drive
    - Six 3.5-inch SATA drives
      - Bay 0 to 5 support SATA drives
      - Optical-drive bay 0 (lower bay) supports one of the following:
        - Optical drive
        - Tape drive (RDX or LTO)
      - Optical-drive bay 1 (upper bay) supports one optional optical drive
  - 2.5/3.5-inch hot-swap drive configurations
    - Eight 3.5-inch SAS/SATA drives (Bay 0 to 3 and Bay 4 to 7)
    - Sixteen 2.5-inch SAS/SATA drives (Bay 0 to 7 and Bay 8 to 15)
    - Four 3.5-inch (Bay 0 to 3) and eight 2.5-inch SAS/SATA drives (Bay 4 to 11)
    - Optical/tape drive bays
      - Optical-drive bay 0 (lower bay) supports one of the following:
        - Optical drive
        - Tape drive (RDX or LTO)
      - Optical-drive bay 1 (upper bay) supports one optional optical drive

Expansion slots

Four PCIe expansion slots are available:
- Slot 1: PCIe Gen4 x4 lane in x4 slot (open-end), TDP 25W, FH/HL
- Slot 2: PCIe Gen5 x16 lane in x16 slot, TDP 75W, FH/HL
- Slot 3: PCIe Gen4 x4 lane in x4 slot (open-end), TDP 25W, FH/HL
- Slot 4: PCIe Gen4 x4 lane in x8 slot, TDP 25W, FH/HL

Notes:

1. PCIe slot 2 supports one GPU adapter when no other adapter is installed in PCIe slot 3.
2. Broadcom 57414 10/25GbE SFP28 2-port PCIe Ethernet Adapter and Broadcom 57416 10GBASE-T 2-Port PCIe Ethernet Adapter can only be installed in slot 1 or slot 4.
3. PCIe slot 4 supports one M.2 boot adapter.
4. Slot 1 and Slot 3 in the ST250 V3 are open-end design, which means that the slots can accept adapters with a longer edge connector than the physical length of the slot connector. For example, if a x8 adapter is installed in the x4 slot 3 of the server, half of the edge connector will not be connected to the slot. The adapter will still function, however performance will be impacted.

Graphics processing unit (GPU)

This server supports one GPU adapter in PCIe slot 2.
For a list of supported GPU adapters, see: https://serverproven.lenovo.com.

Integrated functions and I/O connectors

- Lenovo XClarity Controller (XCC), which provides service processor control and monitoring functions, video controller, and remote keyboard, video, mouse, and remote drive capabilities.
  - The server supports Lenovo XClarity Controller 2 (XCC2). For additional information about Lenovo XClarity Controller 2 (XCC2), refer to https://pubs.lenovo.com/lxcc-overview/.
- Front I/O module
  - One Lenovo XClarity Controller USB 2.0 connector
  - One USB 3.2 Gen 1 (5 Gb) connector
- Rear panel
  - Four USB 3.2 Gen 1 (5 Gb) connectors
  - Two Ethernet connectors (Ethernet connector 1 shared with Lenovo XClarity Controller network connector)
  - One Lenovo XClarity Controller network connector
  - One Video Graphics Array (VGA) connector
  - One serial connector

Network

- Two 1 Gbps RJ45 Ethernet connectors
- One 1 Gbps RJ45 Lenovo XClarity Controller network connector

Rear button

NMI button

RAID adapter

The following options are available:
- Hardware RAID (RAID level 0, 1, 5, and 10):
  - ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Adapter (with flash power module)
  - ThinkSystem RAID 940-8i Flash PCIe Gen4 12Gb Adapter (with flash power module)
  - ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Adapter (with flash power module)
  - ThinkSystem RAID 5350-8i PCIe 12Gb Adapter
- Software RAID (RAID level 0, 1, 5, and 10):
  - Intel VROC SATA RAID

For a list of supported adapters, see:

http://datacentersupport.lenovo.com

Host bus adapter

- ThinkSystem 4350-8i SAS/SATA 12Gb HBA
- ThinkSystem 440-8e SAS/SATA PCIe Gen4 12Gb HBA

System fan

This server comes with the following fans:
- One heat sink and fan assembly (80 x 80 x 25 mm)
- Two front system fans for drives (92 x 92 x 25 mm)
- One rear system fan (120 x 120 x 25 mm)

Electrical input

Depending on your configuration, the server comes with one of the following power supply configurations:
- Supports one fixed power supply:
  - ThinkSystem 500W 230V/115V Platinum Fixed Power Supply v2
  - ThinkSystem 300W 230V/115V Gold Fixed Gen2 Power Supply
- Supports up to two power supplies for redundancy support:
  - 800W 230V/115V Platinum CRPS Power Supply
  - 800W 230V/115V Titanium CRPS Power Supply

Important: CRPS power supplies in the chassis must have the same wattage, vendor, and part number (or alternate part number).

Notes:

- ThinkSystem ST250 V3 only supports AC input power. **Do not use 240 VDC input.**
- The actual power efficiency depends on system configuration.

Minimal configuration for debugging

- System board
- Firmware and RoT security module (installed on the system board)
- One processor
- One memory module in slot 3
- One power supply unit
- One drive with RAID adapter and backplane or backplate (if OS is needed for debugging)
- One rear system fan, one heat sink fan, and one front system fan for drives

Operating systems
Supported and certified operating systems: • Microsoft Windows Server • VMware ESXi • Red Hat Enterprise Linux • SUSE Linux Enterprise Server References: • Complete list of available operating systems: https://lenovopress.lenovo.com/osig. • OS deployment instructions, see “Deploy the operating system” on page 57.

Mechanical specifications

Summary of the mechanical specifications of server. Depending on the model, some features might not be available, or some specifications might not apply.

Dimension
4U server • Height: 176 mm (6.93 inches) • Width: 578 mm (22.76 inches) • Depth: 444 mm (17.48 inches)

Weight
• **2.5-inch drive configuration** – 20.5 kg (45.19 lb) maximum • **3.5-inch drive configuration** – 22.7 kg (50.04 lb) maximum

Environmental specifications

Summary of the environmental specifications of server. Depending on the model, some features might not be available, or some specifications might not apply.

Heat output
Approximate heat output: • Minimum configuration: 484 BTU per hour (141 watts) • Maximum configuration : 1397 BTU per hour (409 watts)

Acoustical noise emissions

The server has the following acoustic noise emissions declaration:

- Sound power level (L_{WAd}):
  - Idling: 4.6 Bel (Typical), 5.1 Bel (Max.)
  - Operating 1: 4.6 Bel (Typical), 5.1 Bel (Max.)
  - Operating 2: 4.8 Bel (Typical), 5.1 Bel (Max.)
- Sound pressure level (L_{pAm}):
  - Idling: 30.5 dBA (Typical), 35.9 dBA (Max.)
  - Operating 1: 30.5 dBA (Typical), 35.9 dBA (Max.)
  - Operating 2: 33.2 dBA (Typical), 35.9 dBA (Max.)

Notes:

- These sound levels were measured in controlled acoustical environments according to procedures specified by ISO7779 and are reported in accordance with ISO 9296.
- Idle mode is the steady state in which the server is powered on but not operating any intended function. Operating mode 1 is 70% CPU TDP. Operating mode 2 is 100% CPU TDP.
- The declared acoustic sound levels are based on the following configurations, which may change depending on configuration/conditions.
  - Typical: 1x 80W CPU, 1x 16GB DIMM, 2x HDD, 1x 800W GW PSU
  - Max: 1x 95W CPU, 2x 32GB DIMM, 2x HDD , 1x 9350-8i RAID,1x 10G NIC, 2x 800W GW PSU
- Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room; the noise levels from other equipment; the room ambient temperature, and employee's location in relation to the equipment. Further, compliance with such government regulations depends on a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. Lenovo recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

Ambient temperature management

Adjust ambient temperature when specific configuration is applied:

- Keep ambient temperature to 45°C or lower when a 60W (or lower) TDP CPU and an 80W heat sink are installed.
- Keep ambient temperature to 40°C or lower when a 70W (or lower) TDP CPU and an 80W heat sink are installed.
- Keep ambient temperature to 35°C or lower when one of the following is installed:
  - 95W (or lower) TDP CPU and a 95W heat sink.
  - 80W (or lower) TDP CPU and an 80W heat sink.
  - GPUs, M.2 drives (480GB or below), U.2 drives, U.3 drives, and 25GbE Ethernet adapters.
  - 3.5-inch drives (20TB or larger capacity).
- Keep ambient temperature to 30°C or lower when an M.2 drive 960GB is installed.

Environment
ThinkSystem ST250 V3 server complies with ASHRAE Class A2 specifications. Depending on the hardware configurations, some models comply with ASHRAE Class A3 and A4 specifications. System performance may be impacted when operating temperature is outside ASHRAE A2 specification. • Air temperature: – Operating – ASHRAE Class A2: 10°C to 35°C (50°F to 95°F); the maximum ambient temperature decreases by 1°C for every 300 m (984 ft) increase in altitude above 900 m (2,953 ft). – ASHRAE Class A3: 5°C to 40°C (41°F to 104°F); the maximum ambient temperature decreases by 1°C for every 175 m (574 ft) increase in altitude above 900 m (2,953 ft). – ASHRAE Class A4: 5°C to 45°C (41°F to 113°F); the maximum ambient temperature decreases by 1°C for every 125 m (410 ft) increase in altitude above 900 m (2,953 ft). – Server off: 5°C to 45°C (41°F to 113°F) – Shipment/storage: -40°C to 60°C (-40°F to 140°F) • Maximum altitude: 3,050 m (10,000 ft) • Relative Humidity (non-condensing): – Operating – ASHRAE Class A2: 8% to 80%; maximum dew point: 21°C (70°F) – ASHRAE Class A3: 8% to 85%; maximum dew point: 24°C (75°F) – ASHRAE Class A4: 8% to 90%; maximum dew point: 24°C (75°F) – Shipment/storage: 8% to 90% • Particulate contamination **Attention:** Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see “Particulate contamination” on page 10. **Note:** The server is designed for standard data center environment and recommended to be placed in industrial data center.

Particulate contamination

Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the device that is described in this document.

Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the device to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If Lenovo determines that the levels of particulates or gases in your environment have caused damage to the device, Lenovo may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 1. Limits for particulates and gases

Contaminant	Limits
Reactive gases	Severity level G1 as per ANSI/ISA 71.04-1985[1]: • The copper reactivity level shall be less than 200 Angstroms per month (Å/month ≈ 0.0035 µg/cm^2-hour weight gain).[2] • The silver reactivity level shall be less than 200 Angstroms per month (Å/month ≈ 0.0035 µg/cm^2-hour weight gain).[3] • The reactive monitoring of gaseous corrosivity must be conducted approximately 5 cm (2 in.) in front of the rack on the air inlet side at one-quarter and three-quarter frame height off the floor or where the air velocity is much higher.
Airborne particulates	Data centers must meet the cleanliness level of ISO 14644-1 class 8. For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods: • The room air might be continuously filtered with MERV 8 filters. • Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters. For data centers with airside economizers, the choice of filters to achieve ISO class 8 cleanliness depends on the specific conditions present at that data center. • The deliquescent relative humidity of the particulate contamination should be more than 60% RH.[4] • Data centers must be free of zinc whiskers.[5]

[1] ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.

[2] The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in Å/month and the rate of weight gain assumes that Cu_2S and Cu_2O grow in equal proportions.

[3] The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in Å/month and the rate of weight gain assumes that Ag_2S is the only corrosion product.

[4] The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.

[5] Surface debris is randomly collected from 10 areas of the data center on a 1.5 cm diameter disk of sticky electrically conductive tape on a metal stub. If examination of the sticky tape in a scanning electron microscope reveals no zinc whiskers, the data center is considered free of zinc whiskers.

Management options

The XClarity portfolio and other system management options described in this section are available to help you manage the servers more conveniently and efficiently.

Overview

Options	Description
Lenovo XClarity Controller	Baseboard management controller (BMC) Consolidates the service processor functionality, Super I/O, video controller, and remote presence capabilities into a single chip on the server system board (system board assembly). **Interface** • CLI application • Web GUI interface • Mobile application • Redfish API **Usage and downloads** https://pubs.lenovo.com/lxcc-overview/
Lenovo XCC Logger Utility	Application that reports the XCC events to local OS system log. **Interface** • CLI application **Usage and downloads** • https://pubs.lenovo.com/lxcc-logger-linux/ • https://pubs.lenovo.com/lxcc-logger-windows/
Lenovo XClarity Administrator	Centralized interface for multi-server management. **Interface** • Web GUI interface • Mobile application • REST API **Usage and downloads** https://pubs.lenovo.com/lxca/
Lenovo XClarity Essentials toolset	Portable and light toolset for server configuration, data collection, and firmware updates. Suitable both for single-server or multi-server management contexts. **Interface** • **OneCLI**: CLI application • **Bootable Media Creator**: CLI application, GUI application • **UpdateXpress**: GUI application **Usage and downloads** https://pubs.lenovo.com/lxce-overview/

Options	Description
Lenovo XClarity Provisioning Manager	UEFI-based embedded GUI tool on a single server that can simplify management tasks. **Interface** • Web interface (BMC remote access) • GUI application **Usage and downloads** https://pubs.lenovo.com/lxpm-overview/ **Important:** Lenovo XClarity Provisioning Manager (LXPM) supported version varies by product. All versions of Lenovo XClarity Provisioning Manager are referred to as Lenovo XClarity Provisioning Manager and LXPM in this document, unless specified otherwise. To see the LXPM version supported by your server, go to https://pubs.lenovo.com/lxpm-overview/.
Lenovo XClarity Integrator	Series of applications that integrate the management and monitoring functionalities of the Lenovo physical servers with the software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center while delivering additional workload resiliency. **Interface** • GUI application **Usage and downloads** https://pubs.lenovo.com/lxci-overview/
Lenovo XClarity Energy Manager	Application that can manage and monitor server power and temperature. **Interface** • Web GUI Interface **Usage and downloads** https://datacentersupport.lenovo.com/solutions/lnvo-lxem
Lenovo Capacity Planner	Application that supports power consumption planning for a server or rack. **Interface** • Web GUI Interface **Usage and downloads** https://datacentersupport.lenovo.com/solutions/lnvo-lcp

Functions

Options		Functions							
		Multi-system mgmt	**OS deploy-ment**	**System configu-ration**	**Firm-ware up-dates[1]**	**Event-s/alert moni-toring**	**Inven-tory/ logs**	**Pow-er mgmt**	**Power planning**
Lenovo XClarity Controller				√	√[2]	√	√[4]		
Lenovo XCC Logger Utility						√			
Lenovo XClarity Administrator		√	√	√	√[2]	√	√[4]		
Lenovo XClarity Essen-tials toolset	OneCLI	√		√	√[2]	√	√		
	Bootable Media Creator			√	√[2]		√[4]		
	UpdateXpress			√	√[2]				
Lenovo XClarity Provisioning Manager			√	√	√[3]		√[5]		
Lenovo XClarity Integrator		√		√	√	√	√	√[6]	
Lenovo XClarity Energy Manager		√				√		√	
Lenovo Capacity Planner									√[7]

Notes:

1. Most options can be updated through the Lenovo tools. Some options, such as GPU firmware or Omni-Path firmware require the use of supplier tools.
2. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** to update firmware using Lenovo XClarity Administrator, Lenovo XClarity Essentials, or Lenovo XClarity Controller.
3. Firmware updates are limited to Lenovo XClarity Provisioning Manager, Lenovo XClarity Controller, and UEFI updates only. Firmware updates for optional devices, such as adapters, are not supported.
4. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** for detailed adapter card information, such as model name and firmware levels, to be displayed in Lenovo XClarity Administrator, Lenovo XClarity Controller, or Lenovo XClarity Essentials.
5. Limited inventory.
6. Power management function is supported only by Lenovo XClarity Integrator for VMware vCenter.
7. It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.

Chapter 2. Server components

This section contains information about each of the components associated with the server.

Front view

This section contains information about the controls, LEDs, and connectors on the front of the server.

The front view of ThinkSystem ST250 V3 varies by model. Refer to the following information for front view identification:

- “Eight 3.5-inch simple-swap drives bays” on page 15
- “Six 3.5-inch simple-swap drives bays” on page 16
- “Eight 3.5-inch hot-swap drives bays” on page 17
- “Sixteen 2.5-inch hot-swap drives bays” on page 18
- “Four 3.5-inch hot-swap + eight 2.5-inch hot-swap drives bays” on page 19

Note: Depending on the model, your server might look slightly different from the illustration.

Eight 3.5-inch simple-swap drives bays

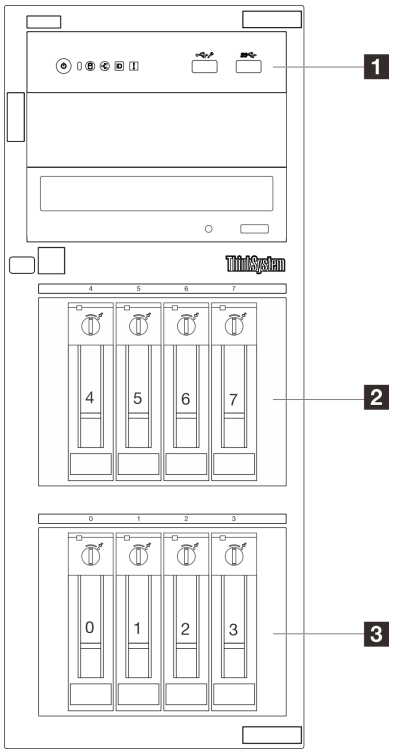


Figure 2. Front view of server models with eight 3.5-inch simple-swap drives bays

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Table 2. Components on server models with eight 3.5-inch simple-swap drives bays

1 Front I/O module	2 3.5-inch simple-swap drive bays • Bay 4-5: SATA drive • Bay 6-7: SATA/NVMe drive
3 3.5-inch simple swap SATA drive bays (Bay 0-3)	

1 Front I/O module

For more information about the front I/O module, see “Front I/O module” on page 23.

2 3 3.5-inch simple-swap drive bays

The drive bays are used to install 3.5-inch simple-swap drives. When you install drives, follow the order of the drive bay numbers. The EMI integrity and cooling of the server are protected by having all drive bays occupied. The vacant drive bays must be occupied by drive bay fillers or drive fillers.

For more information about drive LEDs, see “Drive LEDs” on page 30.

Six 3.5-inch simple-swap drives bays

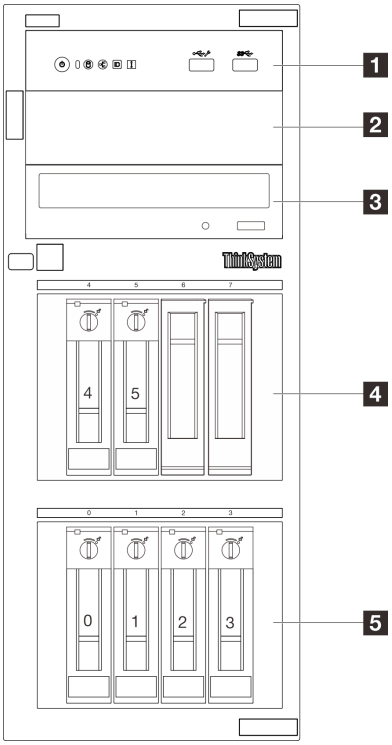


Figure 3. Front view of server models with six 3.5-inch simple-swap drives bays

Table 3. Components on server models with six 3.5-inch simple-swap drives bays

1 Front I/O module	2 Optical-drive bay 2
3 Optical-drive bay 1	4 3.5-inch simple-swap SATA drive bays (Bay 4-5)
5 3.5-inch simple swap SATA drive bays (Bay 0-3)	

1 Front I/O module

For more information about the front I/O module, see “Front I/O module” on page 23.

2 3 Optical-drive bay

Depending on the model, the server might come with an optical drive or a tape drive installed in the lower 5.25-inch optical-drive bay. The upper 5.25-inch optical-drive bay is for a secondary optical drive. Some models have a secondary optical drive installed.

4 5 3.5-inch simple-swap drive bays

The drive bays are used to install 3.5-inch simple-swap drives. When you install drives, follow the order of the drive bay numbers. The EMI integrity and cooling of the server are protected by having all drive bays occupied. The vacant drive bays must be occupied by drive bay fillers or drive fillers.

For more information about drive LEDs, see “Drive LEDs” on page 30.

Eight 3.5-inch hot-swap drives bays

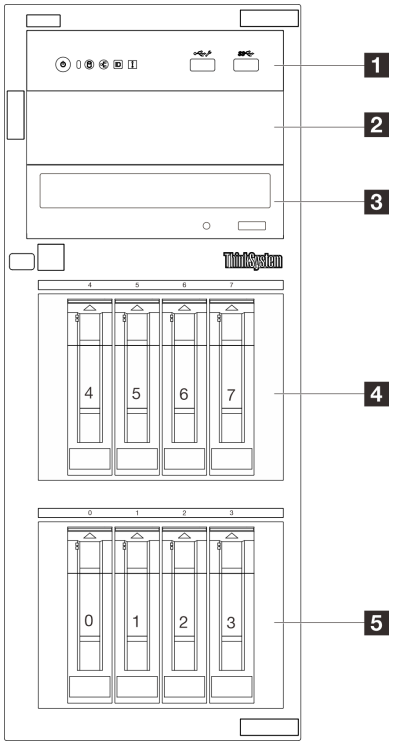


Figure 4. Front view of server models with eight 3.5-inch hot-swap drives bays

Table 4. Components on server models with eight 3.5-inch simple-swap drives bays

1 Front I/O module	2 Optical-drive bay 2
3 Optical-drive bay 1	4 3.5-inch hot-swap SAS/SATA drive bays (Bay 4-7)
5 3.5-inch hot-swap SAS/SATA drive bays (Bay 0-3)	

1 Front I/O module

For more information about the front I/O module, see “Front I/O module” on page 23.

2 3 Optical-drive bay

Depending on the model, the server might come with an optical drive or a tape drive installed in the lower 5.25-inch optical-drive bay. The upper 5.25-inch optical-drive bay is for a secondary optical drive. Some models have a secondary optical drive installed.

4 5 3.5-inch hot-swap drive bays

The drive bays are used to install 3.5-inch hot-swap drives. When you install drives, follow the order of the drive bay numbers. The EMI integrity and cooling of the server are protected by having all drive bays occupied. The vacant drive bays must be occupied by drive bay fillers or drive fillers.

For more information about drive LEDs, see “Drive LEDs” on page 30.

Sixteen 2.5-inch hot-swap drives bays

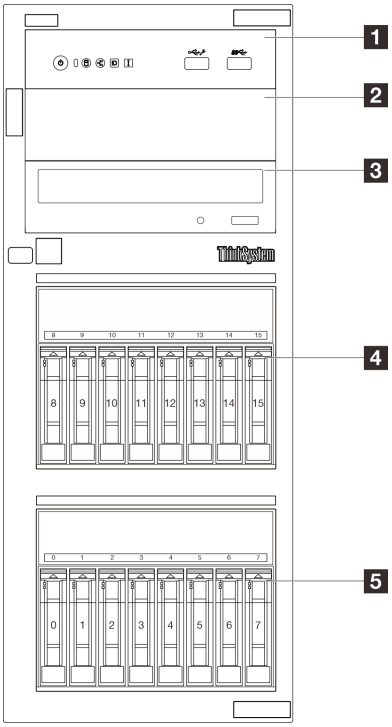


Figure 5. Front view of server models with sixteen 2.5-inch hot-swap drives bays

Table 5. Components on server models with sixteen 2.5-inch hot-swap drives bays

1 Front I/O module	2 Optical-drive bay 2
3 Optical-drive bay 1	4 2.5-inch hot-swap SAS/SATA drive bays (Bay 8-15)
5 2.5-inch hot-swap SAS/SATA drive bays (Bay 0-7)	

1 Front I/O module

For more information about the front I/O module, see “Front I/O module” on page 23.

2 3 Optical-drive bay

Depending on the model, the server might come with an optical drive or a tape drive installed in the lower 5.25-inch optical-drive bay. The upper 5.25-inch optical-drive bay is for a secondary optical drive. Some models have a secondary optical drive installed.

4 5 2.5-inch hot-swap drive bays

The drive bays are used to install eight 2.5-inch hot-swap drives. When you install drives, follow the order of the drive bay numbers. The EMI integrity and cooling of the server are protected by having all drive bays occupied. The vacant drive bays must be occupied by drive bay fillers or drive fillers.

For more information about drive LEDs, see “Drive LEDs” on page 30.

Four 3.5-inch hot-swap + eight 2.5-inch hot-swap drives bays

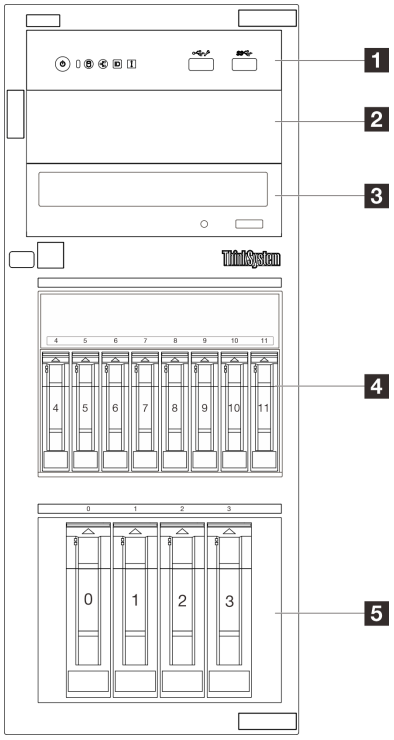


Figure 6. Front view of server models with four 3.5-inch hot-swap + eight 2.5-inch hot-swap drives bays

Table 6. Components on server models with four 3.5-inch hot-swap + eight 2.5-inch drives bays

1 Front I/O module	2 Optical-drive bay 2
3 Optical-drive bay 1	4 3.5-inch hot-swap SAS/SATA drive bays (Bay 4-11)
5 2.5-inch hot-swap SAS/SATA drive bays (Bay 0-3)	

1 Front I/O module

For more information about the front I/O module, see “Front I/O module” on page 23.

2 3 Optical-drive bay

Depending on the model, the server might come with an optical drive or a tape drive installed in the lower 5.25-inch optical-drive bay. The upper 5.25-inch optical-drive bay is for a secondary optical drive. Some models have a secondary optical drive installed.

4 5 2.5-inch/3.5–inch hot-swap drive bays

The drive bays are used to install 2.5-inch and 3.5-inch hot-swap drives. When you install drives, follow the order of the drive bay numbers. The EMI integrity and cooling of the server are protected by having all drive bays occupied. The vacant drive bays must be occupied by drive bay fillers or drive fillers.

For more information about drive LEDs, see “Drive LEDs” on page 30.

Rear view

The rear of the server provides access to several components, including the power supplies, PCIe adapters, serial port, and Ethernet port.

Note: Depending on the configuration, your server might be slightly different from the image.

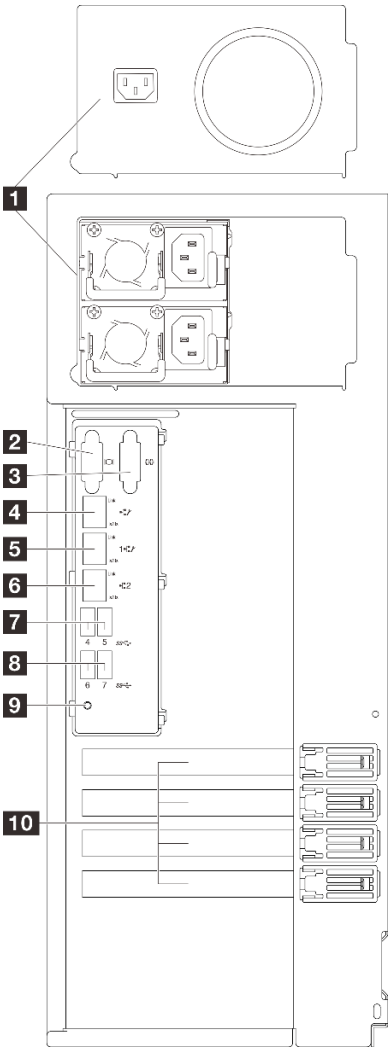


Figure 7. Rear view

Table 7. Components on the rear of server models with a fixed power supply or two hot-swap power supplies

1 Power supply units	6 Ethernet connector 2
2 VGA connector	7 USB 3.2 Gen 1 connectors
3 Serial connector	8 USB 3.2 Gen 1 connectors
4 XCC system management port (1 GB RJ-45)	9 NMI button
5 Ethernet connector 1 (shared with XCC network port)	10 PCIe slots

1 Power supply units

Install power supply units to these bays, connect them to power cords. Make sure the power cords are connected properly. See "Technical specifications" on page 4 for the power supplies supported by this system.

For more information about the LEDs, see "Power supply LEDs" on page 33.

2 VGA connector

Connect a monitor to this connector.

3 Serial connector

Connect a 9-pin serial device to this connector. The serial port is shared with XClarity Controller. XClarity Controller can take control of the shared serial port to redirect serial traffic, using Serial over LAN (SOL).

Note: If the Serial over LAN (SOL) or Emergency Management Services (EMS) feature is enabled, the serial port will be hidden on Linux and Microsoft Windows. Therefore, it is required to disable SOL and EMS to use the serial port on operating systems for serial devices.

To enable the serial port module on Linux or Microsoft Windows, see https://support.lenovo.com/hk/en/solutions/ht514908-how-to-enable-the-serial-port-on-thinksystem-st50-st50-v2-st250-st250-v2-sr250-and-sr250-v2-lenovo-thinksystem-sr250-v2-sr250-st250-v2-st250-st50-v2-and-st50.

4 XCC system management port (1 GB RJ-45)

The server has a 1 GB RJ-45 connector dedicated to Lenovo XClarity Controller (XCC) functions. Through the system management port, you can access the Lenovo XClarity Controller directly by connecting your laptop to the management port using an Ethernet cable. Make sure that you modify the IP settings on the laptop so that it is on the same network as the server default settings. A dedicated management network provides additional security by physically separating the management network traffic from the production network.

See the following for more information:

- "Set the network connection for the Lenovo XClarity Controller" on page 49
- "XCC system management port (10/100/1000 Mbps RJ-45) LEDs" on page 37

5 6 Ethernet connector 1 and 2

Used to attach an Ethernet cable for a LAN. Each Ethernet connector has two status LEDs to help you identify the Ethernet connectivity and activity. For more information, see "XCC system management port (10/100/1000 Mbps RJ-45) LEDs" on page 37. Ethernet 1 connector can be set as XClarity Controller Network connector.

To set Ethernet 1 connector as XClarity Controller Network connector, start Setup Utility and select **BMC Settings → Network Settings → Network Settings Network Interface Port : Shared**. Then, click **Shared NIC on** and select **Share OnLom Port:01**.

7 8 USB 3.2 Gen 1 connectors

Used to attach a device that requires a USB 2.0 or 3.0 connection, such as a keyboard, a mouse, or a USB flash drive.

9 NMI button

Press this button to force a nonmaskable interrupt to the processor. You might have to use a pen or the end of a straightened paper clip to press the button. You can also use it to force a blue-screen memory dump. Use this button only when you are directed to do so by Lenovo Support.

10 PCIe slots

There are four PCIe slots on the system board to install appropriate PCIe adapters. For information about the PCIe slots, see “Specifications” on page 3.

Side view

Follow the instructions in this section to locate the components from the side of the server.

Note: Depending on the configuration, your server might be slightly different from the image.

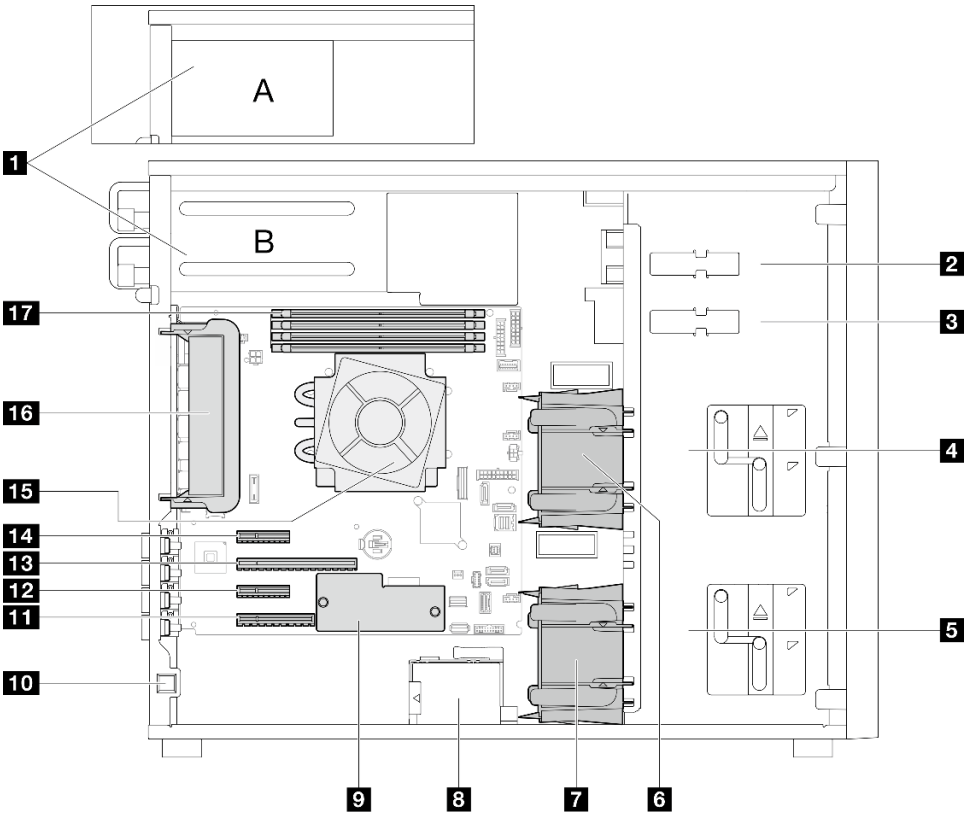


Table 8. Components on the server models side view

1 Power supply cage	10 Intrusion switch
2 Upper ODD drive bay	11 PCIe Slot 4
3 Lower ODD/tape drive bay	12 PCIe Slot 3
4 Upper storage drive cage	13 PCIe Slot 2

Table 8. Components on the server models side view (continued)

5 Lower storage drive cage	14 PCIe Slot 1
6 Front system fan 1	15 Processor and heat sink
7 Front system fan 2	16 Rear system fan
8 RAID flash power module holder	17 DIMM slots
9 Firmware and RoT security module	

Front I/O module

The front I/O module of the server provides controls, connectors, and LEDs. The front I/O module varies by model.

The following illustrations show the front I/O module for different server models. To locate the front I/O module, see Chapter 2 “Server components” on page 15.

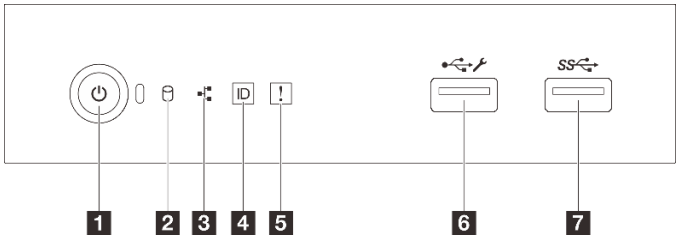


Figure 8. Front I/O module

Table 9. Components on the front I/O module

Callout	Callout
1 Power button/LED (green)	5 System error LED (yellow)
2 Drive activity LED (green) **Note:** For onboard SATA indication only	6 USB 2.0 connector with Lenovo XClarity Controller management
3 Network activity LED (green) **Note:** For onboard LAN indication only	7 USB 3.2 Gen 1 connector
4 System ID button/LED (blue)	

1 Power button/LED (green)

You can press the power button to turn on the server when you finish setting up the server. You can also hold the power button for several seconds to turn off the server if you cannot turn off the server from the operating system. See “Power on the server” in *User Guide* or *Hardware Maintenance Guide* for more information. The power status LED helps you determine the current power status.

Status	Color	Description
Solid on	Green	The server is on and running.
Slow blinking (about one flash per second)	Green	The server is off and is ready to be powered on (standby state).

Status	Color	Description
Fast blinking (about four flashes per second)	Green	The server is off, but the XClarity Controller is initializing, and the server is not ready to be powered on.
Off	None	There is no ac power applied to the server.

2 Drive activity LED (green)

The drive activity LED helps you to determine the status of the drive activity.

Note: The drive activity LED only indicates the activities of drives that are connected to the SATA ports on the system board.

Status	Color	Description
Solid on	Green	The drive is active.
Flashing	Green	The drive is being accessed.
Off	None	The drive is not active.

3 Network activity LED (green)

The network activity LED helps you identify the network connectivity and activity.

Status	Color	Description
On	Green	The server is connected to a network.
Blinking	Green	The network is connected and active.
Off	None	The server is disconnected from the network.

4 System ID button/LED (blue)

Use this system ID button and the blue system ID LED to visually locate the server. Each time you press the system ID button, the state of the system ID LED changes. The LED can be changed to on, blinking, or off. You can also use the Lenovo XClarity Controller or a remote management program to change the state of the system ID LED to assist in visually locating the server among other servers.

If the XClarity Controller USB connector is set to have both the USB 2.0 function and XClarity Controller management function, you can press the system ID button for three seconds to switch between the two functions.

5 System error LED (yellow)

The system error LED provides basic diagnostic functions for your server.

Status	Color	Description	Action
On	Yellow	An error has been detected on the server. Causes might include one or more of the following errors: • The temperature of the server reached the non-critical temperature threshold. • The voltage of the server reached the non-critical voltage threshold. • A fan has been detected to be running at low speed. • The power supply has a critical error. • The power supply is not connected to the power.	Check system logs or internal error LEDs to identify the failed part.
Off	None	The server is off or the server is on and is working correctly.	None.

6 USB 2.0 connector with Lenovo XClarity Controller management

Note: This is the only USB port that supports USB automation update of the firmware and RoT security module.

Connect a USB 2.0 device, such as a mouse, keyboard, or other devices, to this connector.

Connection to Lenovo XClarity Controller is primarily intended for users with a mobile device running the Lenovo XClarity Controller mobile application. When a mobile device is connected to this USB port, an Ethernet over USB connection is established between the mobile application running on the device and the Lenovo XClarity Controller.

Select **Network** in **BMC Configuration** to view or modify settings.

Four types of settings are available:

- **Host only mode**

  In this mode, the USB port is always solely connected to the server.
- **BMC only mode**

  In this mode, the USB port is always solely connected to Lenovo XClarity Controller.
- **Shared mode: owned by BMC**

  In this mode, connection to the USB port is shared by the server and Lenovo XClarity Controller, while the port is switched to Lenovo XClarity Controller.
- **Shared mode: owned by host**

  In this mode, connection to the USB port is shared by the server and Lenovo XClarity Controller, while the port is switched to the server.

7 USB 3.2 Gen 1 (5GB) connector

Used to attach a device that requires a USB 2.0 or 3.0 connection, such as a keyboard, a mouse, or a USB flash drive.

Server locks

Locking the server cover prevents unauthorized access to the inside of your server. Locking the front door (available on some models) prevents unauthorized access to the installed drives.

Padlock

Your server comes with a padlock loop. When a padlock is installed, the server cover cannot be removed.

Note: It is recommended to purchase your own padlock from a local store.

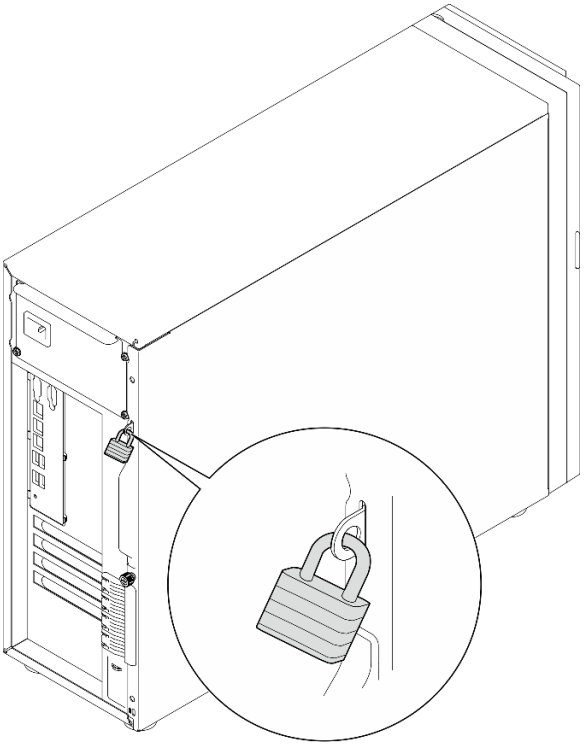


Figure 9. Padlock

Kensington-style cable lock

You can use a Kensington-style cable lock to secure your server to a desk, table, or other non-permanent fixture. The cable lock attaches to the security-lock slot at the rear of your server and is operated with a key or combination depending on the type selected. The cable lock also locks the server cover. This is the same type of lock used with many notebook computers. You can order such a cable lock directly from Lenovo by searching for **Kensington** at:
http://www.lenovo.com/support

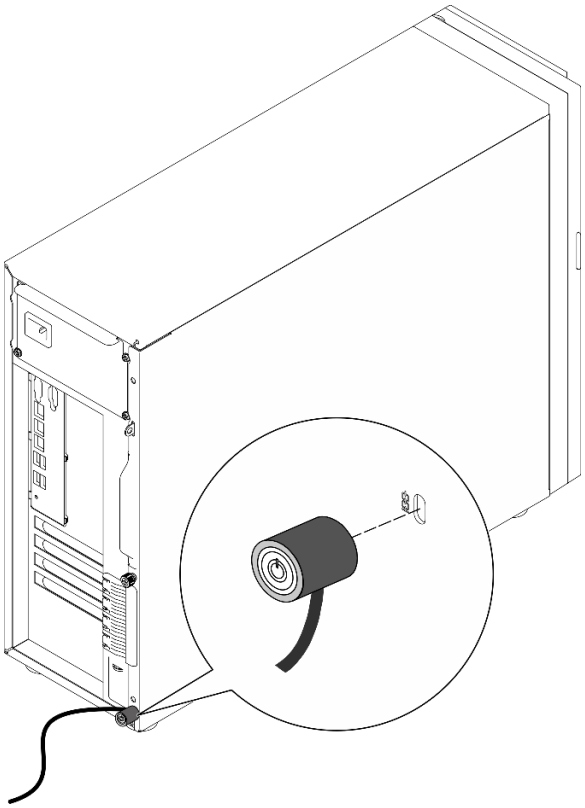


Figure 10. Kensington-style cable lock

Front door lock

You can use the key in the material box to open or lock the front door of the server. The front door protects the drive cage and prevents unauthorized access to the installed drives.

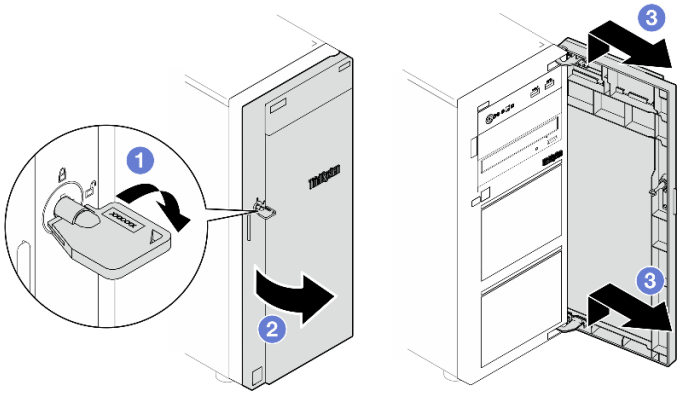


Figure 11. Front door lock

System-board layout

The illustrations in this section provide information about the connectors, switches, and jumpers that are available on the system board.

For more information about the LEDs that are available on the system board, see “System-board LEDs” on page 34.

System-board connectors

The following illustrations show the internal connectors on the system board.

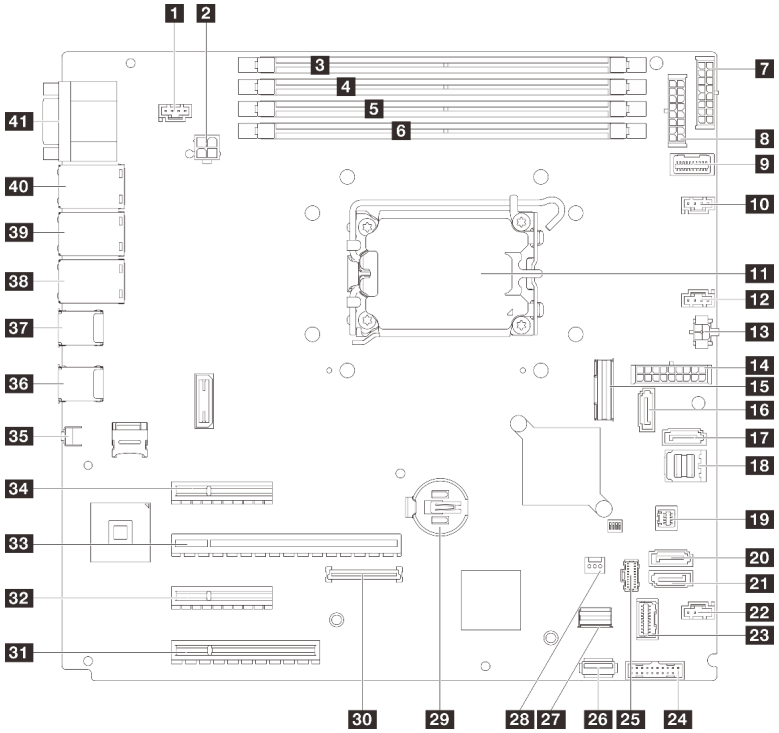


Figure 12. System-board connectors

Table 10. System-board connectors

1 SYS_FAN3 connector	22 Fan4 connector
2 Processor power connector	23 Front I/O module connector
3 DIMM 1	24 Front USB 3.0/2.0 header
4 DIMM 2	25 M.2 power connector
5 DIMM 3	26 Internal USB 3.2 Gen1 connector
6 DIMM 4	27 M.2 signal connector
7 BP2 power connector	28 Intrusion switch connector
8 BP1 power connector	29 CMOS battery
9 Power distribution board side band connector	30 Firmware and RoT security module connector
10 Fan1 connector	31 PCIe slot 4
11 Processor socket	32 PCIe slot 3
12 Fan2 connector	33 PCIe slot 2
13 Optical drive power connector	34 PCIe slot 1
14 System power connector	35 NMI button
15 Slimline x8 connector	36 Two USB 3.2 Gen1 connectors
16 SATA 6	37 Two USB 3.2 Gen1 connectors

Table 10. System-board connectors (continued)

17 SATA 7	38 Ethernet connector 2
18 SATA 0–3	39 Ethernet connector 1 (shared with XCC network port)
19 SGPIO1 connector	40 XCC network connector
20 SATA 5	41 Serial connector and VGA connector
21 SATA 4	

System-board switches

The following illustrations show the location of the switches, jumpers, and buttons on the server.

Important:

1. Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. Review the following information:
   - https://pubs.lenovo.com/safety_documentation/
   - “Installation Guidelines”, “Handling static sensitive devices”, and “Power off the server ” in *User Guide* or *Hardware Maintenance Guide*.
2. Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.

Note: If there is a clear protective sticker on the top of the switch blocks, you must remove and discard it to access the switches.

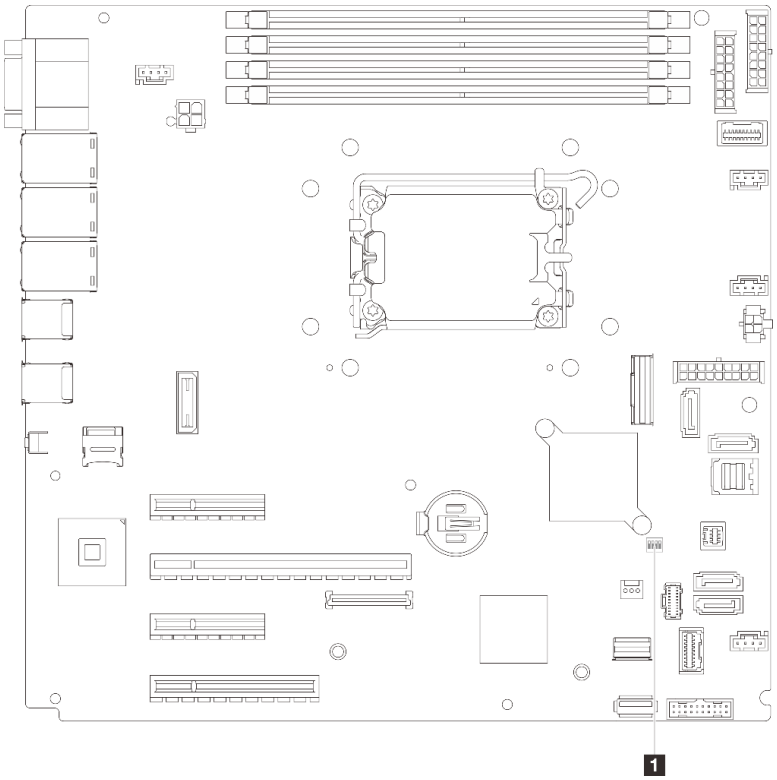


Figure 13. System-board switches

SW1 switch block

The following table describes the functions of the SW1 switch block on the system board.

Table 11. System board SW1 switch block description

Switch number	Default position	Description	Definition
1	Off	Clear CMOS jumper	• Off: Normal (default). • On: Clear the real-time clock (RTC) registry.
2	Off	Reserved	Reserved
3	Off	Force XCC update jumper	• Off: Normal (default). • On: Force the Lenovo XClarity Controller to update to the latest version.
4	Off	Reserved	Reserved

System LEDs and diagnostics display

See the following section for information on available system LEDs and diagnostics display.

For more information, refer to “Troubleshooting by system LEDs and diagnostics display” on page 30.

Troubleshooting by system LEDs and diagnostics display

See the following section for information on available system LEDs and diagnostics display.

Drive LEDs

This topic provides information on drive LEDs.

The following table describes the problems that are indicated by drive activity LED and drive status LED.

Note: Depending on the configuration, your server might be slightly different from the image.

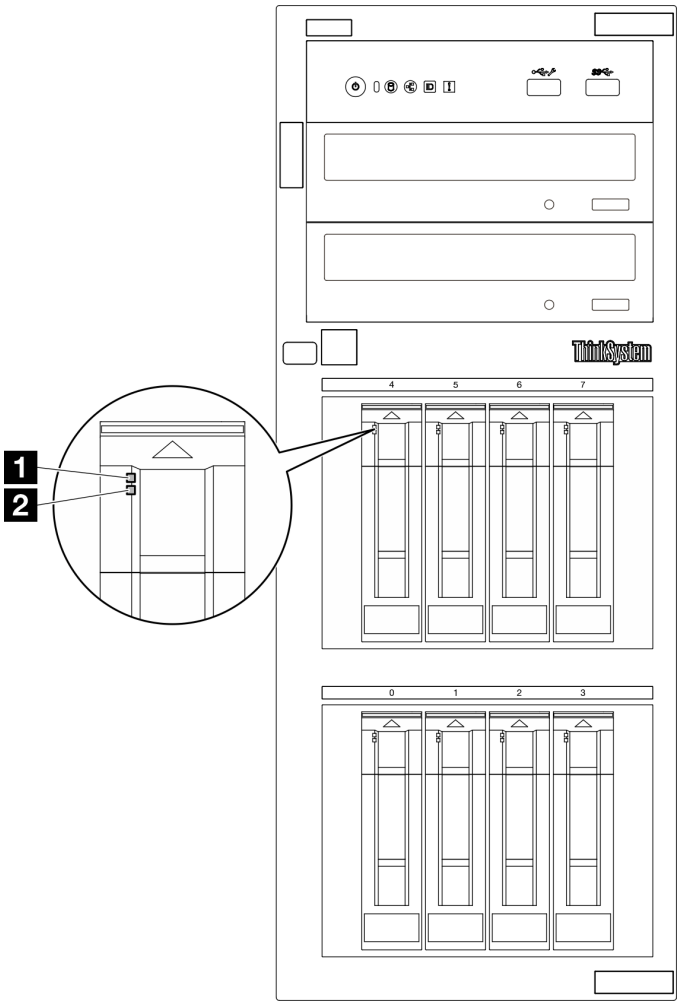


Figure 14. Drive LEDs

LED	Description
1 Drive activity LED (green)	Each hot-swap drive comes with an activity LED. When this LED is flashing, it indicates that the drive is in use.
2 Drive status LED (yellow)	The drive status LED indicates the following status: • The LED is lit: the drive has failed. • The LED is flashing slowly (once per second): the drive is being rebuilt. • The LED is flashing rapidly (three times per second): the drive is being identified.

Front I/O modules LEDs

The front I/O module of the server provides controls, connectors, and LEDs.

The following illustrations show the front I/O module for different server models. To locate the front I/O module, see for more information.

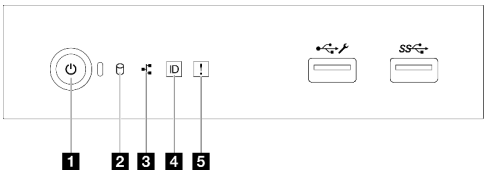


Figure 15. Front I/O module LEDs

Table 12. Front I/O module LEDs

1 Power button/LED (green)	4 System ID button/LED (blue)
2 Drive activity LED (green) **Note:** For onboard SATA indication only	5 System Error LED (yellow)
3 Network activity LED (green) **Note:** For onboard LAN indication only	

1 Power button/LED (green)

You can press the power button to turn on the server when you finish setting up the server. You can also hold the power button for several seconds to turn off the server if you cannot turn off the server from the operating system. See “Power on the server” in *User Guide* or *Hardware Maintenance Guide* for more information. The power status LED helps you determine the current power status.

Status	Color	Description
Solid on	Green	The server is on and running.
Slow blinking (about one flash per second)	Green	The server is off and is ready to be powered on (standby state).
Fast blinking (about four flashes per second)	Green	The server is off, but the XClarity Controller is initializing, and the server is not ready to be powered on.
Off	None	There is no ac power applied to the server.

2 Drive activity LED (green)

The drive activity LED helps you to determine the status of the drive activity.

Note: The drive activity LED only indicates the activities of drives that are connected to the SATA ports on the system board.

Status	Color	Description
Solid on	Green	The drive is active.
Flashing	Green	The drive is being accessed.
Off	None	The drive is not active.

3 Network activity LED (green)

The network activity LED helps you identify the network connectivity and activity.

Status	Color	Description
On	Green	The server is connected to a network.
Blinking	Green	The network is connected and active.
Off	None	The server is disconnected from the network.

4 System ID button/LED (blue)

Use this system ID button and the blue system ID LED to visually locate the server. Each time you press the system ID button, the state of the system ID LED changes. The LED can be changed to on, blinking, or off. You can also use the Lenovo XClarity Controller or a remote management program to change the state of the system ID LED to assist in visually locating the server among other servers.

If the XClarity Controller USB connector is set to have both the USB 2.0 function and XClarity Controller management function, you can press the system ID button for three seconds to switch between the two functions.

5 System error LED (yellow)

The system error LED provides basic diagnostic functions for your server.

Status	Color	Description	Action
On	Yellow	An error has been detected on the server. Causes might include one or more of the following errors: • The temperature of the server reached the non-critical temperature threshold. • The voltage of the server reached the non-critical voltage threshold. • A fan has been detected to be running at low speed. • The power supply has a critical error. • The power supply is not connected to the power.	Check system logs or internal error LEDs to identify the failed part.
Off	None	The server is off or the server is on and is working correctly.	None.

Power supply LEDs

This topic provides information about various power supply LED status and corresponding action suggestions.

The following minimal configuration is required for the server to start:

- System board
- Firmware and RoT security module (installed on the system board)
- One processor
- One memory module in slot 3
- One power supply unit
- One drive with RAID adapter and backplane or backplate (if OS is needed for debugging)
- One rear system fan, one heat sink fan, and one front system fan for drives

CRPS power supply LED

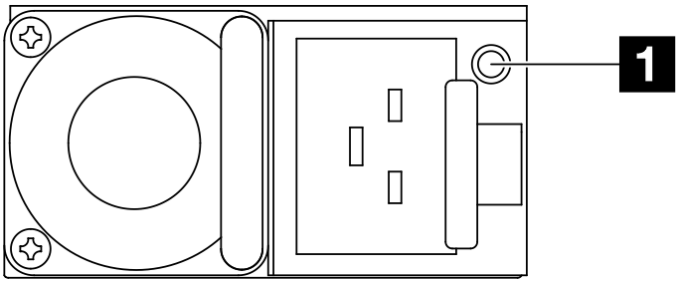


Figure 16. CRPS Power supply LED

LED	Description
1 Power supply status	The power supply status LED can be in one of the following states: • Green: The power supply is connected to the AC power source and working normally. • Off: The power supply is disconnected from the AC power source. • Slow blinking green (about one flash every second): The power supply is in PSU standby state with AC present, cold standby state, or always standby state. • Amber: The AC power cord is unplugged, AC power lost (with a second power supply in parallel still in AC power input power), or power supply has failed. To resolve the issue, replace the power supply. • Slow blinking amber (about one flash every second): Power supply warning events where the power supply continues to operate. • Fast blinking green (about 2 flashes each second): Power supply firmware updating.

System-board LEDs

The following illustrations show the light-emitting diodes (LEDs) on the system board.

Press the power button to light the LEDs on the system board when the power source has been removed from the server.

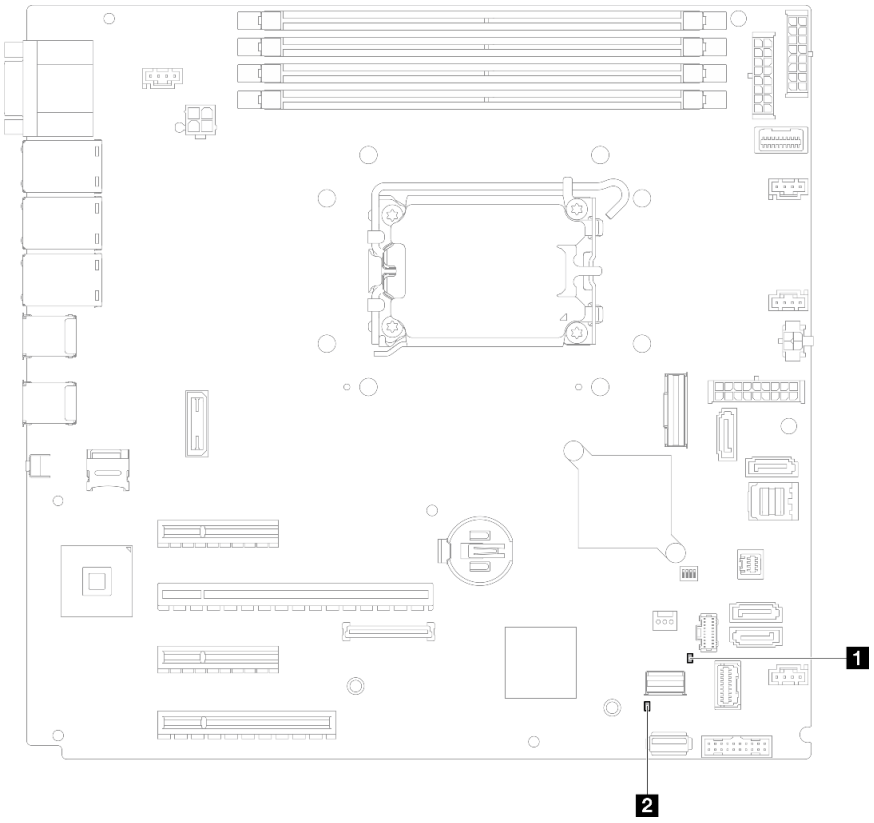


Figure 17. System-board LEDs

Table 13. System board LEDs description and actions

LED	Description and actions
1 System error LED (yellow)	An error has been detected on the server. Causes might include one or more of the following errors: • The temperature of the server reached the non-critical temperature threshold. • The voltage of the server reached the non-critical voltage threshold. • A fan has been detected to be running at low speed. • The power supply has a critical error. • The power supply is not connected to the power. Complete the following steps: Check system logs or internal error LEDs to identify the failed part.
2 System power LED (green)	The states of the system power LED are as follows: • **Off:** No power supply is properly installed, or the LED itself has failed. • **Flashing rapidly (four times per second):** The server is turned off and is not ready to be turned on. The power-control button is disabled. This will last approximately 5 to 10 seconds. • **Flashing slowly (once per second):** The server is turned off and is ready to be turned on. Press the power-control button to turn on the server. • **On:** The server is turned on.

Firmware and RoT security module LEDs

The following illustrations show the light-emitting diodes (LEDs) on the ThinkSystem V3 Firmware and Root of Trust Security Module (Firmware and RoT Security Module).

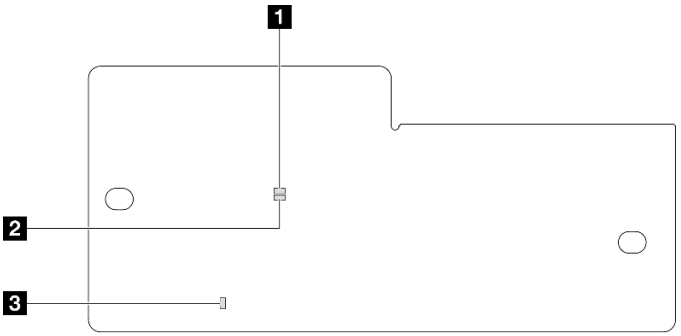


Figure 18. LEDs on the firmware and RoT security module

1 AP0 LED (Green)	2 AP1 LED (Green)	3 Fatal Error LED (Amber)

Table 14. LEDs description

Scenario	AP0 LED	AP1 LED	Fatal Error LED	FPGA heart-beat LED	XCC heart-beat LED	Actions
RoT security module fatal firmware failure	Off	Off	On	N/A	N/A	Replace the firmware and RoT security module.
	Blink	N/A	On	N/A	N/A	Replace the firmware and RoT security module.
No system power (FPGA heartbeat LED off)	Off	Off	Off	Off	Off	If the AC power is on, but the system board assembly does not have power, then: 1. Check the power supply unit (PSU) or power distribution board (PDB) if any. If the PSU or PDB has any error, replace it. 2. If the PSU or PDB is good, do the following: a. Replace the system I/O board. b. Replace the processor board.
XCC firmware recoverable error	Blink	N/A	Off	N/A	N/A	Information only. No action is required.
XCC firmware is recovered from error	Blink	N/A	Off	N/A	N/A	Information only. No action is required.
UEFI firmware authentication failure	N/A	Blink	Off	N/A	N/A	Information only. No action is required.

Table 14. LEDs description (continued)

Scenario	AP0 LED	AP1 LED	Fatal Error LED	FPGA heart-beat LED	XCC heart-beat LED	Actions
UEFI firmware is recovered from authentication failure	N/A	On	Off	N/A	N/A	Information only. No action is required.
System is OK (FPGA heartbeat LED is On)	On	On	Off	On	Blink (1 Hz)	Information only. No action is required.

XCC system management port (10/100/1000 Mbps RJ-45) LEDs

This topic provides information on LEDs of XCC system management port (10/100/1000 Mbps RJ-45) and Ethernet port.

The following table describes the problems that are indicated by LEDs on XCC system management port (10/100/1000 Mbps RJ-45) and Ethernet port.

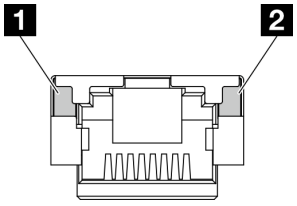


Figure 19. XCC system management port and Ethernet port LEDs

LED	Description
1 XCC system management port (10/100/1000 Mbps RJ-45) link LED	Use this green LED to distinguish the network connectivity status: • Off: The network link is disconnected. • Green: The network link is established.
2 XCC system management port (10/100/1000 Mbps RJ-45) activity LED	Use this green LED to distinguish the network activity status: • Off: The server is disconnected from a LAN. • Green: The network is connected and active.

Chapter 3. Parts list

Identify each of the components that is available for your server with the parts list.

For more information about ordering parts:

1. Go to **http://datacentersupport.lenovo.com** and navigate to the support page for your server.
2. Click **Parts**.
3. Enter the serial number to view a listing of parts for your server.

It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.

Note: Depending on the model, your server might look slightly different from the illustration.

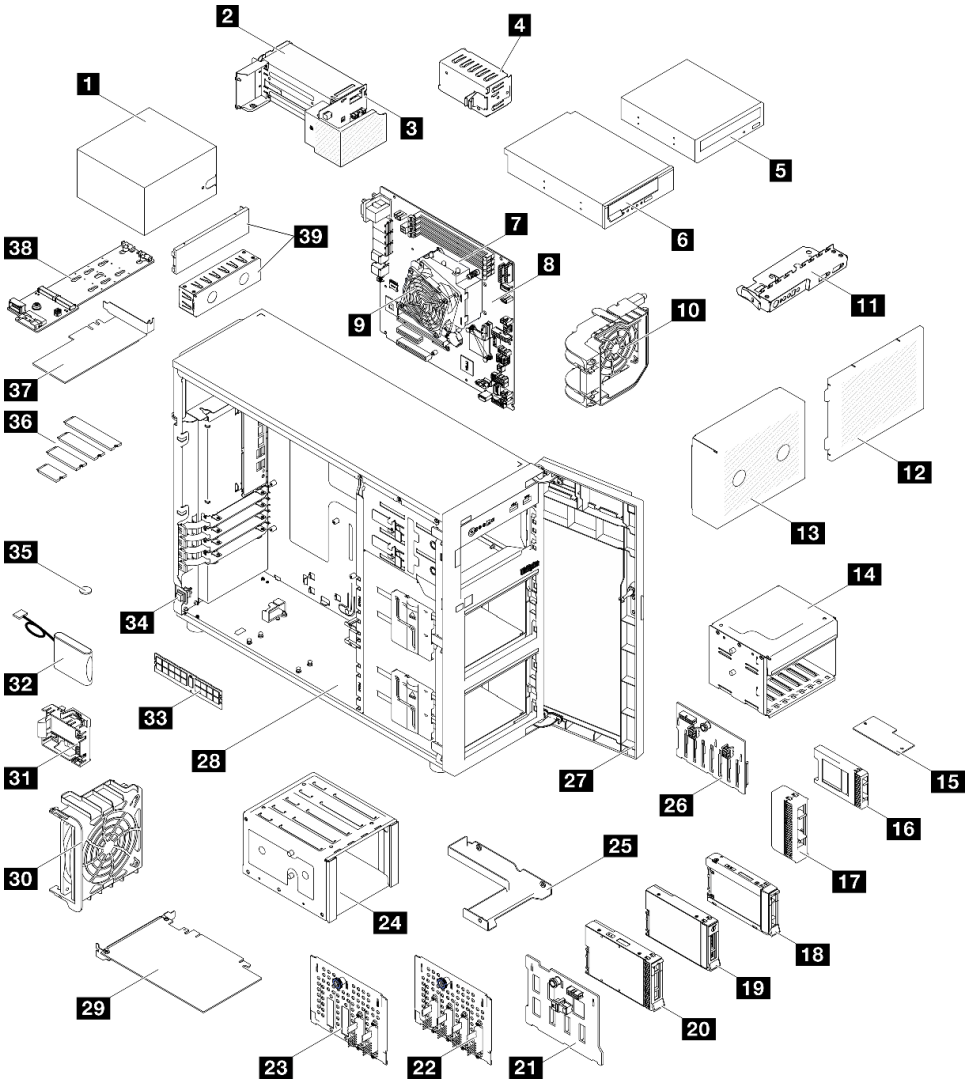


Figure 20. Server components

The parts listed in the following table are identified as one of the following:

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- **T1:** Tier 1 customer replaceable unit (CRU). Replacement of Tier 1 CRUs is your responsibility. If Lenovo installs a Tier 1 CRU at your request with no service agreement, you will be charged for the installation.
- **T2:** Tier 2 customer replaceable unit (CRU). You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **F:** Field replaceable unit (FRU). FRUs must be installed only by trained service technicians.
- **C:** Consumable and Structural parts. Purchase and replacement of consumable and structural parts (components, such as a filler or bezel) is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.

Table 15. Parts list

Index	Description	Type
For more information about ordering parts: 1. Go to **http://datacentersupport.lenovo.com** and navigate to the support page for your server. 2. Click **Parts**. 3. Enter the serial number to view a listing of parts for your server.		
1	Fixed power supply unit	T2
2	CRPS hot-swap power supply unit	T2
3	Power distribution board for hot-swap power supplies	T2
4	CRPS hot-swap power supply filler	C
5	5.25-inch optical disk drive	T1
6	5.25-inch LTO/RDX tape drive	T1
7	Processor	F
8	System board	F
9	Heat sink and fan	F
10	Front system fan	T1
11	Front I/O module	T2
12	Drive cage cover	T1
13	Drive cage filler	T1
14	2.5-inch drive cage	T1
15	Firmware and RoT security module	F
16	2.5-inch drive filler	C
17	3.5-inch drive filler	C
18	2.5-inch hot-swap drive	T1
19	3.5-inch simple-swap drive	T1
20	3.5-inch hot-swap drive	T1
21	3.5-inch hot-swap drive backplane	T1
22	3.5-inch simple-swap drive backplate	T1
23	3.5-inch simple-swap drive backplate with ODD	T1
24	3.5-inch drive cage	T1

Table 15. Parts list (continued)

Index	Description	Type
25	2.5-inch to 3.5-inch drive adapter	T1
26	2.5-inch hot-swap drive backplane	T1
27	Front door	T1
28	Chassis	T1
29	PCIe adapter	T1
30	Rear system fan	T1
31	RAID flash power module holder	T2
32	RAID flash power module	T1
33	Memory module	T1
34	Intrusion switch	T1
35	CMOS battery (CR2032)	C
36	M.2 drive	T1
37	PCIe adapter for M.2 boot adapter	T1
38	M.2 boot adapter	T1
39	5.25-inch Optical drive filler cover and optical drive filler	T1

Power cords

Several power cords are available, depending on the country and region where the server is installed.

To view the power cords that are available for the server:

1. Go to:

   http://dcsc.lenovo.com/#/

2. Click **Preconfigured Model** or **Configure to order**.
3. Enter the machine type and model for your server to display the configurator page.
4. Click **Power → Power Cables** to see all line cords.

Notes:

- For your safety, a power cord with a grounded attachment plug is provided to use with this product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.
- Power cords for this product that are used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).
- For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.
- For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

- For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.
- Power cords for a specific country or region are usually available only in that country or region.

Chapter 4. Unboxing and setup

Information in this section assists you on unboxing and setting up the server. When unboxing the server, check if the items in the package are correct, and learn where to find information of server serial number and Lenovo XClarity Controller access. Make sure to follow the instructions in “Server setup checklist” on page 45 when setting up the server.

Server package contents

When you receive your server, verify that the shipment contains everything that you expected to receive.

The server package includes the following items:

- Server
- Rail installation kit*. Installation guide is provided in the package.
- Cable management arm*. Installation guide is provided in the package.
- Material box, including items such as power cords*, front door key, accessory kit, and printed documents.

Notes:

- Some of the items listed are available on select models only.
- Items marked with asterisk(*) are optional.

If any item is missing or damaged, contact your place of purchase. Ensure that you retain your proof of purchase and packing material. They might be required to receive warranty service.

Identify the server and access the Lenovo XClarity Controller

This section contains instruction on how to identify your server and where to find the Lenovo XClarity Controller access information.

Identifying your server

When you contact Lenovo for help, the machine type, model, and serial number information help support technicians to identify your server and provide faster service.

The illustration below shows the location of the ID label which contains the model number, machine type, and serial number of the server. You can also add other system information labels to the front of the server in the customer label spaces.

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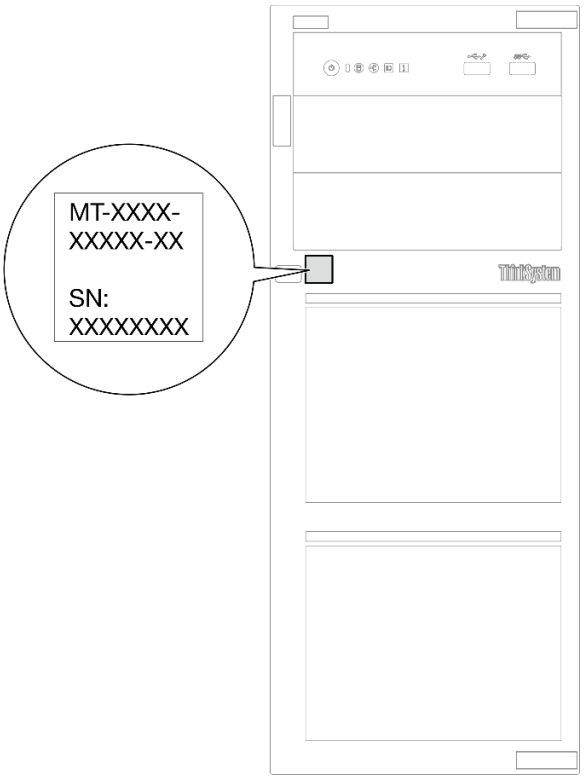


Figure 21. Location of the ID label

Lenovo XClarity Controller network access label

In addition, the Lenovo XClarity Controller network access label is attached on the front of the server. After you get the server, peel the XClarity Controller network access label away and store it in a safe place for future use.

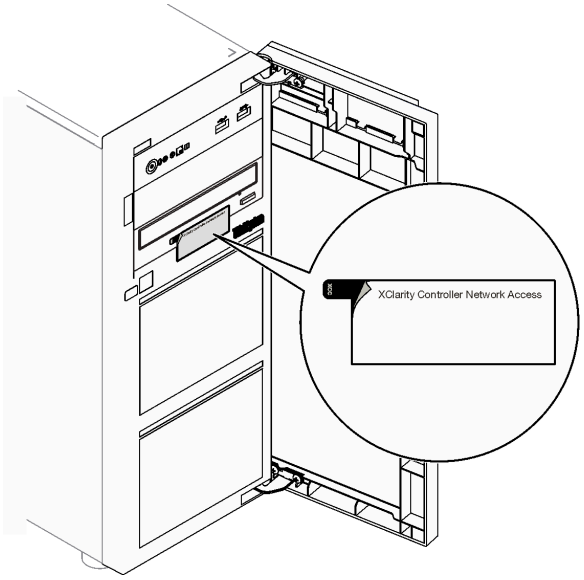


Figure 22. Location of XClarity Controller network access label

Service information QR code

On the inside surface of the server cover, there is a quick response (QR) code that provides mobile access to service information. You can scan the QR code with a mobile device using a QR code reader application and get quick access to the Service Information web page. The Service Information web page provides additional information for parts installation and replacement videos, and error codes for solution support.

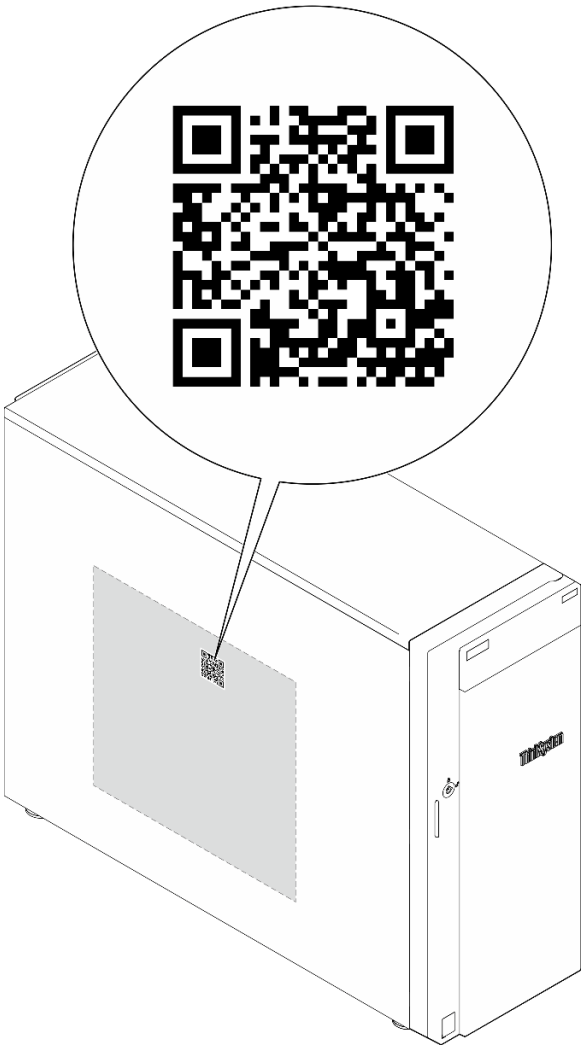


Figure 23. Service information QR code

Server setup checklist

Use the server setup checklist to ensure that you have performed all tasks that are required to set up your server.

The server setup procedure varies depending on the configuration of the server when it was delivered. In some cases, the server is fully configured and you just need to connect the server to the network and an AC power source, and then you can power on the server. In other cases, the server needs to have hardware options installed, requires hardware and firmware configuration, and requires an operating system to be installed.

The following steps describe the general procedure for setting up a server.

Setup the server hardware

Complete the following procedures to setup the server hardware.

1. Unpack the server package. See “Server package contents” on page 43.
2. Install any required hardware or server options. See the related topics in “Hardware replacement procedures” in *User Guide* or *Hardware Maintenance Guide*.
3. If necessary, install the rail and CMA to a standard rack cabinet. Follow the instruction in *Rail Installation Guide* and *CMA Installation Guide* that comes with the rail installation kit.
4. If necessary, install the server into a standard rack cabinet. See “Install the server to rack” in *User Guide* or *Hardware Maintenance Guide*.
5. Connect all external cables to the server. See Chapter 2 “Server components” on page 15 for connectors locations.

   Typically, you will need to connect the following cables:

   - Connect server to the power source
   - Connect server to the data network
   - Connect the server to the storage device
   - Connect the server to the management network
6. Power on the server.

   Power button location and power LED are specified in:

   - Chapter 2 “Server components” on page 15
   - “Troubleshooting by system LEDs and diagnostics display” on page 30

   The server can be turned on (power LED on) in any of the following ways:

   - You can press the power button.
   - The server can restart automatically after a power interruption.
   - The server can respond to remote power-on requests sent to the Lenovo XClarity Controller.

   Note: You can access the management processor interface to configure the system without powering on the server. Whenever the server is connected to power, the management processor interface is available. For details about accessing the management server processor, see “Opening and Using the XClarity Controller Web Interface” section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.
7. Validate the server. Make sure that the power LED, Ethernet connector LED, and network LED are lit with green light, which means the server hardware was set up successfully.

   See “Troubleshooting by system LEDs and diagnostics display” on page 30 for more information on the LED indications.

Configure the system

Complete the following procedures to configure the system. For detailed instructions, refer to Chapter 5 “System configuration” on page 49.

1. Set the network connection for the Lenovo XClarity Controller to the management network.
2. Update the firmware for the server, if necessary.
3. Configure the firmware for the server.

   The following information is available for RAID configuration:

   - https://lenovopress.lenovo.com/lp0578-lenovo-raid-introduction

- https://lenovopress.lenovo.com/lp0579-lenovo-raid-management-tools-and-resources

4. Install the operating system.
5. Back up the server configuration.
6. Install the applications and programs for which the server is intended to be used.

Chapter 5. System configuration

Complete these procedures to configure your system.

Set the network connection for the Lenovo XClarity Controller

Before you can access the Lenovo XClarity Controller over your network, you need to specify how Lenovo XClarity Controller will connect to the network. Depending on how the network connection is implemented, you might need to specify a static IP address as well.

The following methods are available to set the network connection for the Lenovo XClarity Controller if you are not using DHCP:

- If a monitor is attached to the server, you can use Lenovo XClarity Provisioning Manager to set the network connection.

  Complete the following steps to connect the Lenovo XClarity Controller to the network using the Lenovo XClarity Provisioning Manager.

  1. Start the server.
  2. Press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.)
  3. Go to **LXPM → UEFI Setup → BMC Settings** to specify how the Lenovo XClarity Controller will connect to the network.
     - If you choose a static IP connection, make sure that you specify an IPv4 or IPv6 address that is available on the network.
     - If you choose a DHCP connection, make sure that the MAC address for the server has been configured in the DHCP server.
  4. Click **OK** to apply the setting and wait for two to three minutes.
  5. Use an IPv4 or IPv6 address to connect Lenovo XClarity Controller.

     Important: The Lenovo XClarity Controller is set initially with a user name of USERID and password of PASSW0RD (with a zero, not the letter O). This default user setting has Supervisor access. It is required to change this user name and password during your initial configuration for enhanced security.
- If no monitor is attached to the server, you can set the network connection through the Lenovo XClarity Controller interface. Connect an Ethernet cable from your laptop to XCC system management port (10/100/1000 Mbps RJ-45) on your server. For the location of the XCC system management port (10/100/1000 Mbps RJ-45), see Chapter 2 “Server components” on page 15.

  Note: Make sure that you modify the IP settings on the laptop so that it is on the same network as the server default settings.

  The default IPv4 address and the IPv6 Link Local Address (LLA) is provided on the Lenovo XClarity Controller Network Access label that is affixed to the Pull Out Information Tab. See “Identify the server and access the Lenovo XClarity Controller” on page 43.
- If you are using the Lenovo XClarity Administrator Mobile app from a mobile device, you can connect to the Lenovo XClarity Controller through the Lenovo XClarity Controller USB connector on the server. For the location of the Lenovo XClarity Controller USB connector, see Chapter 2 “Server components” on page 15.

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Note: The Lenovo XClarity Controller USB connector mode must be set to manage the Lenovo XClarity Controller (instead of normal USB mode). To switch from normal mode to Lenovo XClarity Controller management mode, hold the ID button on the server for at least 3 seconds until its LED flashes slowly (once every couple of seconds). See Chapter 2 “Server components” on page 15 for the location of the ID button.

To connect using the Lenovo XClarity Administrator Mobile app:

1. Connect the USB cable of your mobile device to the Lenovo XClarity Controller USB connector on the server.
2. On your mobile device, enable USB tethering.
3. On your mobile device, launch the Lenovo XClarity Administrator mobile app.
4. If automatic discovery is disabled, click **Discovery** on the USB Discovery page to connect to the Lenovo XClarity Controller.

For more information about using the Lenovo XClarity Administrator Mobile app, see:

https://pubs.lenovo.com/lxca/lxca_usemobileapp

Set USB port for Lenovo XClarity Controller connection

Before you can access the Lenovo XClarity Controller through the USB port, you need to configure the USB port for Lenovo XClarity Controller connection.

Server support

To see if your server supports accessing Lenovo XClarity Controller through the USB port, check one of the following:

- Refer to Chapter 2 “Server components” on page 15.
-  If there is a wrench icon on the USB port of your server, you can set the management USB port to connect to Lenovo XClarity Controller. It is also the only USB port that supports USB automation update of the system I/O board (or firmware and RoT security module).

Setting the USB port for Lenovo XClarity Controller connection

You can switch the USB port between normal and Lenovo XClarity Controller management operation by performing one of the following steps.

- Hold the ID button for at least 3 seconds until its LED flashes slowly (once every couple of seconds). See Chapter 2 “Server components” on page 15 for ID button location.
- From the Lenovo XClarity Controller management controller CLI, run the `usbfp` command. For information about using the Lenovo XClarity Controller CLI, see the “Command-line interface” section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.
- From the Lenovo XClarity Controller management controller web interface, click **BMC Configuration → Network → USB Management Port Assignment**. For information about Lenovo XClarity Controller web interface functions, see the “Description of XClarity Controller functions on web interface” section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

Checking USB port current setting

You can also check the current setting of the USB port using the Lenovo XClarity Controller management controller CLI (`usbfp` command) or the Lenovo XClarity Controller management controller web interface (**BMC Configuration → Network → USB Management Port Assignment**). See the “Command-line

interface” and “Description of XClarity Controller functions on web interface” sections in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

Update the firmware

Several options are available to update the firmware for the server.

You can use the tools listed here to update the most current firmware for your server and the devices that are installed in the server.

- Best practices related to updating firmware is available at the following site:
  - https://lenovopress.lenovo.com/lp0656-lenovo-thinksystem-firmware-and-driver-update-best-practices
- The latest firmware can be found at the following site:
  - https://datacentersupport.lenovo.com/tw/en/products/servers/thinksystem/st250v3/7dce/downloads/driver-list/
- You can subscribe to product notification to stay up to date on firmware updates:
  - https://datacentersupport.lenovo.com/solutions/ht509500

Update Bundles (Service Packs)

Lenovo typically releases firmware in bundles called Update Bundles (Service Packs). To ensure that all of the firmware updates are compatible, you should update all firmware at the same time. If you are updating firmware for both the Lenovo XClarity Controller and UEFI, update the firmware for Lenovo XClarity Controller first.

Update method terminology

- **In-band update**. The installation or update is performed using a tool or application within an operating system that is executing on the server’s core CPU.
- **Out-of-band update**. The installation or update is performed by the Lenovo XClarity Controller collecting the update and then directing the update to the target subsystem or device. Out-of-band updates have no dependency on an operating system executing on the core CPU. However, most out-of-band operations do require the server to be in the S0 (Working) power state.
- **On-Target update.** The installation or update is initiated from an installed operating system executing on the target server itself.
- **Off-Target update.** The installation or update is initiated from a computing device interacting directly with the server’s Lenovo XClarity Controller.
- **Update Bundles (Service Packs)**. Update Bundles (Service Packs) are bundled updates designed and tested to provide the interdependent level of functionality, performance, and compatibility. Update Bundles (Service Packs) are server machine-type specific and are built (with firmware and device driver updates) to support specific Windows Server, Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES) operating system distributions. Machine-type-specific firmware-only Update Bundles (Service Packs) are also available.

Firmware updating tools

See the following table to determine the best Lenovo tool to use for installing and setting up the firmware:

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Drive Firmware Updates	Graphical user interface	Command line interface	Supports Update Bundles (Service Packs)
Lenovo XClarity Provisioning Manager (LXPM)	In-band[2] On-Target	√			√		
Lenovo XClarity Controller (XCC)	In-band[4] Out-of-band Off-Target	√	Selected I/O devices	√[3]	√		√
Lenovo XClarity Essentials OneCLI (OneCLI)	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√[3]		√	√
Lenovo XClarity Essentials UpdateXpress (LXCE)	In-band Out-of-band On-Target Off-Target	√	All I/O devices		√		√
Lenovo XClarity Essentials Bootable Media Creator (BoMC)	In-band Out-of-band Off-Target	√	All I/O devices		√ (BoMC application)	√ (BoMC application)	√
Lenovo XClarity Administrator (LXCA)	In-band[1] Out-of-band[2] Off-Target	√	All I/O devices	√	√		√
Lenovo XClarity Integrator (LXCI) for VMware vCenter	Out-of-band Off-Target	√	Selected I/O devices		√		

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Drive Firmware Updates	Graphical user interface	Command line interface	Supports Update Bundles (Service Packs)
Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center	In-band Out-of-band On-Target Off-Target	√	All I/O devices		√		√

Notes:

1. For I/O firmware updates.
2. For BMC and UEFI firmware updates.
3. Drive firmware update is only supported by the tools and methods below:
   - XCC Bare Metal Update (BMU): In-band, and requires system reboot.
   - Lenovo XClarity Essentials OneCLI:
     - For OneCLI version earlier than 5.0.0:
       - For drives supported by ThinkSystem V2 and V3 products (legacy drives): In-band, and does not require system reboot.
       - For drives supported only by ThinkSystem V3 products (new drives): Staging to XCC and complete the update with XCC BMU (In-band, and requires system reboot.).
     - For OneCLI 5.0.0 and later versions: In-band, and does not require system reboot.
4. Bare Metal Update (BMU) only.

- **Lenovo XClarity Provisioning Manager**

  From Lenovo XClarity Provisioning Manager, you can update the Lenovo XClarity Controller firmware, the UEFI firmware, and the Lenovo XClarity Provisioning Manager software.

  Note: By default, the Lenovo XClarity Provisioning Manager Graphical User Interface is displayed when you start the server and press the key specified in the on-screen instructions. If you have changed that default to be the text-based system setup, you can bring up the Graphical User Interface from the text-based system setup interface.

  For additional information about using Lenovo XClarity Provisioning Manager to update firmware, see:

  “Firmware Update” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/

- **Lenovo XClarity Controller**

  If you need to install a specific update, you can use the Lenovo XClarity Controller interface for a specific server.

  Notes:

  – To perform an in-band update through Windows or Linux, the operating system driver must be installed and the Ethernet-over-USB (sometimes called LAN over USB) interface must be enabled.

  For additional information about configuring Ethernet over USB, see:

  “Configuring Ethernet over USB” section in the XCC documentation version compatible with your server at https://pubs.lenovo.com/lxcc-overview/

  - If you update firmware through the Lenovo XClarity Controller, make sure that you have downloaded and installed the latest device drivers for the operating system that is running on the server.

  For additional information about using Lenovo XClarity Controller to update firmware, see:

  "Updating Server Firmware" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/

- **Lenovo XClarity Essentials OneCLI**

  Lenovo XClarity Essentials OneCLI is a collection of command line applications that can be used to manage Lenovo servers. Its update application can be used to update firmware and device drivers for your servers. The update can be performed within the host operating system of the server (in-band) or remotely through the BMC of the server (out-of-band).

  For additional information about using Lenovo XClarity Essentials OneCLI to update firmware, see:

  https://pubs.lenovo.com/lxce-onecli/onecli_c_update

- **Lenovo XClarity Essentials UpdateXpress**

  Lenovo XClarity Essentials UpdateXpress provides most of OneCLI update functions through a graphical user interface (GUI). It can be used to acquire and deploy Update Bundles (Service Packs) update packages and individual updates. Update Bundles (Service Packs) contain firmware and device driver updates for Microsoft Windows and for Linux.

  You can obtain Lenovo XClarity Essentials UpdateXpress from the following location:

  https://datacentersupport.lenovo.com/solutions/lnvo-xpress

- **Lenovo XClarity Essentials Bootable Media Creator**

  You can use Lenovo XClarity Essentials Bootable Media Creator to create bootable media that is suitable for firmware updates, VPD updates, inventory and FFDC collection, advanced system configuration, FoD Keys management, secure erase, RAID configuration, and diagnostics on supported servers.

  You can obtain Lenovo XClarity Essentials BoMC from the following location:

  https://datacentersupport.lenovo.com/solutions/lnvo-bomc

- **Lenovo XClarity Administrator**

  If you are managing multiple servers using the Lenovo XClarity Administrator, you can update firmware for all managed servers through that interface. Firmware management is simplified by assigning firmware-compliance policies to managed endpoints. When you create and assign a compliance policy to managed endpoints, Lenovo XClarity Administrator monitors changes to the inventory for those endpoints and flags any endpoints that are out of compliance.

  For additional information about using Lenovo XClarity Administrator to update firmware, see:

  https://pubs.lenovo.com/lxca/update_fw

- **Lenovo XClarity Integrator offerings**

  Lenovo XClarity Integrator offerings can integrate management features of Lenovo XClarity Administrator and your server with software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center.

  For additional information about using Lenovo XClarity Integrator to update firmware, see:

  https://pubs.lenovo.com/lxci-overview/

Configure the firmware

Several options are available to install and set up the firmware for the server.

Note: UEFI **Legacy Mode** is not supported by ThinkSystem V4 products.

- **Lenovo XClarity Provisioning Manager (LXPM)**

  From Lenovo XClarity Provisioning Manager, you can configure the UEFI settings for your server.

  Notes: The Lenovo XClarity Provisioning Manager provides a Graphical User Interface to configure a server. The text-based interface to system configuration (the Setup Utility) is also available. From Lenovo XClarity Provisioning Manager, you can choose to restart the server and access the text-based interface. In addition, you can choose to make the text-based interface the default interface that is displayed when you start LXPM. To do this, go to **Lenovo XClarity Provisioning Manager → UEFI Setup → System Settings → <F1>Start Control → Text Setup**. To start the server with Graphic User Interface, select **Auto** or **Tool Suite**.

  See the following documentations for more information:

  - Search for the LXPM documentation version compatible with your server at https://pubs.lenovo.com/lxpm-overview/
  - *UEFI User Guide* at https://pubs.lenovo.com/uefi-overview/

- **Lenovo XClarity Essentials OneCLI**

  You can use the config application and commands to view the current system configuration settings and make changes to Lenovo XClarity Controller and UEFI. The saved configuration information can be used to replicate or restore other systems.

  For information about configuring the server using Lenovo XClarity Essentials OneCLI, see:

  https://pubs.lenovo.com/lxce-onecli/onecli_c_settings_info_commands

- **Lenovo XClarity Administrator**

  You can quickly provision and pre-provision all of your servers using a consistent configuration. Configuration settings (such as local storage, I/O adapters, boot settings, firmware, ports, and Lenovo XClarity Controller and UEFI settings) are saved as a server pattern that can be applied to one or more managed servers. When the server patterns are updated, the changes are automatically deployed to the applied servers.

  Specific details about configuring the server using Lenovo XClarity Administrator are available at:

  https://pubs.lenovo.com/lxca/server_configuring

- **Lenovo XClarity Controller**

  You can configure the management processor for the server through the Lenovo XClarity Controller Web interface, the command-line interface, or Redfish API.

  For information about configuring the server using Lenovo XClarity Controller, see:

  “Configuring the Server” section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/

Memory module configuration

Memory performance depends on several variables, such as memory mode, memory speed, memory ranks, memory population and processor.

Information about optimizing memory performance and configuring memory is available at the Lenovo Press website:

https://lenovopress.lenovo.com/servers/options/memory

In addition, you can take advantage of a memory configurator, which is available at the following site:

https://dcsc.lenovo.com/#/memory_configuration

RAID configuration

Using a Redundant Array of Independent Disks (RAID) to store data remains one of the most common and cost-efficient methods to increase server's storage performance, availability, and capacity.

RAID increases performance by allowing multiple drives to process I/O requests simultaneously. RAID can also prevent data loss in case of a drive failure by reconstructing (or rebuilding) the missing data from the failed drive using the data from the remaining drives.

RAID array (also known as RAID drive group) is a group of multiple physical drives that uses a certain common method to distribute data across the drives. A virtual drive (also known as virtual disk or logical drive) is a partition in the drive group that is made up of contiguous data segments on the drives. Virtual drive is presented up to the host operating system as a physical disk that can be partitioned to create OS logical drives or volumes.

An introduction to RAID is available at the following Lenovo Press website:

https://lenovopress.lenovo.com/lp0578-lenovo-raid-introduction

Detailed information about RAID management tools and resources is available at the following Lenovo Press website:

https://lenovopress.lenovo.com/lp0579-lenovo-raid-management-tools-and-resources

Intel VROC

Enabling Intel VROC

Before setting up RAID for NVMe drives, follow the below steps to enable VROC:

1. Restart the system. Before the operating system starts up, press the key specified in the on-screen instructions to enter the Setup Utility. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.)
2. Go to **System settings → Devices and I/O Ports → Onboard SATA Mode → RAID** and enable the option.
3. Save the changes and reboot the system.

Intel VROC configurations

Intel offers various VROC configurations with different RAID level and SSD support. See the following for more details.

Notes:
- Supported RAID levels varies by model. For the RAID level supported by ST250 V3, see Technical specifications.

Intel VROC configurations for SATA SSDs	Requirements
Intel VROC SATA RAID	• Supports RAID levels 0, 1, 5, and 10.

Deploy the operating system

Several options are available to deploy an operating system on the server.

Available operating systems

- Microsoft Windows Server
- VMware ESXi
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server

Complete list of available operating systems: https://lenovopress.lenovo.com/osig.

Tool-based deployment

- **Multi-server**

  Available tools:

  – Lenovo XClarity Administrator

    https://pubs.lenovo.com/lxca/compute_node_image_deployment

- **Single-server**

  Available tools:

  – Lenovo XClarity Provisioning Manager

    “OS Installation” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/

Manual deployment

If you cannot access the above tools, follow the instructions below, download the corresponding *OS Installation Guide*, and deploy the operating system manually by referring to the guide.

1. Go to https://datacentersupport.lenovo.com/solutions/server-os.
2. Select an operating system from the navigation pane and click **Resources**.
3. Locate the “OS Install Guides” area and click the installation instructions. Then, follow the instructions to complete the operation system deployment task.

Back up the server configuration

After setting up the server or making changes to the configuration, it is a good practice to make a complete backup of the server configuration.

Make sure that you create backups for the following server components:

- **Management processor**

  You can back up the management processor configuration through the Lenovo XClarity Controller interface. For details about backing up the management processor configuration, see:

  “Backing up the BMC configuration” section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

  Alternatively, you can use the `backup` command from Lenovo XClarity Essentials OneCLI to create a backup of all configuration settings. For more information about the `backup` command, see:

https://pubs.lenovo.com/lxce-onecli/config_backup

- **Operating system**

  Use your backup methods to back up the operating system and user data for the server.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you.

On the World Wide Web, up-to-date information about Lenovo systems, optional devices, services, and support are available at:

http://datacentersupport.lenovo.com

Note: IBM is Lenovo's preferred service provider for ThinkSystem.

Before you call

Before you call, there are several steps that you can take to try and solve the problem yourself. If you decide that you do need to call for assistance, gather the information that will be needed by the service technician to more quickly resolve your problem.

Attempt to resolve the problem yourself

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The online help also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

You can find the product documentation for your ThinkSystem products at the following location:

https://pubs.lenovo.com/

You can take these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated software, firmware, and operating-system device drivers for your Lenovo product. (See the following links) The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
  - Drivers and software downloads
    - https://datacentersupport.lenovo.com/tw/en/products/servers/thinksystem/st250v3/7dce/downloads/driver-list/
  - Operating system support center
    - https://datacentersupport.lenovo.com/solutions/server-os
  - Operating system installing instructions
    - https://pubs.lenovo.com/thinksystem#os-installation
- If you have installed new hardware or software in your environment, check https://serverproven.lenovo.com to make sure that the hardware and software are supported by your product.
- Refer to “Problem Determination” in *User Guide* or *Hardware Maintenance Guide* for instructions on isolating and solving issues.

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- Go to http://datacentersupport.lenovo.com and check for information to help you solve the problem.

  To find the Tech Tips available for your server:

  1. Go to http://datacentersupport.lenovo.com and navigate to the support page for your server.
  2. Click on **How To's** from the navigation pane.
  3. Click **Article Type → Solution** from the drop-down menu.

     Follow the on-screen instructions to choose the category for the problem that you are having.
- Check Lenovo Data Center Forum at https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

Gathering information needed to call Support

If you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare the appropriate information before you call. You can also go to http://datacentersupport.lenovo.com/warrantylookup for more information about your product warranty.

Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.

- Hardware and Software Maintenance agreement contract numbers, if applicable
- Machine type number (Lenovo 4-digit machine identifier). Machine type number can be found on the ID label, see "Identify the server and access the Lenovo XClarity Controller" on page 43.
- Model number
- Serial number
- Current system UEFI and firmware levels
- Other pertinent information such as error messages and logs

As an alternative to calling Lenovo Support, you can go to https://support.lenovo.com/servicerequest to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to the service technicians. The Lenovo service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

Collecting service data

To clearly identify the root cause of a server issue or at the request of Lenovo Support, you might need collect service data that can be used for further analysis. Service data includes information such as event logs and hardware inventory.

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

  Use the Collect Service Data function of Lenovo XClarity Provisioning Manager to collect system service data. You can collect existing system log data or run a new diagnostic to collect new data.
- **Lenovo XClarity Controller**

  You can use the Lenovo XClarity Controller web interface or the CLI to collect service data for the server. The file can be saved and sent to Lenovo Support.

  – For more information about using the web interface to collect service data, see the "Backing up the BMC configuration" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

  - For more information about using the CLI to collect service data, see the “XCC `ffdc` command” section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

- **Lenovo XClarity Administrator**

  Lenovo XClarity Administrator can be set up to collect and send diagnostic files automatically to Lenovo Support when certain serviceable events occur in Lenovo XClarity Administrator and the managed endpoints. You can choose to send diagnostic files to Lenovo Support using Call Home or to another service provider using SFTP. You can also manually collect diagnostic files, open a problem record, and send diagnostic files to the Lenovo Support.

  You can find more information about setting up automatic problem notification within the Lenovo XClarity Administrator at https://pubs.lenovo.com/lxca/admin_setupcallhome.

- **Lenovo XClarity Essentials OneCLI**

  Lenovo XClarity Essentials OneCLI has inventory application to collect service data. It can run both in-band and out-of-band. When running in-band within the host operating system on the server, OneCLI can collect information about the operating system, such as the operating system event log, in addition to the hardware service data.

  To obtain service data, you can run the `getinfor` command. For more information about running the `getinfor`, see https://pubs.lenovo.com/lxce-onecli/onecli_r_getinfor_command.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to https://datacentersupport.lenovo.com/serviceprovider and use filter searching for different countries. For Lenovo support telephone numbers, see https://datacentersupport.lenovo.com/supportphonelist for your region support details.

Appendix B. Documents and supports

This section provides handy documents, driver and firmware downloads, and support resources.

Documents download

This section provides introduction and download link for handy documents.

Documents

Download the following product documentations at:

https://pubs.lenovo.com/st250-v3/st250_v3_user_guide.pdf

- ***Rail Installation Guides***
  - Rail installation in a rack
- ***User Guide***
  - Complete overview, system configuration, hardware components replacing, and troubleshooting.

    Selected chapters from *User Guide*:
    - ***System Configuration Guide*** **:** Server overview, components identification, system LEDs and diagnostics display, product unboxing, setting up and configuring the server.
    - ***Hardware Maintenance Guide*** **:** Installing hardware components, cable routing, and troubleshooting.
- ***Messages and Codes Reference***
  - XClarity Controller, LXPM, and uEFI events
- ***UEFI Manual***
  - UEFI setting introduction

Support websites

This section provides driver and firmware downloads and support resources.

Support and downloads

- Drivers and Software download website for ThinkSystem ST250 V3
  - https://datacentersupport.lenovo.com/tw/en/products/servers/thinksystem/st250v3/7dce/downloads/driver-list/
- Lenovo Data Center Forum
  - https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg
- Lenovo Data Center Support for ThinkSystem ST250 V3
  - https://datacentersupport.lenovo.com/products/servers/thinksystem/st250v3/7dce
- Lenovo License Information Documents
  - https://datacentersupport.lenovo.com/documents/lnvo-eula
- Lenovo Press website (Product Guides/Datasheets/White papers)
  - https://lenovopress.lenovo.com/

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- Lenovo Privacy Statement
  - https://www.lenovo.com/privacy
- Lenovo Product Security Advisories
  - https://datacentersupport.lenovo.com/product_security/home
- Lenovo Product Warranty Plans
  - http://datacentersupport.lenovo.com/warrantylookup
- Lenovo Server Operating Systems Support Center website
  - https://datacentersupport.lenovo.com/solutions/server-os
- Lenovo ServerProven website (Options compatibility lookup)
  - https://serverproven.lenovo.com
- Operating System Installation Instructions
  - https://pubs.lenovo.com/thinksystem#os-installation
- Submit an eTicket (service request)
  - https://support.lenovo.com/servicerequest
- Subscribe to Lenovo Data Center Group product notifications (Stay up to date on firmware updates)
  - https://datacentersupport.lenovo.com/solutions/ht509500

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Important notes

Processor speed indicates the internal clock speed of the processor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1 024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard-disk-drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as `total bytes written` (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. Lenovo is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

Lenovo makes no representations or warranties with respect to non-Lenovo products. Support (if any) for the non-Lenovo products is provided by the third party, not Lenovo.

Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Additional electronic emissions notices are available at:

https://pubs.lenovo.com/important_notices/

Taiwan Region BSMI RoHS declaration

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (PB)	汞Mercury (Hg)	鎘Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr^{+6})	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機架	○	○	○	○	○	○
外部蓋板	○	○	○	○	○	○
機械組合件	–	○	○	○	○	○
空氣傳動設備	–	○	○	○	○	○
冷卻組合件	–	○	○	○	○	○
內存模組	–	○	○	○	○	○
處理器模組	–	○	○	○	○	○
電纜組合件	–	○	○	○	○	○
電源供應器	–	○	○	○	○	○
儲備設備	–	○	○	○	○	○
印刷電路板	–	○	○	○	○	○

備考1. 〝超出0.1 wt %〞及〝超出0.01 wt %〞係指限用物質之百分比含量超出百分比含量基準值。

Note1 : “exceeding 0.1wt%” and “exceeding 0.01 wt%” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.

備考2. 〝○〞係指該項限用物質之百分比含量未超出百分比含量基準值。

Note2 : “○”indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.

備考3. 〝-〞係指該項限用物質為排除項目。

Note3 : The “-“ indicates that the restricted substance corresponds to the exemption.

Taiwan Region import and export contact information

Contacts are available for Taiwan Region import and export information.

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進口商地址: 台北市南港區三重路 66 號 8 樓
進口商電話: 0800-000-702